Comparison of Point Line Intercept and SamplePoint Data Collection Methods

Clay W. Wood, Cindy L. Adams, and Brenda K. Schladweiler

BKS Environmental Associates, Inc.

Introduction

- Vegetation data collection is a crucial component of monitoring reclamation success.
- Many different sampling methods are available including line transects, quadrats, and aerial imagery.
- SamplePoint was developed by the United States Department of Agriculture - Agricultural Research Service Rangeland Resources Research Unit, United States Department of Interior - Bureau of Land Management Wyoming State Office, and Berryman Consulting in 2004.

Historical Basis of Point Line Intercept

- Point line intercept has been widely used as a data collection method since 1923.
- Wyoming Department of Environmental Quality – Land Quality Division began using point line intercept as a preferred method on the early 1980's.
- Bureau of Land Management has incorporated the point line intercept method into the Assessment, Inventory, and Monitoring Strategy For Integrated Renewable Resource Management implemented in 2011.

Purpose and Methods Overview

- The purpose of this study is to determine if there is a statistically significant difference between total vegetation cover, total ground cover, and time requirements for Point Line Intercept and SamplePoint sampling methods.
- Vegetation data was collected using point line intercept and SamplePoint on an active coal mine in Northeast Wyoming.
- Total vegetation cover includes all vegetation growth from the current year.
- Total ground cover includes vegetation, litter, rock, and cryptograms.
- Both sampling methods were conducted along the same transect.
- Time required for each method was recorded for both field collection as well as data/image processing.

Point Line Intercept Transect Methods

- 50-meter transect represents a single sample location.
- Photos are taken of each transect location.
- Percent cover measurements are taken at 1-meter intervals along the transect using a laser pointer.
- Each point-intercept (50 points) represents 2% toward cover measurements.
- Percent cover measurements record aerial and basal point-intercepts by live foliar vegetation species, litter, rock, lichen, or bare ground.
  - Litter does not include standing dead vegetation from current year's growth.
- Belt transect (2m) used to gather additional species composition information.

SamplePoint Transect Methods

- 50-meter transect represents a single sample location.
- A 0.5m^2 frame was utilized to take photos.
  - Top and bottom of frame were aligned with the edge of the photo for consistency.
- SamplePoint software was used to generate 25 random sample locations within each photo.
- Percent cover measurements record aerial cover by lifeform, litter, rock, lichen, or bare ground.
  - Litter does not include standing dead vegetation from current year's growth.
- Belt transect (2m) was used to generate a species list.

Example of Sampling Location

Example of Point Line Intercept transect

Example of SamplePoint transect

- Red boxes represent individual sample locations along a transect.

Point Line Intercept and SamplePoint Study Parameters

Point Line Intercept

- 30 transects (15 reclaimed and 15 native)
- 50 points per transect (1-m interval)
- 1500 total points for project
- Data collected by lifeform, species, litter, soil, rock, and lichen

SamplePoint

- 30 transects (15 reclaimed and 15 native)
- 10 photos per transect (5-m interval)
  - Total of 300 photos taken
- 25 random points per photo in SamplePoint program
- 7500 total points for project
- Data collected by lifeform, litter, soil, rock, and lichen

Statistical Analyses Conducted

- Normality Test
  - Assumed equal variances for treatment groups
- Analysis of Variance (ANOVA)
  - Total Vegetation Cover (by sampling method and sampled area)
  - Total Ground Cover (by sampling method and sampled area)
  - Time Requirements (by sampling method)

Statistical Analysis Parameters

Parameter	N Value
Cover Data	
Total Vegetation Cover	60 (15 for each treatment)
Total Ground Cover	60 (15 for each treatment)
Time Requirements	
Field Data Collection	59*
Data Processing	59*

*One time entry was not recorded for the point line intercept method

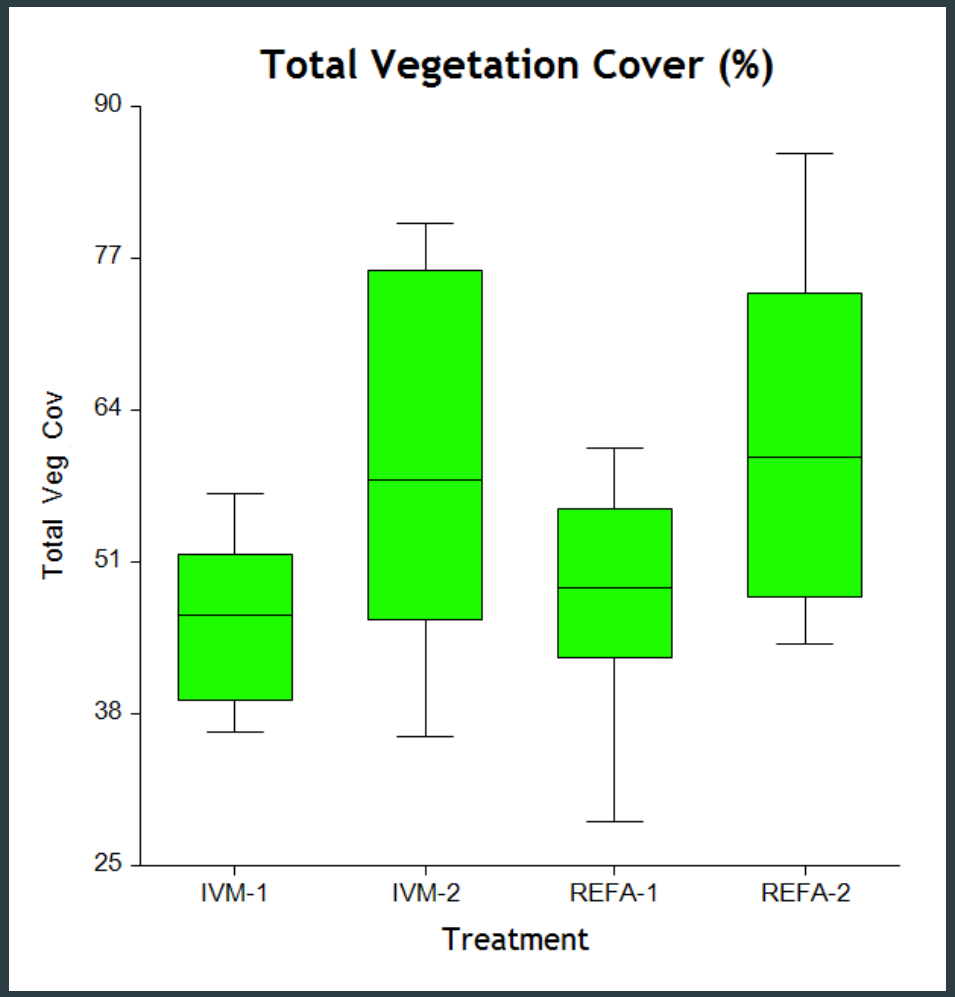
- Treatments are defined by sampling method and sampled area
  - IVM-1: SamplePoint on reclamation
  - IVM-2: Point Line Intercept on reclamation
  - REFA-1: SamplePoint on reference area
  - REFA-2: Point Line Intercept on reference area

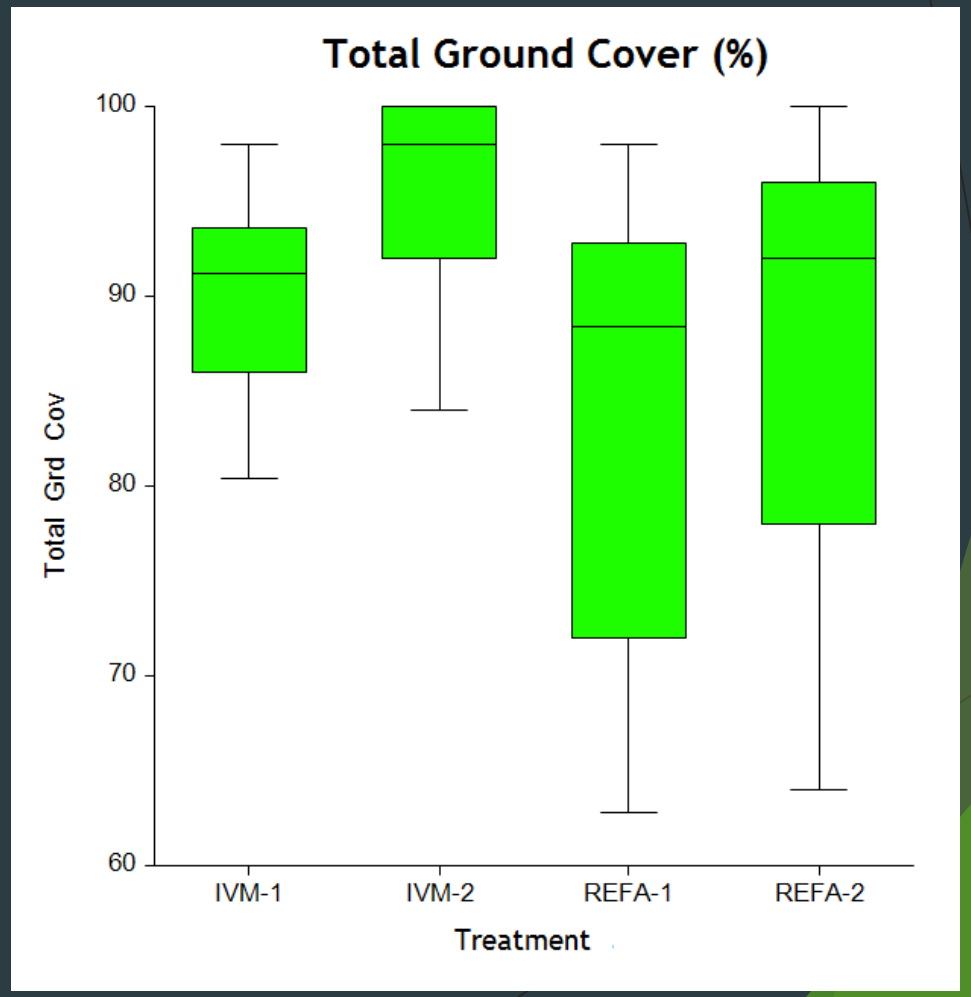
Total Vegetation and Total Ground Cover

Sample Method	Sampled Area	Treatment	Mean	Standard Error	F-Ratio
Total Vegetation Cover					
Point Line Intercept	Reclaimed	IVM-2	59.86	2.92	7.64
Point Line Intercept	Reference	REFA-2	61.73	2.92	
Sample Point	Reclaimed	IVM-1	46.05	2.92	
Sample Point	Reference	REFA-1	47.81	2.92	
Total Ground Cover					
Point Line Intercept	Reclaimed	IVM-2	96.40	2.31	5.37
Point Line Intercept	Reference	REFA-2	87.60	2.31	
Sample Point	Reclaimed	IVM-1	89.82	2.31	
Sample Point	Reference	REFA-1	83.63	2.31	

- F-Ratio of 2 or greater is considered a statistically significant difference for purposes of this comparison.

Total Vegetation and Total Ground Cover (continued)



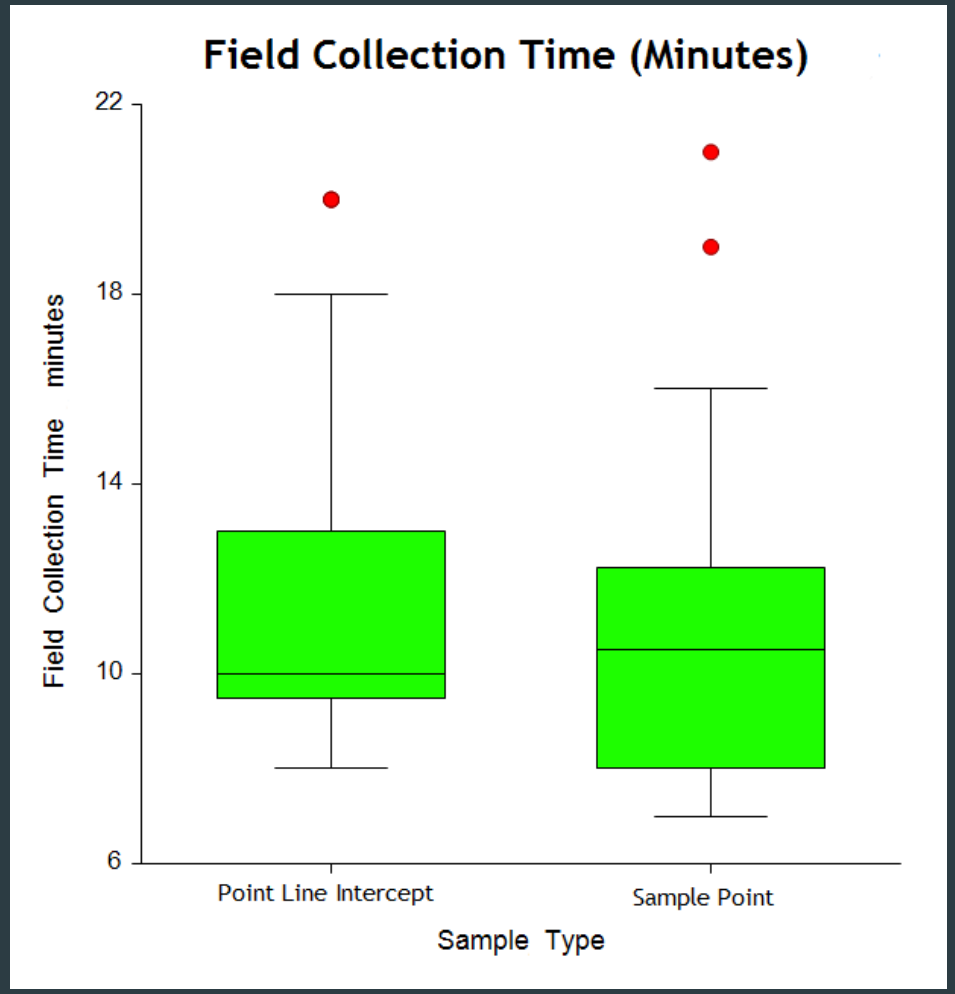


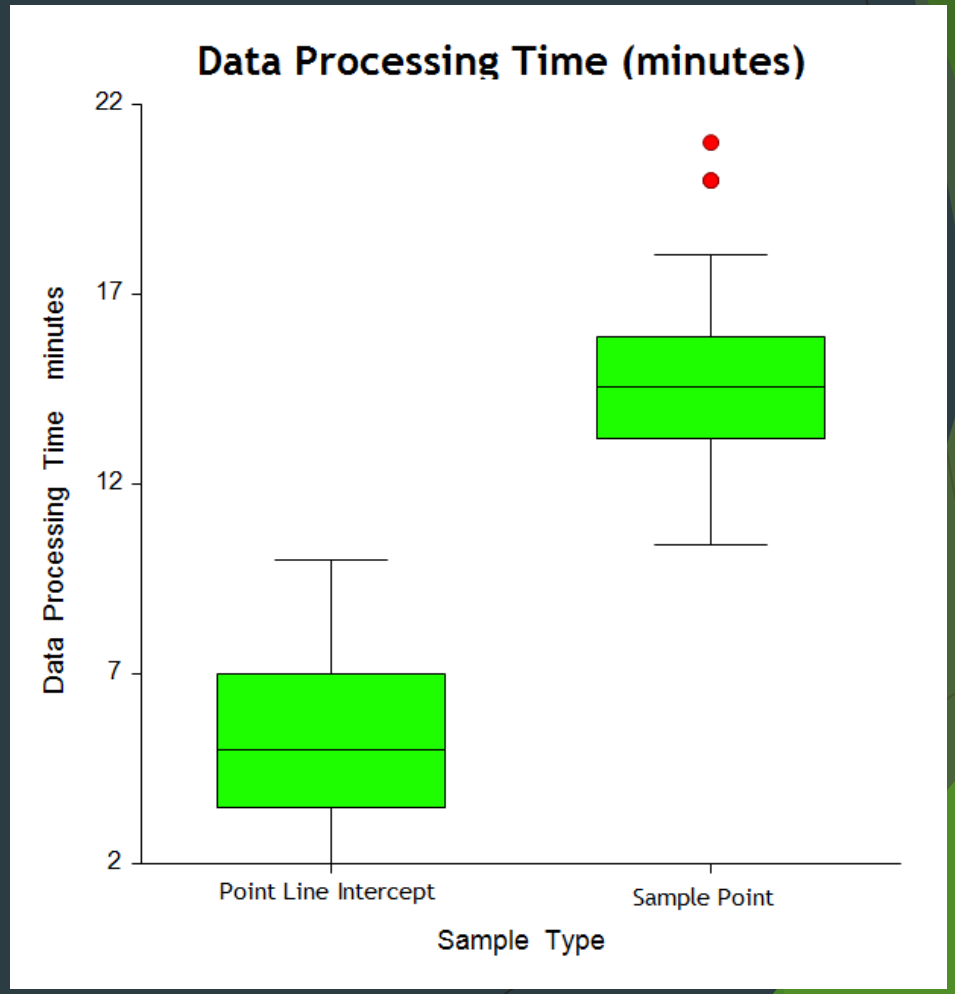
Time Requirements for Point Line Intercept and SamplePoint

Sample Method	Mean Time (minutes)	Standard Error	F-Ratio
Field Data Collection Time			
Point Line Intercept	11.69	0.66	0.56
SamplePoint	11.00	0.65	
Data Processing Time			
Point Line Intercept	5.31	0.44	237.77
SamplePoint	14.80	0.43	

- F-Ratio of 2 or greater is considered a statistically significant difference for purposes of this comparison.

Time Requirements for Point Line Intercept and SamplePoint (continued)





Statistical Conclusions

- Point Line Intercept sampling method resulted in greater Total Vegetation Cover and Total Ground Cover
- Time requirements for Field Data Collection were not significantly different between sampling methods
- Time requirements for Data Processing were significantly different with SamplePoint requiring more time
- Based on relatively large sample size F and T test results were robust
  - Data was normally distributed

Advantages and Disadvantages of Point Line Intercept

- Simple, straight-forward, adaptable, and cost effective
- Widely used by multiple agencies for many years
- Provides consistent and repeatable data
- Variety of measurement possibilities including:
  - Aerial cover, basal cover, and species specific data
- Identification of plant species in the field and collection of unknown plant species for identification is possible
- Time efficient data collection and data processing
- Slightly longer field data collection time
- Sampler may have bias when a hit is close to two different cover attributes, can be mitigated with training and being aware of this bias during data collection
- Summarization of data requires manual or electronic download
- Species occurring less frequently may not be sampled unless combined with another technique (e.g., belt transect)

Advantages and Disadvantages of SamplePoint

- Images can be collected rapidly and analyzed at a later date
- Simple, repeatable method
- Can compare photos from the same site over multiple years on established transects
- Data is summarized automatically
- Data analysis time is greater
- Basal cover data may not be achievable
- May not be able to ID individual plant species
- Risk losing data due to insufficient battery or damaged equipment
- ID of stratified vegetation layers not possible
- Time of day and shadows may impact analysis

Challenges of both Sampling Methods

- Time required to get to the site and set up a transect will still be necessary.
- Data errors and sampler bias are possible with both methods.
- Returning to the same transect or frame across multiple sampling times may not be exact.
- Sampling at slightly different times of year or in different states for phenology may provide inconsistent data among years.
- Capturing landscape wide data may not be achievable given time and budget.
- People in the field and office need to have a good taxonomic background.

Overall Conclusions

- Regulatory agencies should consider both reliable historical methods as well as innovative technologies.
- The use of both sampling methods provide useful data depending on the scale of the project and available budgets.
- Both methods present implementation challenges that need to be addressed during sampler training.

Acknowledgements

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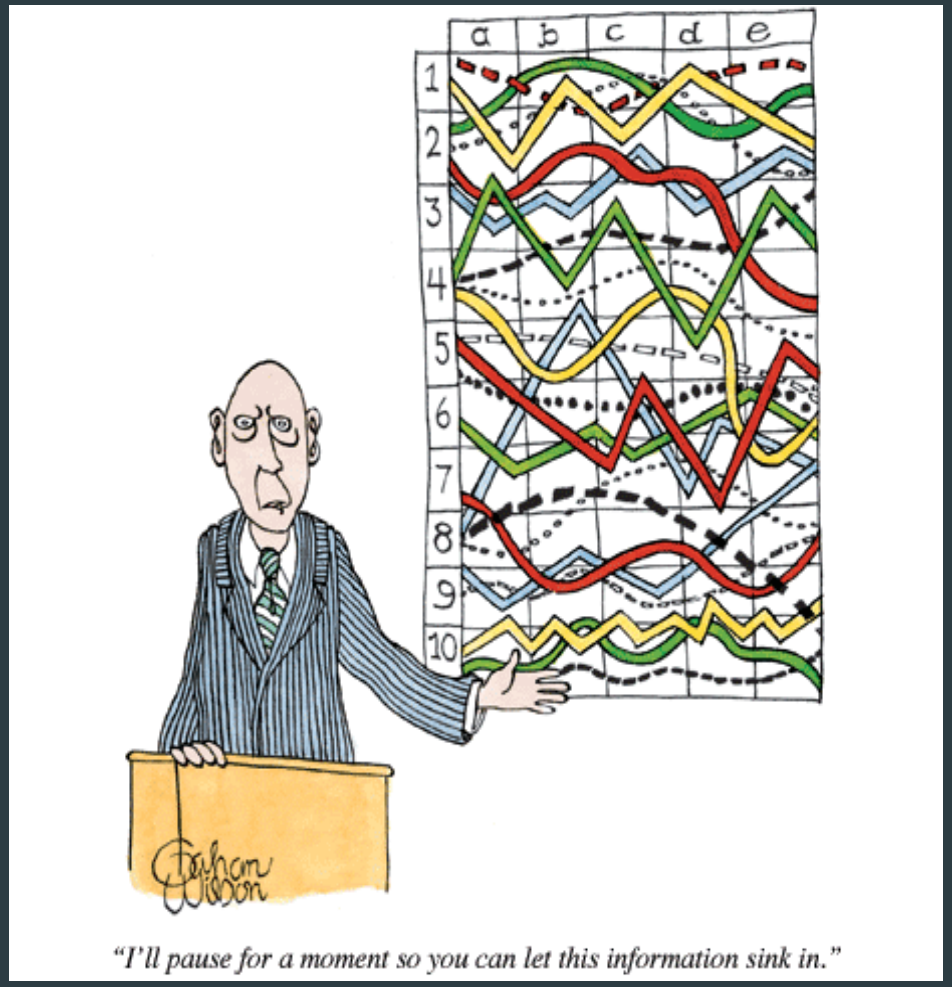
- BKS Environmental field crews

Questions?



"I'll pause for a moment so you can let this information sink in."

Contact Information:
Brenda K. Schladweiler
BKS Environmental Associates, Inc.
(307) 686-0800
bschladweiler@bksenvironmental.com

www.bksenvironmental.com