Project Monitoring
Protocols and Techniques

5th Annual ARKWIPP
Conference 2013

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The point(s)

• Save time, money and effort
• Communicate successes effectively
• Be a better manager (adaptive management)
Today you will

• Review field methods learned yesterday
• Learn how to enter data in Excel
• Learn how to manipulate data in Excel
• Learn how to make basic graphs
• Learn how to answer questions with data
• Learn about some of what is possible to do with data

Refer to your manuals

REVIEW FROM YESTERDAY
**Schedule**

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“Why do analysis?”

**INTRODUCTION & OVERVIEW**
Introductions

• Plant ecologist
• Ph.D. from UNM ’98
• 20 yrs experience working on restoration and monitoring plant communities
• Biology professor at DU since 2003
• >25 publications on invasive species/restoration/conservation

Revegetation Manual

Best Management Practices for Revegetation after Tamarisk Removal
In the Upper Colorado River Basin

Dr. John D’Huy | Dr. Ray Law | Michelle DePuygo-de-Luna | Sue DeMarino
New Book

41 authors write about:

- Biology & Distribution
- Ecology
- History
- Politics
- Philosophy/ethics
- Management

Tamarisk
BEST MANAGEMENT PRACTICES in COLORADO WATERSHEDS

Colorado State University
University of Denver
Colorado Department of Agriculture
Denver Botanical Gardens
US Environmental Protection Agency
Tamarisk Coalition

Tamarix
A CASE STUDY: HISTORICAL CHANGES IN THE AMERICAN WEST
Edited by David E. Miller and David E. Quigley
Next book: Monitoring Best Practices

- Has been developed from tamarisk projects in UCRB and Arkansas River Basin
- Objective: How do we get the most out of our monitoring efforts?
- Need your feedback

Introductions, cont.

Around the room:
- Name, organization
- Current project (?)
- Experience/comfort with:
  - MS Excel
  - Numbers generally
What is monitoring?

• Collecting information
• Can be qualitative (e.g. photos, notes) or quantitative (numerical, e.g. % cover, # trees/acre)
• Can be used to objectively answer questions, for example:
  1. Are weeds coming back into the sites where tamarisk was removed?
  2. Which type of tamarisk removal is best for promoting native species?

Why not just look at it? (i.e. qualitative only)

• Our eyes have bias built in
• Have no good way to communicate this (e.g. “tamarisk dominated” means what?)
• Hard to measure success
• Can be misleading
Example data 1: Introduced spp over time

Mean(Sum(% cover (calculated), I)) vs. Year & Season

Example data 2: removal method affect on natives

Cut Stump
Hydro-ax
Trackhoe

relative cover natives

No
Yes
Has tamarix been removed yet
Why monitor your site?

So that the outcome of your effort is

• Clear (was it a success or not?)
• Quantifiable (to what degree was it a success?)
• Contributing to future success (your own and others)

So why don’t we?

• Time intensive
• Expensive
• Don’t have skills

Now let’s do it!
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Is this a success?
Use of quantitative data

Converting field data sheets to usable data

- Determine dependent and independent variables plus reference columns
- Identify all species and/or classifications of interest
- Double-check data (will save time)
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Your turn: Worksheet, section II

1) Identify variables
2) Identify columns, based on variables
3) Identify what the rows will be (e.g. each species in each transect, or each functional group in each transect, or...)

### Sample entered data

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<tr>
<th>Reach</th>
<th>Site</th>
<th>Tam removed</th>
<th>Year</th>
<th>Date</th>
<th>Transect</th>
<th>Species</th>
<th>Nativity</th>
<th>Growth</th>
<th>Habit</th>
<th># of hits/ transect</th>
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### Your turn: Set up your spreadsheet & enter data

1. Prepare data sheet (tally data on data sheet)
2. Open file
3. Label columns
4. Begin entering data
5. Check format of data
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**What you can do in Excel**

**What it does easily**
- Organizes data
- Make summary tables using “pivot table” function
- Make graphs of raw or summary data

**More difficult to do**
- Create error bars around means
- Do statistical analysis (i.e. determine- are these meaningful patterns/differences?)
Your turn:

- Graphs with your data
- Graphs with sample data (multiple years and sites)
  - Choose a restoration goal to answer: what graph do you need?

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Determine overarching restoration goal

Prioritize and Select Site(s)

Create Site-specific restoration plan (tactics)

Implement plan

Conduct post-project monitoring

Engage adaptive management

Evaluate Non-ecological factors

Establish a realistic restoration objective

Evaluate Ecological factors

Was goal met?

• Reaching a certain benchmark (e.g. cover of natives, mortality of tamarisk)
  – Can be done with simple summaries

• Answering a question (e.g. what removal method is best for native species?)
  – Usually requires statistics
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– TC (Julie Knudson), TNC (Matt Moorehead) & BLM (multiple)

THANK YOU

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