Collaborative Forest Monitoring

Cory Davis
(cory.davis@umontana.edu)
(406) 257-3166
University of Montana
College of Forestry and Conservation
Monitoring Coordinator
Southwestern Crown of
the Continent Collaborative

Topics

- What is monitoring
- Types of monitoring
- What monitoring does Forest Service do
- Why do we monitor
  - Adaptive Management
- What to monitor
- Who should do monitoring
  - Citizen Science
- Funding
- Lessons Learned

What is monitoring?

Tracking changes through time, usually in response to some management action (pre- and post-treatment)

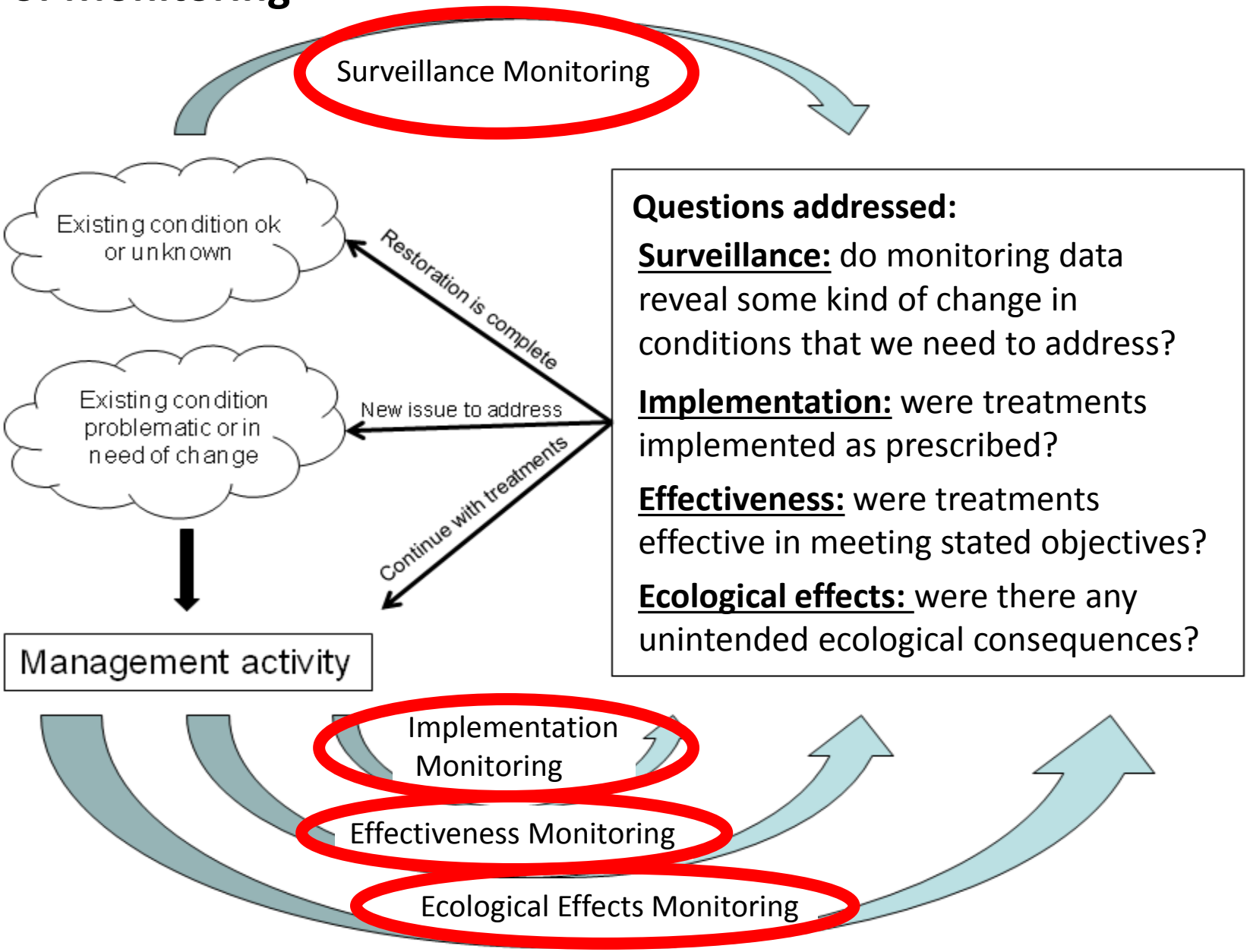
Forest Service:

The collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting a resource or management objective.

A monitoring activity may include an information needs assessment; planning and scheduling; data collection, classification, mapping, data entry, storage and maintenance; product development; evaluation; and reporting phases.

Research vs. Monitoring?

Types of Monitoring



Questions addressed:

Surveillance: do monitoring data reveal some kind of change in conditions that we need to address?

Implementation: were treatments implemented as prescribed?

Effectiveness: were treatments effective in meeting stated objectives?

Ecological effects: were there any unintended ecological consequences?

Hutto and Belote 2013. *Distinguishing four types of monitoring based on the questions they address.*

Types of Monitoring

Type of monitoring	Goal-oriented question	Design approach	Examples
Surveillance	Are ecological properties changing in some undesirable way through time, or do we perceive an association between a particular land-use activity and a negative indicator?	Re-sampling ecological response variables through time; establishing time series data; looking for correlations between land-use and the presence or absence of some indicator	Forest Inventory and Analysis (FIA) plots, Breeding Bird Survey (BBS) routes, Northern Region Landbird Monitoring Program (NRLMP) points
Implementation	Was management prescription implemented according to contract specifications?	Project-specific qualitative and quantitative data collection (not necessarily requiring statistical design)	Typical agency monitoring following treatment implementation
Effectiveness	Did management actions achieve the social, economic, or ecological goals and objectives outlined in the prescription?	BACI design of treatments (ANOVA); chronosequence study of past treatments (correlation or hierarchical statistical modeling)	Very rare; typically involves one or a few treatment sites over a brief time period; chronosequence studies are notably absent
Ecological effects	Did management actions result in ecological tradeoffs or unintended ecological consequences?	BACI design of treatments (ANOVA); chronosequence study of past treatments (correlation or hierarchical statistical modeling)	Very rare; usually relegated to the research arm of an agency or to universities; chronosequence studies are notably absent

Hutto and Belote 2013. *Distinguishing four types of monitoring based on the questions they address.*

Some design terms

Before-After-Control-Impact (BACI) design

Control point: similar to pre-treatment site; are responses due to treatment?

Reference point: site that treatment is attempting to achieve; are desired conditions being reached?

Challenge: Where to put reference points?

- What are the historic conditions?
- Are there good examples where historic disturbance regime has been retained? Wilderness?

Larson et al. 2012. Effects of restoration thinning on spatial heterogeneity in mixed-conifer forest. (Use of reference sites)

What monitoring does Forest Service do?

<u>District/Forest:</u>

- Mostly for planning, not post-treatment
- Implementation monitoring
- Species of Concern, weeds
- Opportunistic

How do NEPA projects intersect with monitoring?

- Required in NEPA documents, but usually minimal and qualitative
- Contract specifications (timber, soil)
- Requires monitoring of effectiveness of mitigation efforts
- Fuels and smoke monitoring for prescribed burns
- Weed monitoring

What monitoring does Forest Service do?

Regional / National I&M

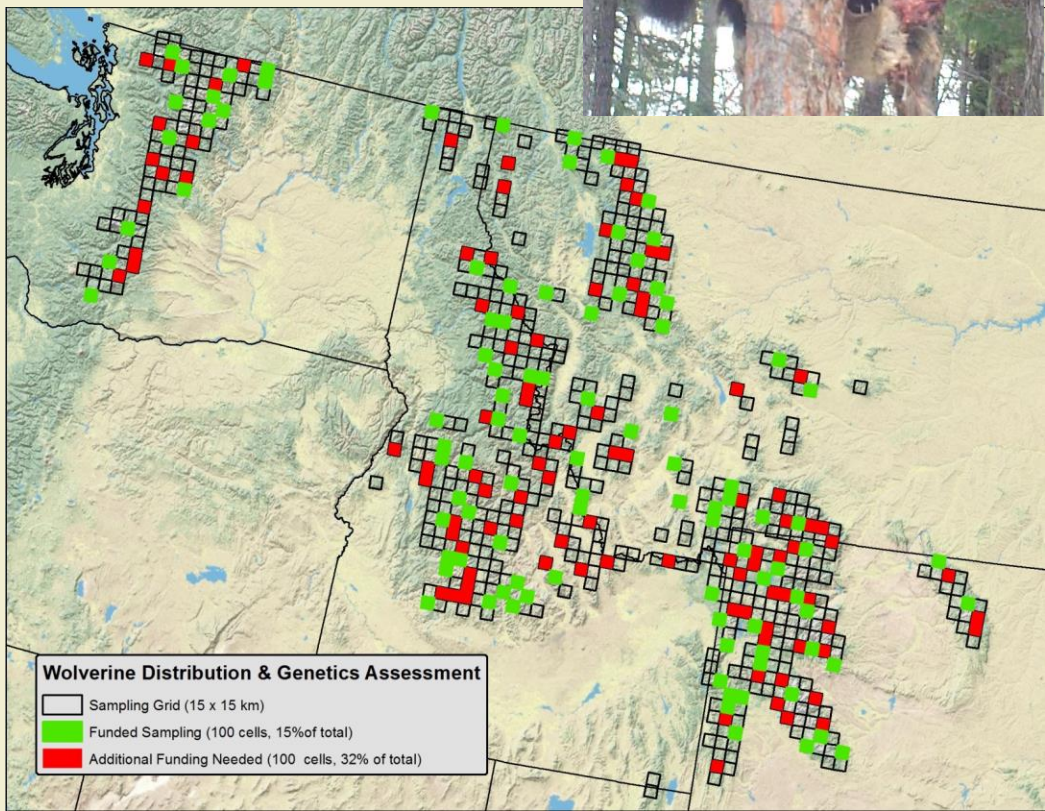
- Forest Inventory and Analysis (FIA)
  - 1 per 6000 acres, 10% surveyed annually
- Old-growth
- Fuels
- Whitebark Pine
- Geospatial Products

What monitoring does Forest Service do?

Partnerships:

Multi-state Wolverine Monitoring Project

- ~200 cells
- Camera bait stations



2012 Forest Planning Rule

Requires Monitoring Plan in new Forest Plans:

- *testing relevant assumptions, tracking relevant changes, and **measuring management effectiveness***
- *Opportunities to design and carry out **multi-party monitoring** with… partners and members of the public*

Address the status of each of the following:

- Select watershed conditions
- Key characteristics of terrestrial and aquatic ecosystems
- Focal species
- Ecological conditions for T&E species
- Visitor use, visitor satisfaction, recreation objectives
- Measurable changes related to climate change

Why do we monitor?

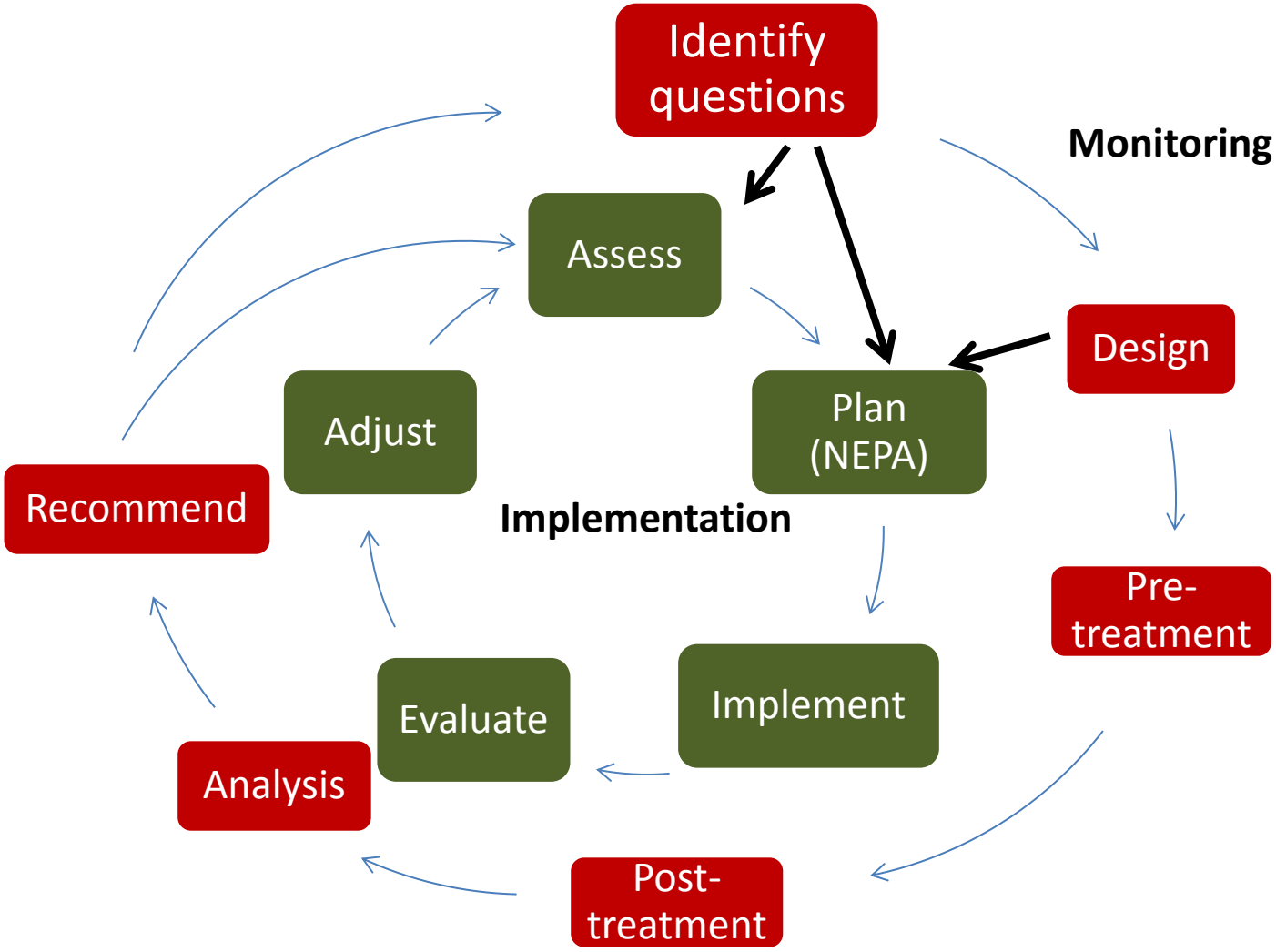
Functional:

- Did the activity accomplish what it was supposed to? Why or why not?
- Adaptive Management
- Are we moving towards desired conditions?

Social:

- Transparency: According to whom?
- Educational opportunities
- Leverage expertise/interests across public and private partners
- Leverage additional funding

Adaptive Management: Engagement Throughout



See **Larson et al. 2013**. Making Monitoring Count: Project Design for Active Adaptive Management. J Forestry 111 (5).

Dalton Mountain, Lincoln, MT

Treatments

Control

Aggregated Retention

Leave tree regeneration

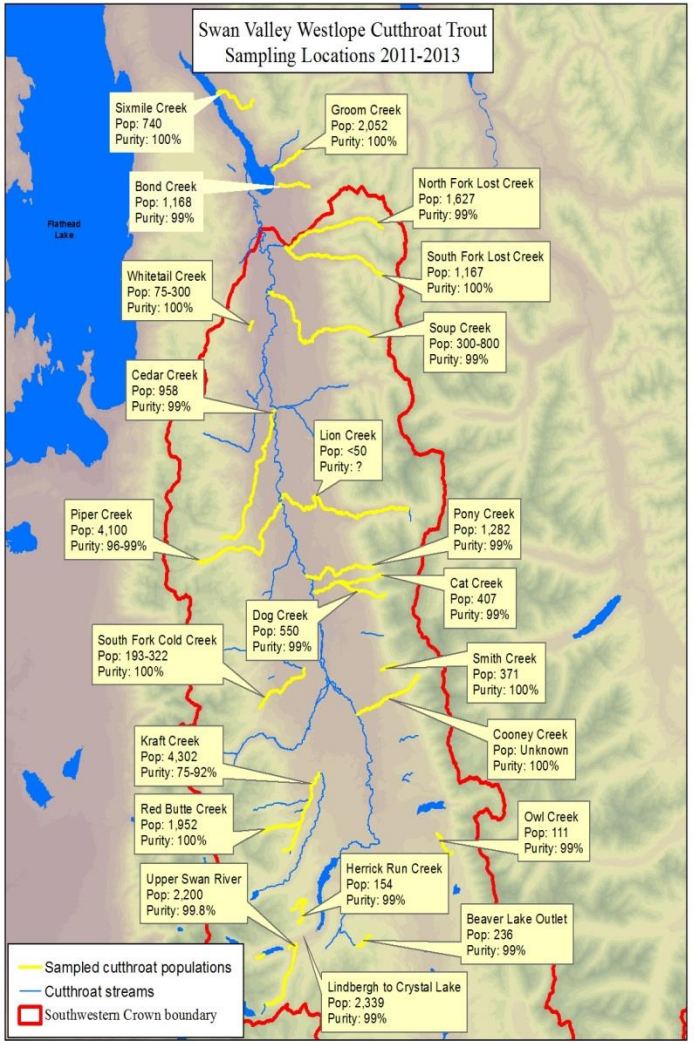
SWCC Adaptive Management Worksheet

- Describe how you envision the data will be used by managers (change where, when, how an activity should occur?)
- Do you expect statistical validation or more qualitative results?
- What types of recommendations do you envision being able to make?
- How do you envision interacting with the managers to discuss your findings?
- When do you think results will be informative?

Adaptive Management Examples

Changed “where” a future action will occur:

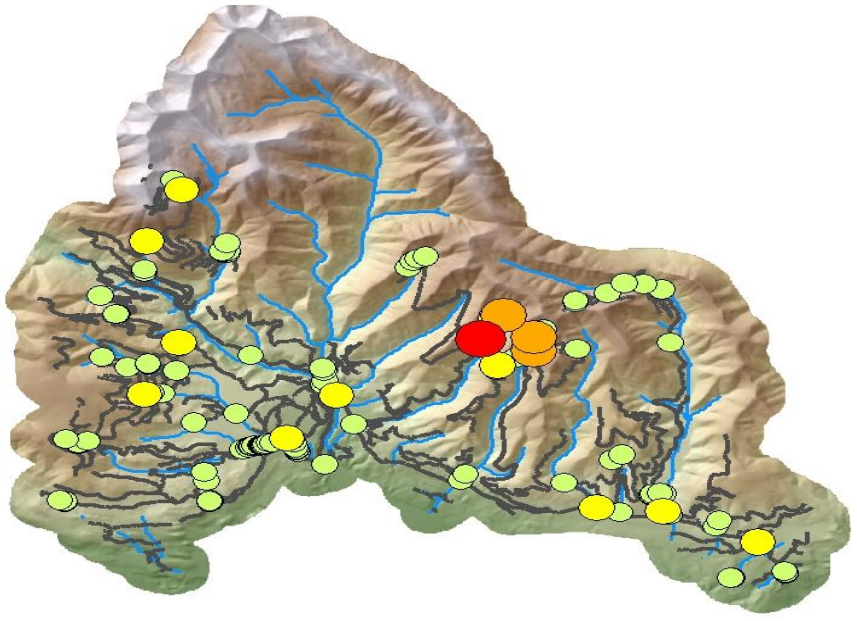
1. Westslope cutthrout trout sampling



Adaptive Management Examples

Changed “where” a future action will occur:

2. GRAIP work on jammer roads



Whitebark Pine AM examples?

- Whitebark Pine Ecosystem Foundation (www.whitebarkfound.org)
  - Region 1 WBP Restoration Plan
  - Central Rocky Mountain White Pine Health Working Group
  - Whitebark Pine-Limber Pine Information System (WLIS): database of all plots
- Keane and Parsons (2010) results of a 15 yr whitebark pine restoration study
  - Includes management guidelines

How can we ensure that long-term monitoring informs future management activities?

- Buy-in from line officers
- Have FS resource specialists at table and on documents
- Personal champions: ensure value of project is passed down
- Discuss results and recommendations in person with staff and line officers
- Track future projects
- Scientific rigor and publications
- Proper data storage with good documentation

Annual Adaptive Management Workshop

- Share results of monitoring projects
- Successes and challenges encountered
- What do results mean for managers?
  - Should we change our treatments?
  - How will resource specialists incorporate info?
- Should monitoring be altered to make it more useful?
- Presentations available at www.swcrown.org

What to Monitor?

Considerations:

- Restoration goals/Desired Conditions
- Level of uncertainty/knowledge
- What data is currently being collected by local agencies and groups?
- NEPA/Litigation?
- What scale is appropriate?
- Capacity/funding

Photopoints

1903

2012

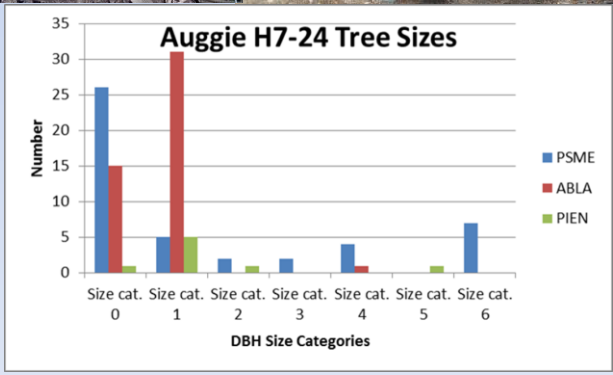
Repeat photography

Gigapan

Smith and Arno 1999. **Eighty-eight years of change in a managed ponderosa pine forest.** Gen. Tech. Rep. RMRS-GTR-23.

Rapid Forest Assessment

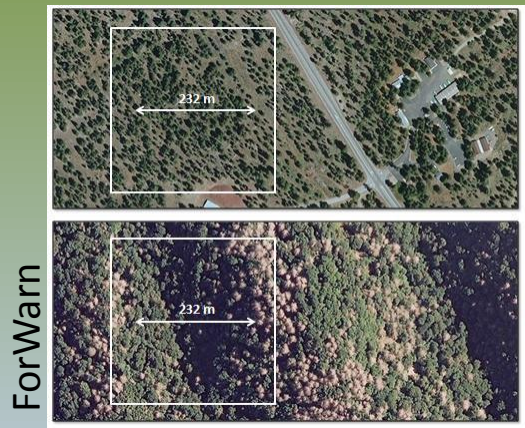
- Quickly capture stand characteristics and predicted processes
- Determine where more intensive monitoring is needed
- Designed for citizen science: minimal training
- Plots can be completed < 1 hour
- Flexible, can add variables and questions of interest
- Trees, fuels, cover, woody debris, weeds, disturbance, scat

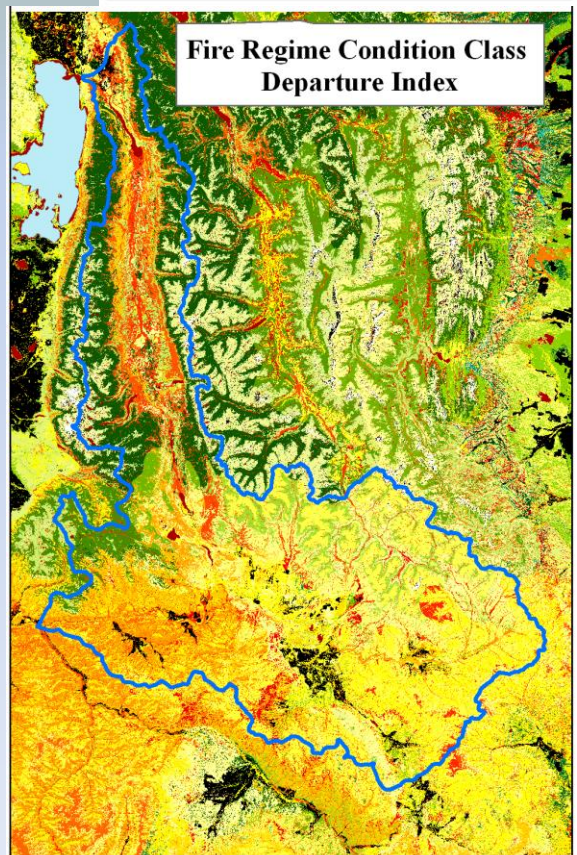


Davis et al. 2015. A Rapid Forest Assessment method for multiparty monitoring across landscapes. JoF 113.

Remote Sensing Products

- R1 Geospatial Data (http://www.fs.usda.gov/detailfull/r1/landmanagement/gis/?cid=stelprd3852570&width=full)
- Landfire (http://www.landfire.gov/data_overviews.php)
- Monitoring Trends in Burn Severity (MTBS) (http://www.mtbs.gov/dataaccess.html)
- NASA MODIS products (http://modis.gsfc.nasa.gov/data/dataprod/index.php)
- LiDAR
- Aerial photography (Hessburg: PNW Research Station)
- MSU: Rick Lawrence's Lab





Landfire 2010

Wildlife Monitoring

- Both universities, RMRS
- Carnivores
  - Bait stations, tracking, cameras
  - Citizen science (Bitterroot NF)
- Birds
  - UM Avian Science Center
  - Sacajawea Audubon
  - Breeding Bird Survey

Monitoring recreation and visitor use

- National Visitor Use Monitoring (NVUM) Program
  - 20% of NFs annually
  - Sometimes contracted, funding available
- Wilderness characteristics monitoring
  - Talk with C-G wilderness coordinator

- *Could pool local user groups to go after joint grant, or pool funds*

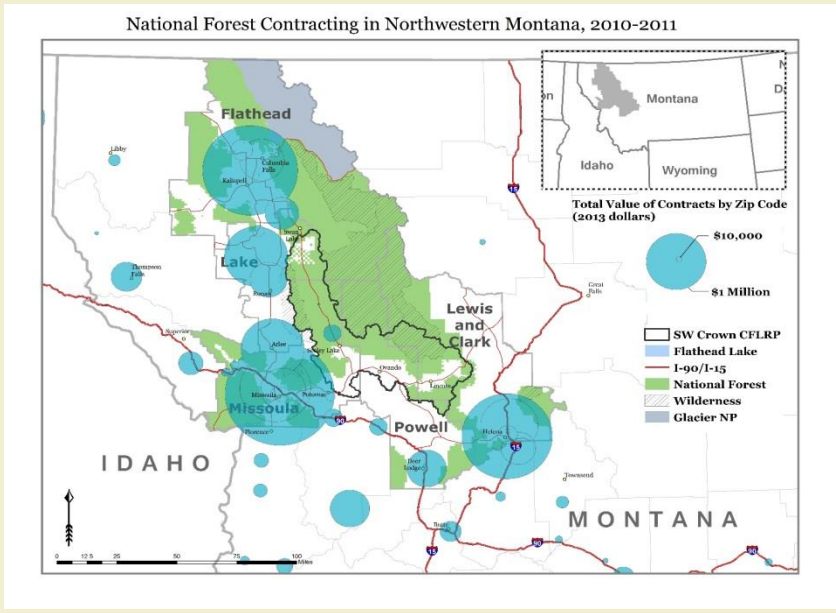
Potential Funding Sources

Be opportunistic!

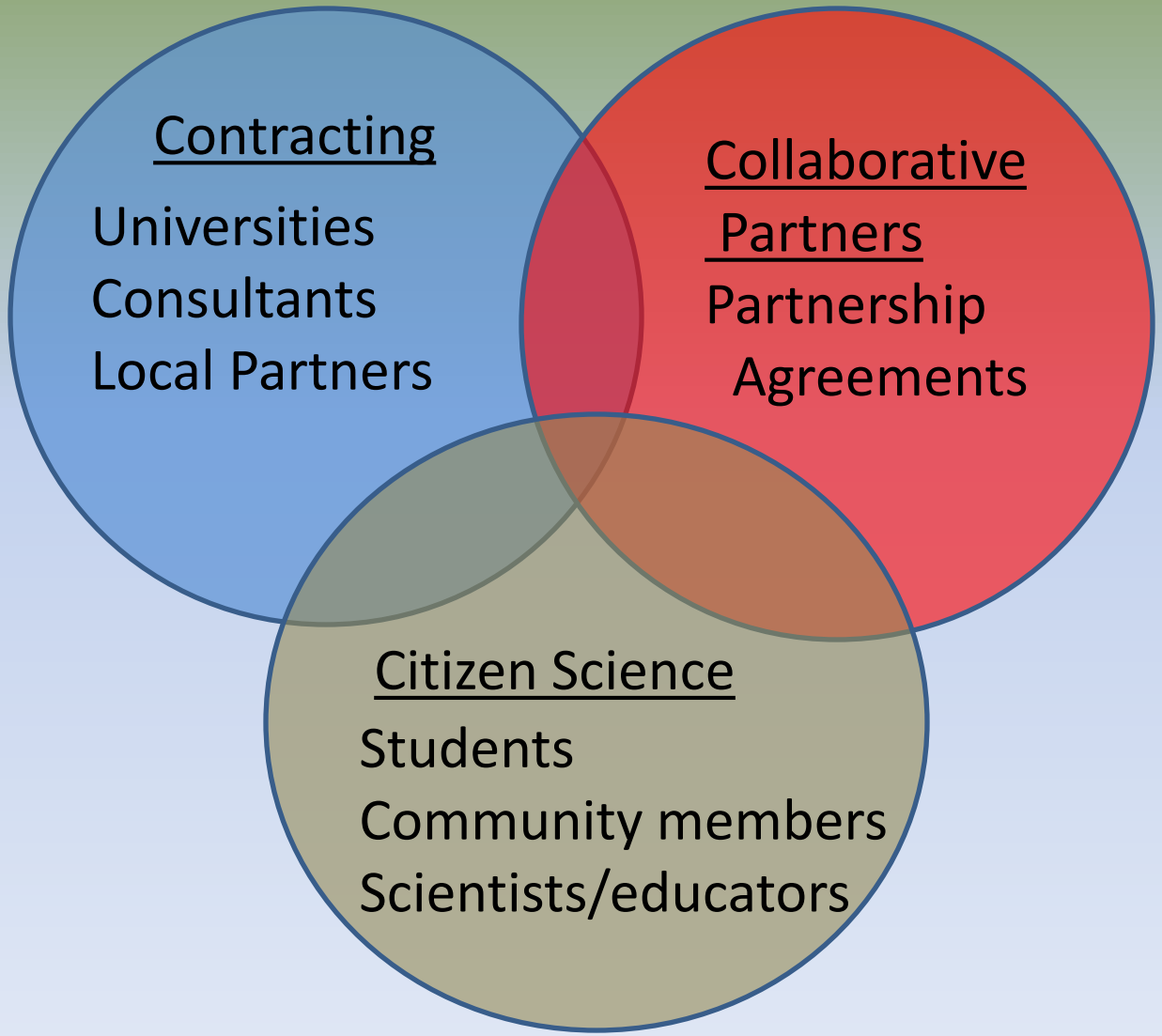
- USFS Partnership Grant Calendar (http://www.fs.usda.gov/detailfull/mbs/workingtogether/?cid=stelprdb5158088&width=full#feb2015)
- Great Northern LCC
- NFF Matching Awards Program
- Healthy Watersheds Consortium
- USFS BioBlitz
- Joint Fire Sciences Program
- Northern Rockies Fire Science Network
- EPA 319 grants (lots of match)
- MDOT
- Citizen Science

Data Display and Accessibility

- LC Map (GNLCC)
- Lemhi Collaborative (http://www.lemhiforest.org)
- Work with MSU: webpage design, data display
- UM BBER



Potential Monitoring Approaches



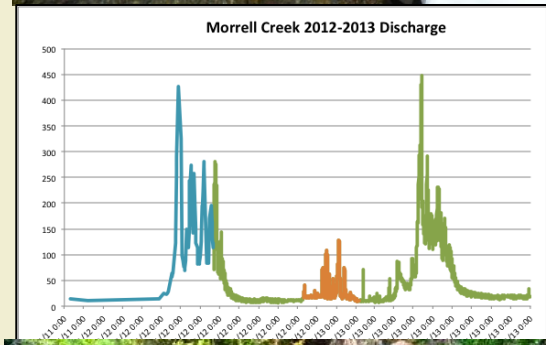
Challenges of Multi-party Monitoring

- Time consuming
- Lots of cooks in the kitchen
- Differing levels of expertise/knowledge
- Different approaches
- Data management issues
- Coordination

Citizen Science

Science + volunteers + schools + natural resource issues

- Engage people in assessing natural resources in their own communities
- Collect long term data that can be useful in making natural resource decisions
- Promote awareness of issues and impacts



Lessons learned

- Be flexible, open-minded, innovative
- Everyone on same page about goals
- Understand the time commitment, be honest about capacity
- Get collaborative work written into position descriptions and programs of work
- Use Partnership Agreements
- Make questions as specific as possible
- **Don’t try and do too much!**

“Don’t let the perfect be the enemy of the good”

Where to Start?

- Determine what is important to the collaborative, list of priorities/questions
- Learn what FS (and other agencies) are already doing
- Learn what universities are doing (or interested in doing)
- Plug into existing efforts
- Determine who could do monitoring
- Seek funding (include coordination)


Questions or
Comments?