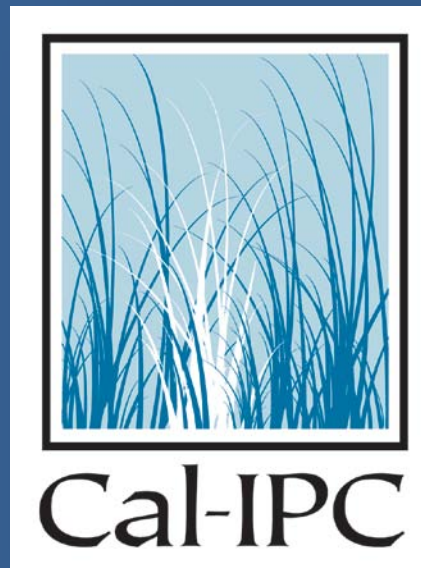


Adaptive Management and Monitoring:

For when things don't happen like they should

Strategic Approaches

Cal-IPC Field Course



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San Diego, CA



MARIN MUNICIPAL
WATER DISTRICT

Terminology

Goal: How you want the world to be

Objective: A measurable, time-bounded statement of what you plan on changing about the world

Strategy: The way you plan on changing the world

Tactic: A tool/plan for changing the world



Developing objectives



1. Prioritize
2. Develop an ecological model
3. Set targets
4. Plan management & monitoring
5. Have an alternative response if goals not met (e.g. hand pulling)

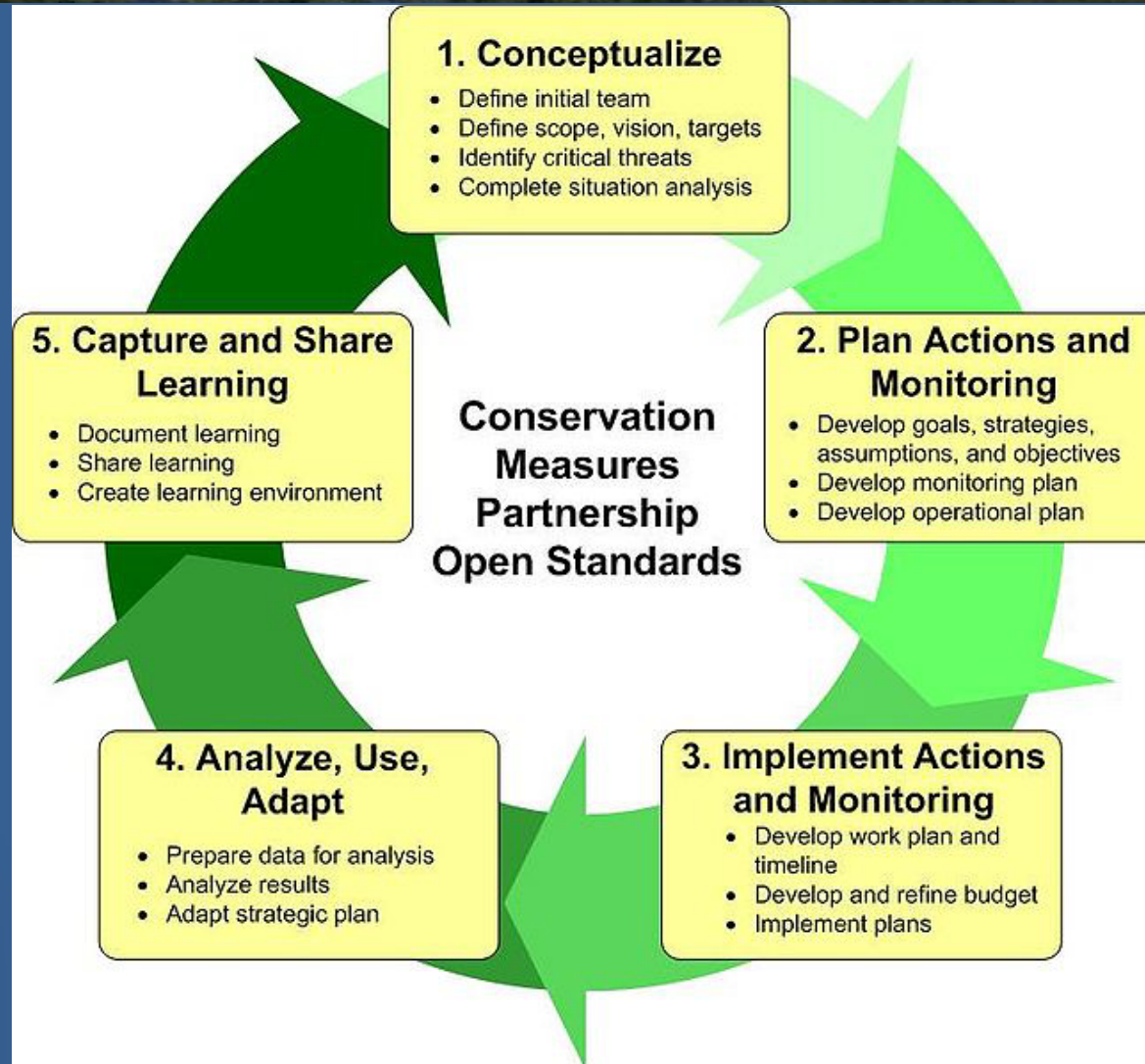
Strategies and tactics

*How you want to get to your goals/objectives,
and having a backup plan, sets you up for*

ADAPTIVE MANAGEMENT



The Adaptive Management Cycle



The Adaptive Management Cycle

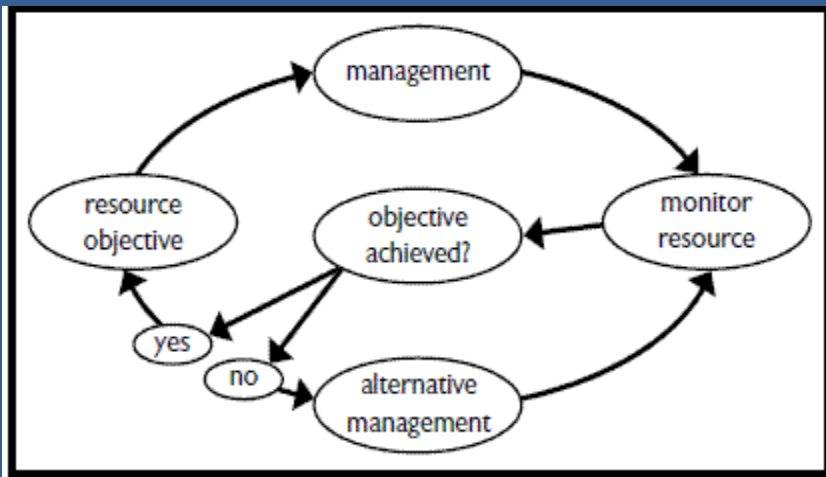


FIGURE 1.1. Diagram of a successful adaptive management cycle. Note that monitoring provides the critical link between objectives and adaptive (alternative) management.

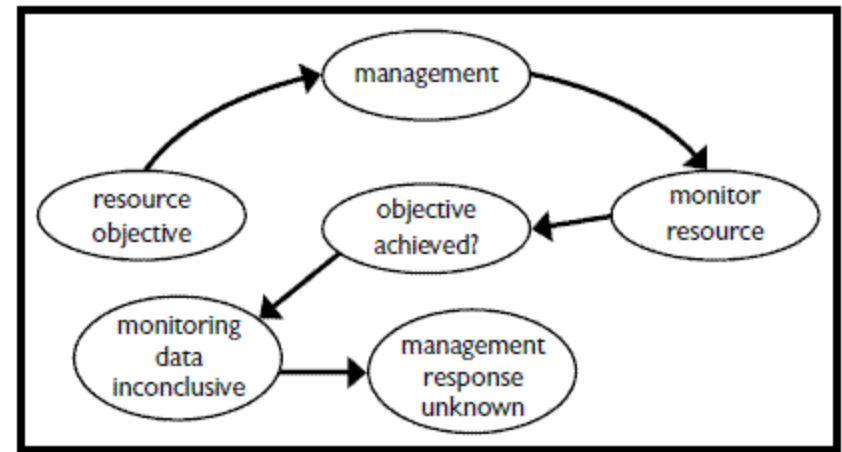


FIGURE 1.2 Diagram of monitoring that fails to close the adaptive management cycle. Because monitoring data is inconclusive, the management response is unknown and the cycle is unsuccessful.

From “Measuring and Monitoring Plant Populations”

BLM Technical Reference available FREE ONLINE

<http://www.blm.gov/nstc/library/pdf/MeasAndMon.pdf>

The Adaptive Management Cycle

- Define what you think will happen when you implement management



The Adaptive Management Cycle

- Measure your identified metric(s)



The Adaptive Management Cycle

- Did what you think was going to happen actually happen?
- If so, congratulations! If not, why not/what do you need to change?



A plan of action

1. Extirpate barbed goatgrass from Pine Mountain by 2020.



A plan of action

2. Zero individuals by 2020 (and five successive years of zero emergents).

Burn it! Spray it! Cut it! Pull it!

Burn it, then pull it!

Burn it, then spray it!

Spray it, then pull it!



A plan of action

3. Project annual reductions
4. Measure, and see if you are on track.



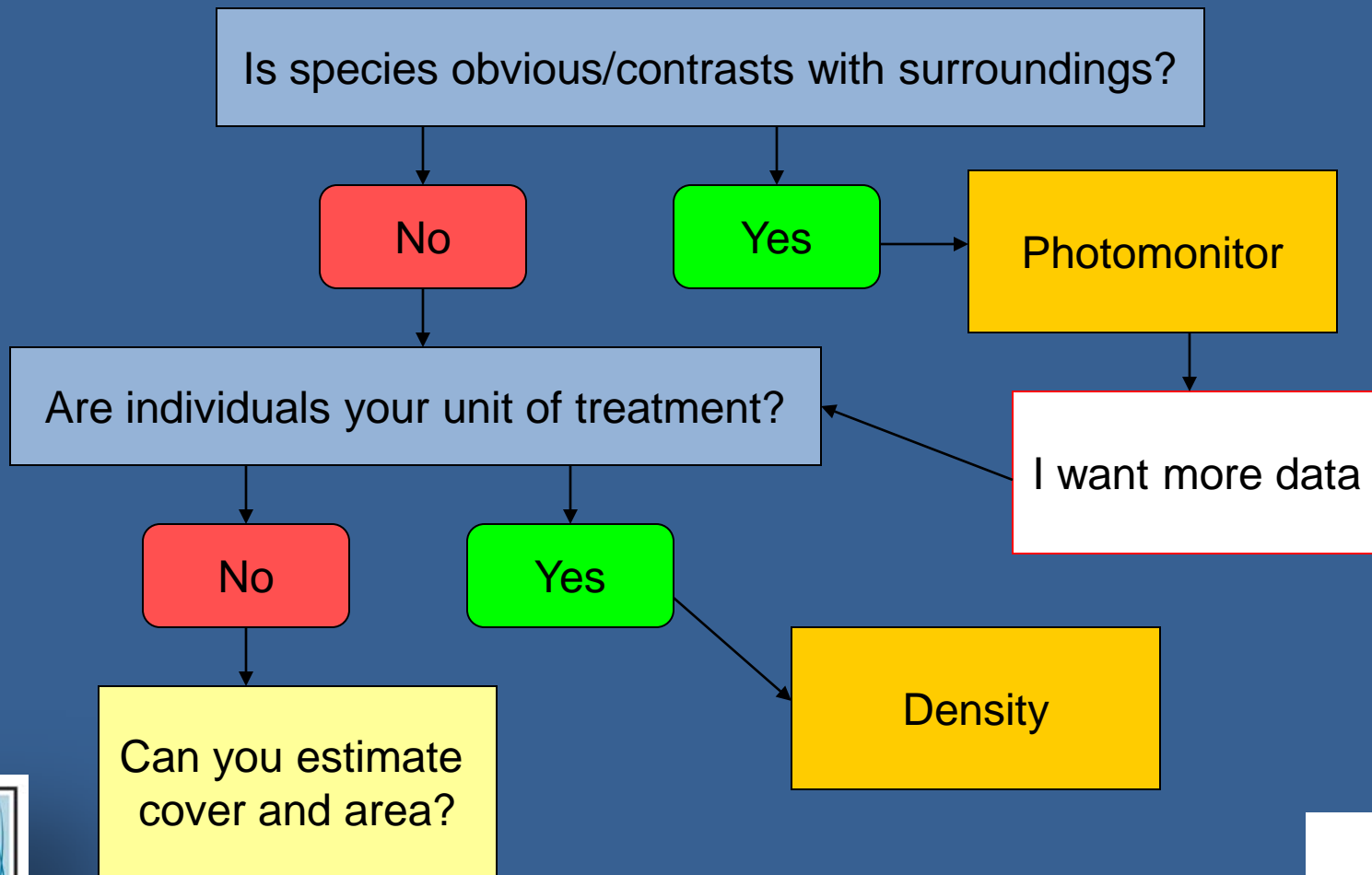
You mean I need to monitor?

Who has time for that?

- You're already out there working on the weed
- Management should provide clear signal
- Can subsample and extrapolate
- Photo-monitoring and estimation can be quick



A draft monitoring flowchart



More monitoring options

- Hours of effort (by crew type)
- Active ingredient used and area covered
- Biomass removed
- Regeneration
- GPS track log



Match monitoring with biology

- Annuals & grasses
- Coppicers or resprouters
- Vines with vertical and horizontal growth



Cape ivy,
*Delairea
odorata*



Match monitoring with biology

- Meta population species
 - best tracked by cover
- Consider seedbank dynamics
- Consider density-dependence



Jubata grass, *Cortaderia jubata*

A plan of action

Extirpate barbed goatgrass from Pine Mountain by 2020.

- Project 10% annual reductions, estimated based on crew time & biomass removed, for pulling-only. (Flaws!)
- Project 50% reduction post-burn, estimated based on crew time & biomass removed.



Pilot projects

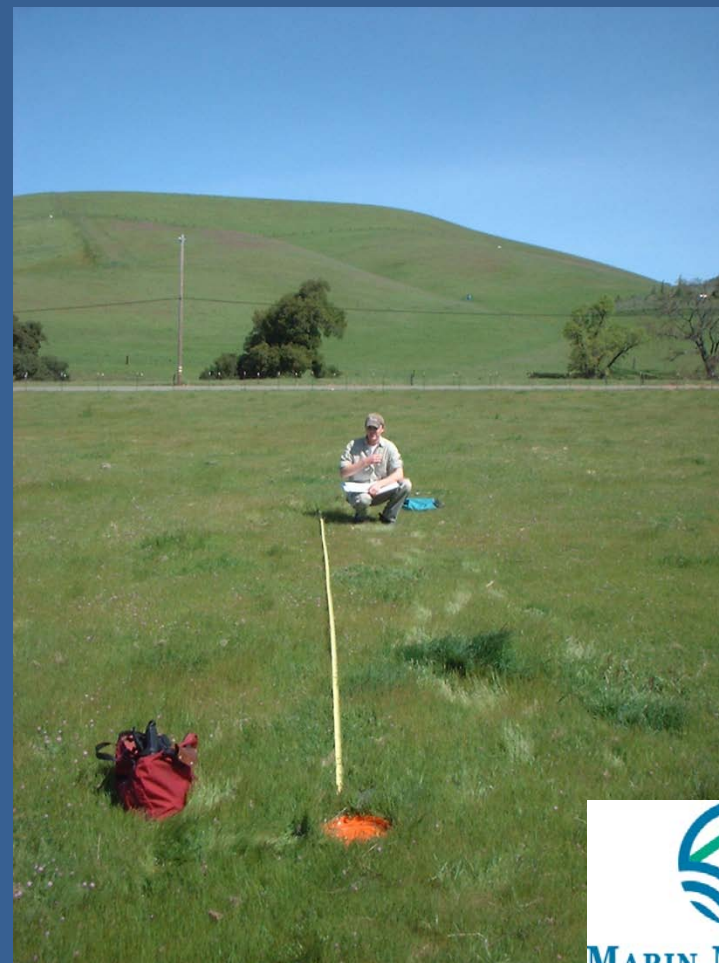
Control attempts on a new species, and/or using a new method.

- Is a 75% kill with 50% herbicide solution cut-stump more cost-effective than 95% kill at 75% strength?
- Is repeated cutting effective?
- What time of year is best for spraying or burning?

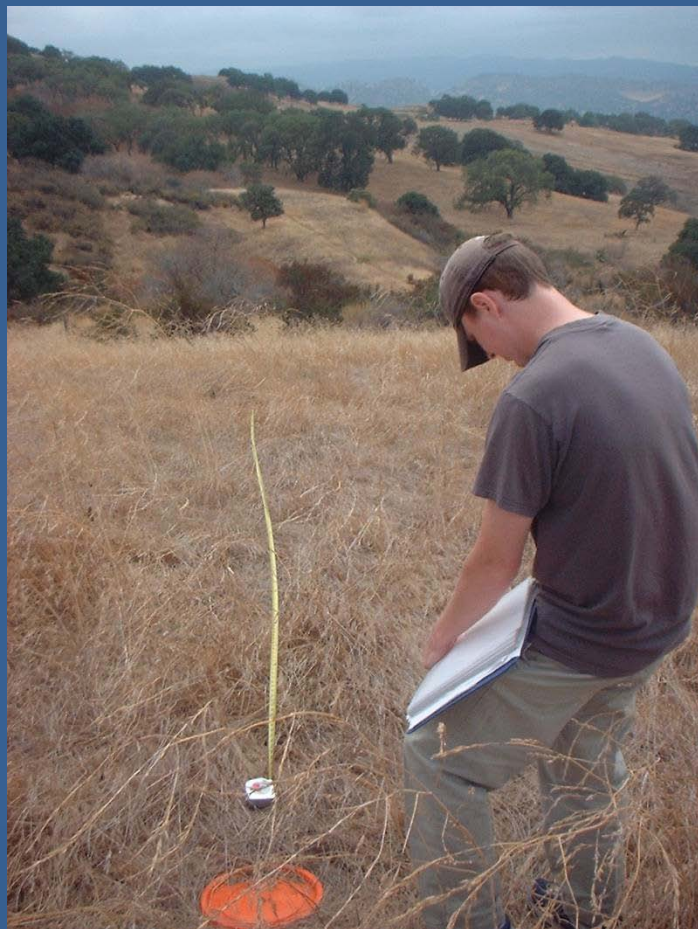


Key monitoring considerations

Will the same person/people be monitoring?



Key monitoring considerations



Can you tell if it's
your management
that's causing the
change?

Key monitoring considerations

Should you have more than one objective?

Is your monitoring good enough to tell you what you need to know?



A backup plan of action

The burn doesn't happen.

The site is colonized by a secondary invader.

There's no measured reduction in the species.

The mower broke, and the crew got called off.



The Adaptive Management Cycle

Define what you think will happen when you implement management



The Adaptive Management Cycle

- Measure your identified metric(s)



The Adaptive Management Cycle

- Did what you think was going to happen actually happen?
- If so, congratulations!
If not, why not?
- What do you need to change?

