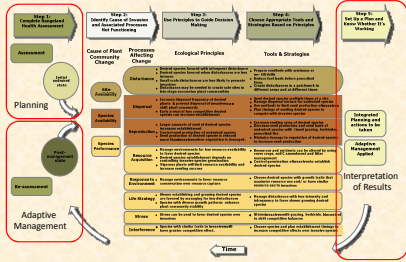




Distributed Weather Tools for Interpretation of State-Transition Probabilities in Disturbed Systems



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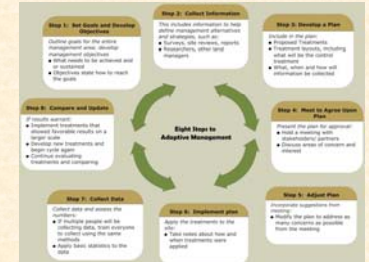
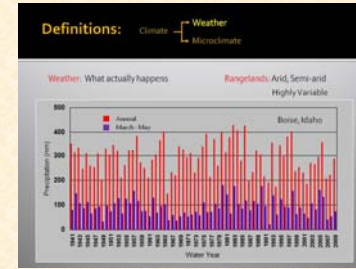
Definitions: Climate $\left\{ \begin{array}{l} \text{Weather} \\ \text{Microclimate} \end{array} \right.$

Climate: Long-term average of weather Associated with historical/potential plant distribution Basis for plant materials selection

Definitions: Climate $\left\{ \begin{array}{l} \text{Weather} \\ \text{Microclimate} \end{array} \right.$

Microclimate: What the seeds/seeding sees

Seedbed preparation: Optimization, Prescriptive



The Ecologically Based Invasive Plant Management (EBIPM) program is an ARS research, demonstration and technology transfer project developed to organize and facilitate restoration planning and management on rangelands that have been severely disturbed by invasive annual weeds. Weather variability impacts all aspects of the EBIPM model. For the purposes of this presentation, we will limit discussion to how weather information can be used in planning, interpretation of results and adaptive management. Information from this poster can also be found in the EBIPM user guide "Using Weather Data to Improve Decision-making for Rangeland Restoration Efforts" which is available on the EBIPM web site at <http://www.ebipm.org/weather-climate-applications-for-adaptive-mgmt>.

EBIPM uses an adaptive management approach for planning. The "8 steps to adaptive management" schematic shown in the figure are discussed in the EBIPM user guide "Adaptive Management for Invasive Annual Grasses" which is available on the EBIPM web site at <http://www.ebipm.org/content/4418>.

Step 1: Set Goals and Develop Objectives

1. Find some weather collaborators
2. Establish longer-term goals.
3. Expect multiple intervention.

Step 2: Collect Information

1. Collect historical weather data: NOAA, USDA, RAWs, State and proprietary, each are
2. Evaluate seasonality
3. Rank years, seasons, months for baseline conditions.

On the Management Horizon:

1. GCM Seasonal Forecasting
2. Gridded data products
3. Topographic adjustment
4. Redundant data and validation
5. EBIPM web links

Main Ideas:

1. Long-term goals: 10 years out.
2. Plan for failure and partial success.
3. Weight success/failure by weather indices.
4. Replicate monitoring for weather variability.
5. Advocate weather-based planning, management, logistics.

Step 3: Develop a Plan

1. Plan for partial-success, non-success.
2. Establish longer-term controls for evaluation of "failed" treatments.
3. Replicate across years

Step 4: Meet to Agree Upon Plan

Present the plan for approval:

- Hold a meeting with stakeholders/partners
- Discuss areas of concern and interest

Step 5: Adjust Plan

Incorporate suggestions from meeting:

- Modify the plan to address as many concerns as possible from the meeting

1. Discuss long-term nature of "success" with stakeholders.
2. Consider longer-term, multi-year, adaptive management in official planning documents.
3. Consider pro-active planning for emergency fire-rehabilitation.

Step 6: Implement plan

Apply the treatments to the site:

- Take notes about how and when treatments were applied

Step 7: Collect Data

Collect data and assess the results:

- If nothing else, take photos frequently using the same methods
- Assess
- Assess areas suitable to the data

1. Consider on-site weather data.
2. Evaluate life stage/phenology as well as biomass, density, ...
3. Plot relative to weather as a continuous variable.

Step 8: Compare and Update

If results warrant:

- Implement treatments that showed favorable results on a per year goal
- Develop new treatments and begin cycle again
- Continue evaluating treatments and comparing

1. Evaluate success/failure relative to year/season/month ranking.
2. React to partial success.
3. Monitor controls over multiple years.