

Forecasting in Ecosystem Restoration Planning

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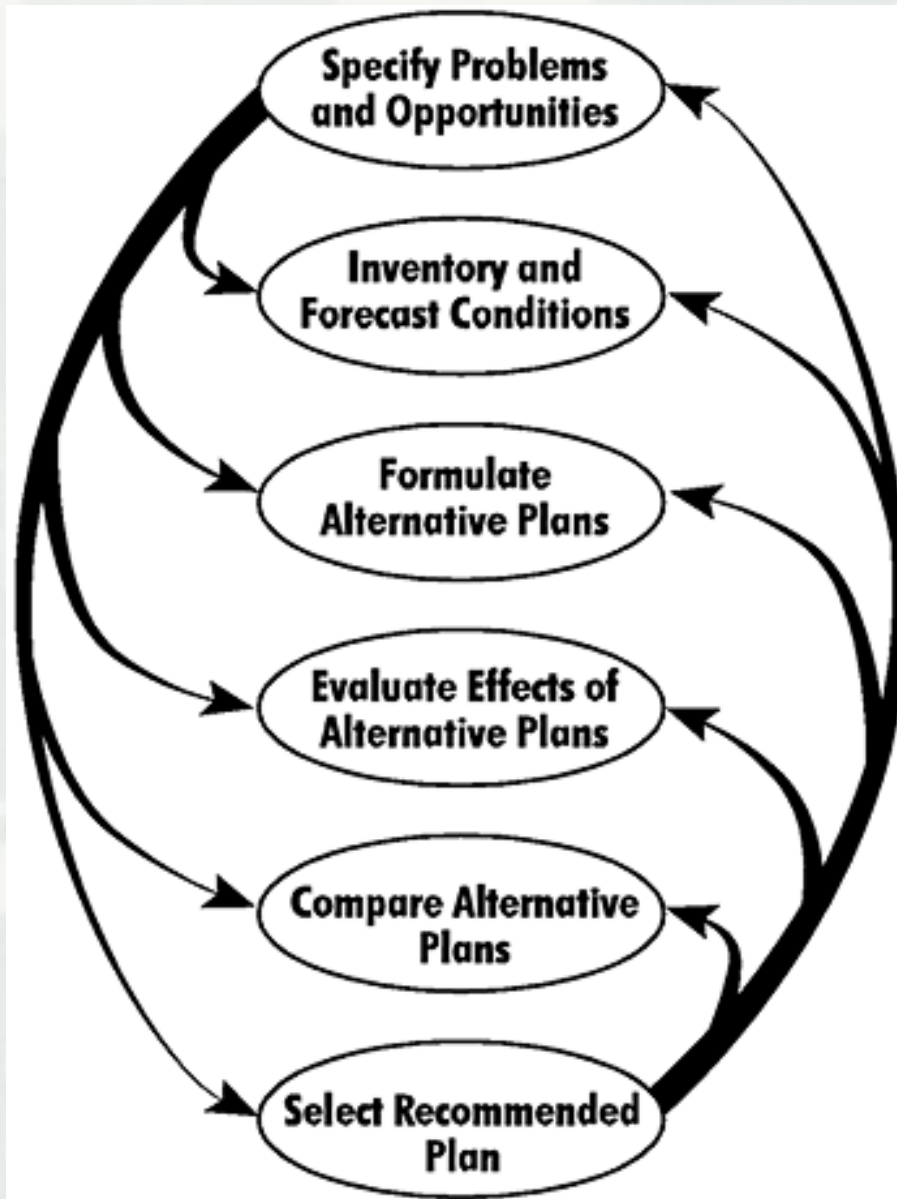
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USACE Restoration Planning

- Federal Water Planning Act of 1965
- Controlled overall by the P&G (1983)
- National Environmental Policy Act (1969)
- Fish and Wildlife Coordination Act (1958)
- Planning Guidance Notebook (PGN)
- ER 1105-2-100
- 6 Step Planning Process

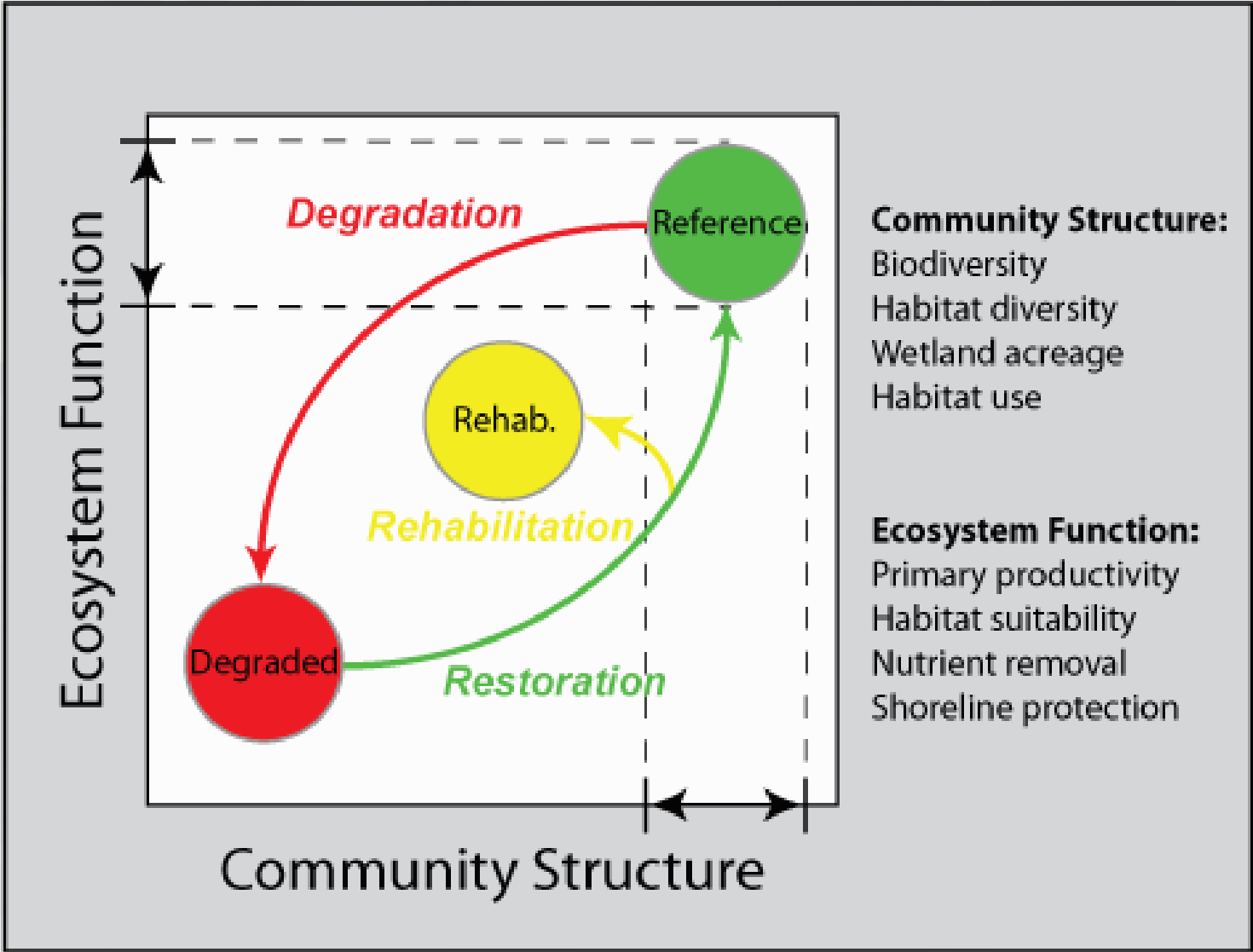




What is Forecasting?

- USACE Planning is done for a 50 year period of analysis
- 50 Years is common to most engineering disciplines
- 50 years allow for big picture view of ecosystem and effects
- May need slightly shorter (35 yrs) or longer (100 years+) timeframes*





Why do we forecast?

- Required (P&G 1983)
- The future will likely be different
- Set a restoration planning baseline
- Future without project condition (FWOP)
- Future with Project Conditions (FWP)
- Sound, science based investment decisions



Conditions=Context

- Five conditions
 - ▶ Historic
 - ▶ Existing
 - ▶ Base year
 - ▶ Future without project
 - ▶ Future with project
- Reference Condition
- Virtual or Novel



Ecosystem significance

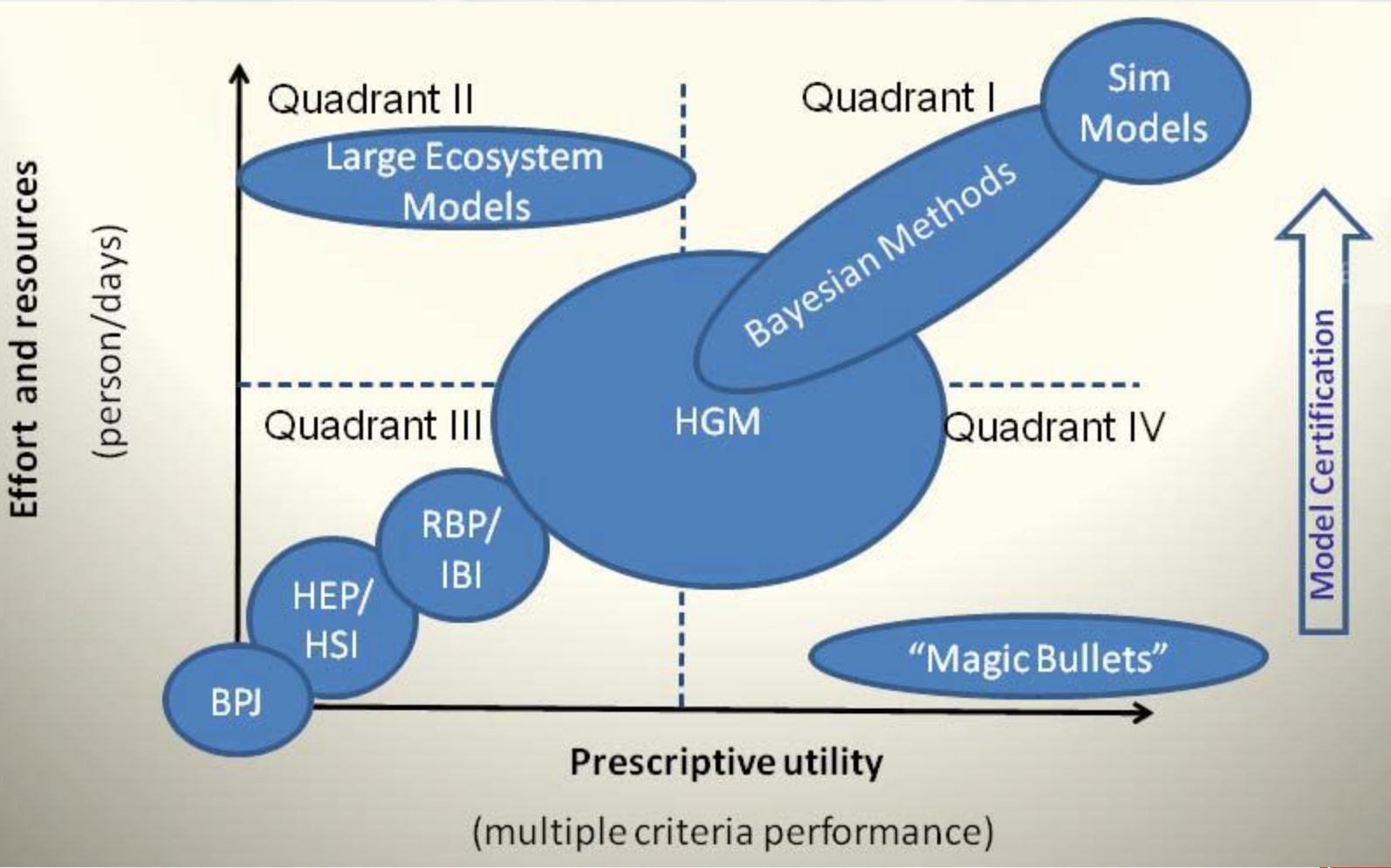
- Focus efforts on Federally significant aquatic resources, habitats & organisms
- **IWR Report 97-R-4 (July 1997)**
- Presidential budget guidance (annual)
- CEQ initiatives
- Regional or National conservation efforts
- Literature & Research



Forecasting Tools

- Conceptual ecological models
- Simple desktop models
- Quantitative ecological models
- Engineering based models (water)
- ERDC TN-EMRRP-EM-10 (Oct 2011)
- Documented Trends
- Best Professional Judgment





Forecasting Complications

- Uncertainty/Data
- Scale
- Stochastic events
- No discernible trends
- Novel ecosystems
- Climate change
- Outside stressors



Forecasting Tricks

- 50 years is a long time, 100 even longer
- Slice future into smaller pieces of pie
- Precision vs. accuracy-Hurricane Models
- Use ecological proxy or guilds
- Get trends and technical backup for your forecasted FWOP condition
- Forecasting can feed Monitoring and A.M.



Forecasting feedback

- Large scale restoration efforts are uniquely qualified to do this.
- Primary projects gather data which they feedback into the planning of follow on projects.
- Cost shared monitoring up to 10 years
- Some have programmatic monitoring*



Take Home Points

- Forecasting is critical to correct planning
- We are a data rich country
- Don't demand 100% information for decisions
- Expect change (Type 1 and 2 Errors)
- Consider novel ecosystems
- Scope effort to scale and significance
- Avoid the Borg



Further Forecasting Info

- <http://oceanservice.noaa.gov/observations/ecoforecast/>
- <http://www.conservationgateway.org/content/landscape-conservation-forecasting>
- <http://www.epa.gov/ecology/basic-foundation.htm>
- http://clear.lsu.edu/about_ecosystem_forecasting/



Questions?



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