

GENERAL SPRINGS RESTORATION PLAN OUTLINE:

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Northern Arizona University Ecohydrology Class (GLG 670)

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I. ADMINISTRATIVE CONTEXT

A. General administrative approach

- 1) Relate springs site restoration to mission and vision
- 2) Develop specific goals for restoration
 - Restore the site to as nearly natural and ecologically functioning a condition as possible
OR restore specific resources, characteristics or populations as desired by the manager
OR restore other desired future condition of the site
 - Consider: Minimizing maintenance costs and activities
 - Optional: Provide outreach about springs to the community, schools, and springs stewards
- 3) Identify and engage stakeholders – develop a small but effective steering committee
- 4) Clarify water rights
- 5) Identify and develop funding
 - Governmental sources
 - Local landowners and stakeholders
 - Local NGOs or other donors

II. BACKGROUND INFORMATION AND ASSESSMENT

A. Sources of Existing Information

- 1) Locate historic oblique and aerial photographs, and historical reports
 - Libraries
 - City, County, State, Federal sources of information
- 2) Consultation with elders (local and Tribal communities)
- 3) Locate private well data?

B. Information Needs and Syntheses

- 1) Develop a groundwater model
- 2) Conduct a springs ecosystem assessment (SSI SEAP)
- 3) Comparison with nearby similar springs
- 4) Compile/evaluate flow trends over time
- 5) Compile/evaluate water quality and trends over time
- 6) Develop soils and stratigraphic maps
- 7) Occurrence of native and non-native vegetation, invertebrates, vertebrates
- 8) Develop a detailed site topographic map
- 9) Dendrochronological analysis?

III. PLANNING

A. Draft Proposed Plan Development

- 1) Steering Committee refines goals and plan preparation
 - Hold regular stakeholder meetings
- 2) Develop budget and schedule
- 3) Plan components
 - Evaluate pre-treatment ecosystem assessment analysis
 - Identify features to preserve *in situ*
 - Identify features to remove – old pipes, concrete, fencing, roads/trails, etc.

- How to accomplish with the least impact?
 - Recontour channel to maximize wet meadow area
 - Developing footpath(s) to prevent further erosion
 - Eliminate non-native species
 - Revegetation with native species
 - Determine irrigation needs and costs, and irrigation schedule and maintenance
 - Develop a monitoring plan and implementation schedule
 - Develop an outreach plan on-site and virtual
 - Public relations – newspaper and radio
 - Local exhibit(s)
 - Remember to repeatedly thank contributors and volunteers
- 4) Identify permitting requirements
 - USACE – Section 404 permit required?
 - Need concise project description and wetland delineation
 - ADEQ – SWPPP (if needed)
 - ADOT – ROW (width of ROW, work space environmental protection)
 - Fish and Wildlife Service – Endangered Species Act compliance
- 5) Define project success metrics
- 6) Refine plan , budget, and schedule

IV. IMPLEMENTATION

A. Initiate compliance activities

B. Site Preparation

- 1) Site survey
- 2) Hazmat protection
- 3) Remove non-native and undesired species
- 4) Accounting

B. Construction

- 1) Remove concrete box, old barbed wire
- 2) Recontour channel to maximize wet meadow area
- 3) Develop a footpath to prevent further erosion
- 4) Accounting and reporting

C. Post-construction

- 1) Restore site from construction impacts
- 2) Establish irrigation, if needed
- 3) Replant desired species
- 4) Reintroduce or translocate desired faunal species
- 5) Accounting and reporting

D. Implement Outreach Program

- 1) Report to MNA Board
- 2) Write-ups in scientific, popular, and news venues
- 3) Accounting and reporting

V. MONITORING, FEEDBACK, PROJECT WRAP-UP

A. Evaluate project success

- 1) Conduct a post-treatment SEAP analysis
- 2) Integrate findings in relation to plan

B. Evaluate Outreach Success

C. Publicize project importance, approach, results and success

- 1) Report to stakeholders
- 2) Write-ups in scientific, popular, and new venues

D. Continue periodic monitoring and feedback