

Year 1 Progress Report

Springs in Peril: Have Changes in Groundwater Input Affected Oklahoma Springs?

Project goals

The goal of this project is to find and re-sample 50 springs that were sampled 20 years ago (1981-1982), and to use the data gathered to:

1. Determine the flow status of Oklahoma springs (especially whether springs in some parts of Oklahoma are losing flow over time).
2. Inventory the invertebrates in springs, to determine whether any flow changes have affected invertebrate populations and to increase our knowledge of faunal biodiversity in springs.

Fieldwork

We had a very successful field season in summer 2001, and were able to physically find nearly all 50 springs. Exceptions were springs for which: owner access was denied (1 spring), there was no spring in the recorded location (1 spring), or the spring was most likely covered with a logging road (1 spring). We have data on site location and description, flow data, and preserved samples of both invertebrates and fish from the springs. Fish were not included in the original proposal, but were subsequently incorporated (see attached copy of the appropriate Animal Care and Use letter). Fish were collected during the previous survey; hence, the addition of fish provides an additional temporal comparison over the 20 years.

Additionally, we have owner questionnaires on spring information completed for most springs. In these questionnaires, owners indicate whether they have perceived a change in spring flow over time. We are unable to get completed questionnaires for many sites (primarily because the owner/manager lacks the knowledge; e.g., in the case of many absentee owners).

Data

Field and questionnaire data have been entered into spreadsheets, spring discharge has been calculated for all sites, and fish have been identified. Invertebrate samples are being processed.

Summary of preliminary results:

Discharge. (Figure 1). All 50 springs were flowing in 1981-1982. In 2001, four of the springs were apparently dry at the time of sampling. Two of these springs were associated with the Ogallala aquifer in the Oklahoma panhandle, indicating a need for further work in this region of the state. There are also apparent patterns in discharge across that state that corresponded to the different groundwater sources. Higher flows occurred in the Arbuckle Mountains (Simpson Group) and in the Ouchita Mountains (Keokuk and Reeds Springs Formation), and lower flows were measured in the panhandle (Ogallala) and southwest corner of the state (Trinity Group).

Fish. Twenty-seven species of fish were found in the combined surveys of 1981-2 and 2001. Although most of the species were common stream fishes, one was a rare darter, *Etheostoma cragini*, which came from a spring that is a new occurrence record.

Differences in spring fish communities between 1981-2 and 2001 were minor and most likely an artifact of sampling (because of movement of fish in and out of springs rather than actual differences). Habitat alterations (three springs: severe siltation, pool draining, and damming) and spring drying (one spring) resulted in major changes in fish communities.

Outputs of the project:

Bergey, E. and W. Matthews. A survey of springs in Oklahoma: Preliminary fish and flow results. Oklahoma Academy of Science, 2 November 2001, Cameron University, Lawton, Oklahoma.

Bergey, E. *in press*. Survey of Oklahoma springs. Oklahoma Biological Survey Newsletter. (popular article)

Plans for next year (March 2002-February 2003):

The main emphases during the next year are to process invertebrate samples, and analyze the invertebrate and flow data (including questionnaire information). We will also send site-specific information to each landowner in the project.

Additionally, it has become apparent that there are large gaps in information, particularly for springs in the western half and southeast corner of the state. We have identified over 100 additional springs in Oklahoma, with emphasis on areas of the state not covered well by the current survey. We are in the process of getting landowner information for the sites and will soon send out a mailing to owners that explains the project and includes a questionnaire. This is also the mechanism that we will use to identify field sites for expanding our sampling program. I anticipate that an additional 20-30 sites (mostly in western Oklahoma) will be visited this summer (for instance, we will return to the panhandle, where there are, indeed, flowing springs).

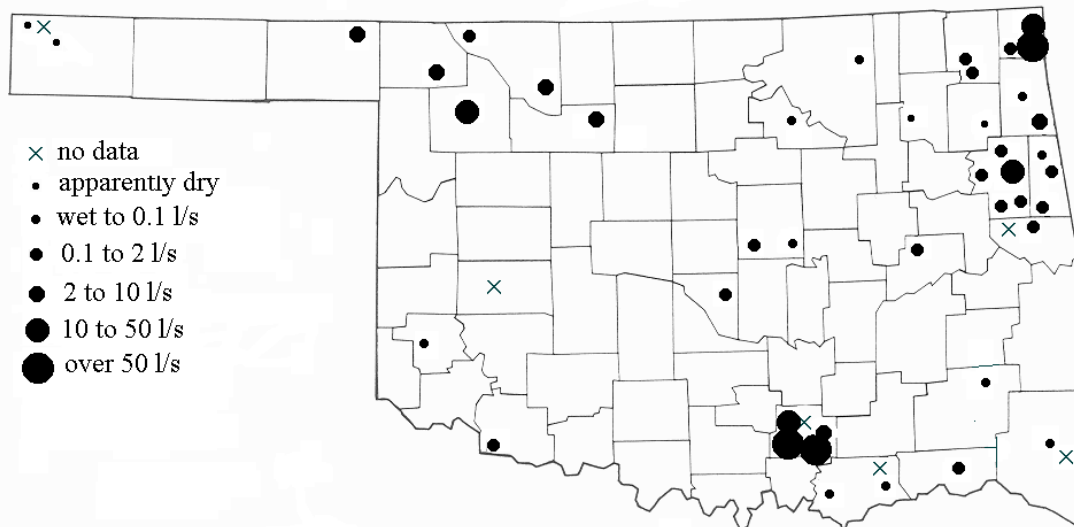


Figure 1. Discharge of Oklahoma springs, measured during summer 2001. Locations are approximate.