**Environmental Flows & Levels for**

**Groundwater Dependent Ecosystems**

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With the increasing pressure on NFS lands to supply the water needed for human activities in the semi-arid to arid West and elsewhere, it is becoming important to the agency’s mission that we be able to identify the water needs of groundwater-dependent ecosystems (GDEs) on agency-managed lands so that they can be appropriately addressed in a comprehensive manner across the spectrum of agency decision making. The Forest Service currently has no consistent approach to assessing the water needs of these resources. This has resulted in confusion over how much water a permittee may take when water diversions or groundwater pumping is requested. This effort establishes a framework for managing water developments on water sources where groundwater levels are critical and identifies minimum environmental flows and levels needed to meet the goals of FLPMA and other pertinent laws and regulations.

GDEs, which include springs, fens, and many riparian areas and wetlands, encompass many of the regionally- and nationally-significant ecosystems on NFS lands and are critical to management of many threatened and endangered species. In many watersheds, GDEs support a disproportionately large percentage of the total biodiversity relative to their size. Many GDEs depend on a critical range of groundwater flows and levels to maintain their species distribution and structure and function in the larger landscape.

The Nature Conservancy has been a leader in developing methods for incorporating the consideration of groundwater resources in ecological assessments and has been a partner with the Forest Service in the development of environmental flow and level methodologies from their inception.

For this effort, we are using the environmental flows and levels definition from a recent draft revision of FSM 2540:

*“The quantity, quality, timing and range of variability of water flows and levels required to sustain or restore freshwater and estuarine ecosystems and the functions and services they provide. Environmental flows and levels include in-stream flows, geomorphic and flood flows, groundwater levels, and lake and wetland levels established for environmental purposes.”*

The effort is founded on the concept that a balance can be achieved between groundwater left underground to support GDEs, and groundwater withdrawal for human uses. To find this balance, we are working with scientists and managers to determine the following:

* The amount and timing of groundwater flow required to support the species and ecosystem processes in the GDEs;
* How groundwater flow into the GDEs would be altered under different withdrawal scenarios;
* The amount or degree of ecological change expected at different levels of withdrawal; and
* The acceptable level of change in ecological conditions and ecosystem function.

**Key Points:**

1. The Forest Service is partnering with the Nature Conservancy to develop methodologies to define water needs of critical groundwater dependent ecosystems.
2. Groundwater-dependent ecosystems are critically important components of NFS lands, and the effect of agency activities and authorizations on those ecosystems can only be appropriately addressed with adequate inventory and monitoring.
3. Development of environmental flow and level methodologies will enable the Forest Service to restore and protect groundwater dependent ecosystems appropriately as a part of the agency’s larger responsibilities to sustainably manage the water resources on NFS lands.