

Overview

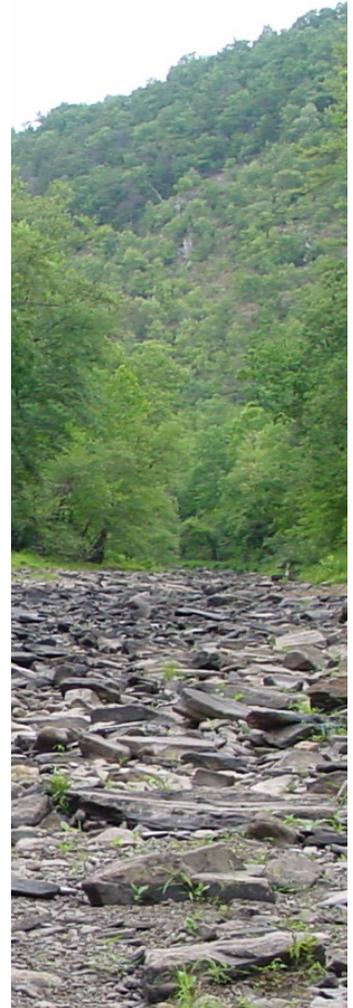
The Department of Natural Resources' Monitoring and Non-Tidal Assessment Division (MANTA) is one of several agencies (Maryland Department of the Environment, Maryland Geological Survey, and U.S. Geological Survey) participating in a study of ground and surface waters in the Fractured-Rock area of Maryland.

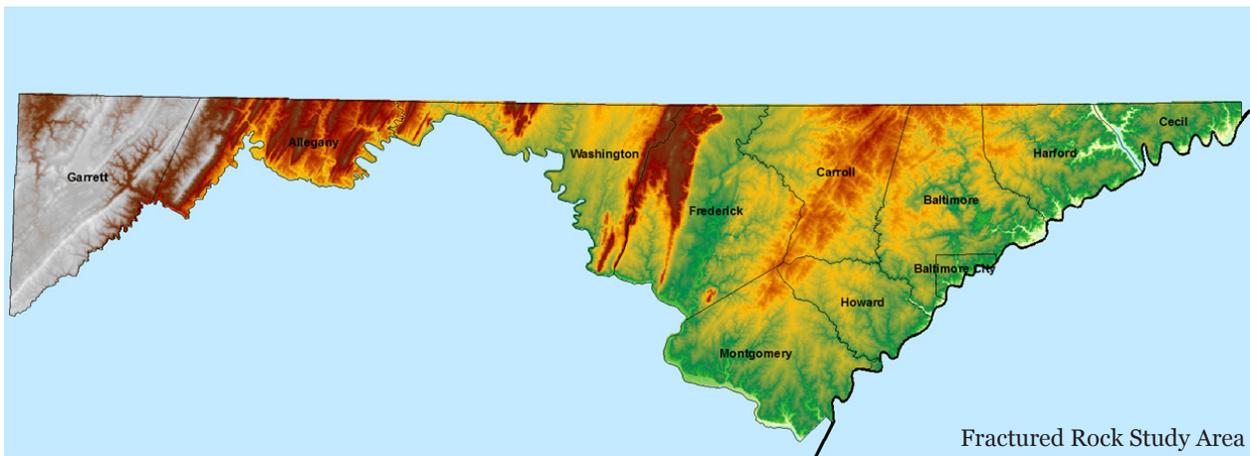
This study is being conducted because watersheds in the Fractured-Rock area may not provide adequate water for human use without causing adverse impacts to streams. Stream flow shapes many characteristics of aquatic ecosystems. Stream organisms, like fish and benthic macroinvertebrates, have adapted to the range and variability in historic flows, which describes the natural flow regime. The alteration of flow regimes often results in a variety of detrimental ecological responses.

Management Questions

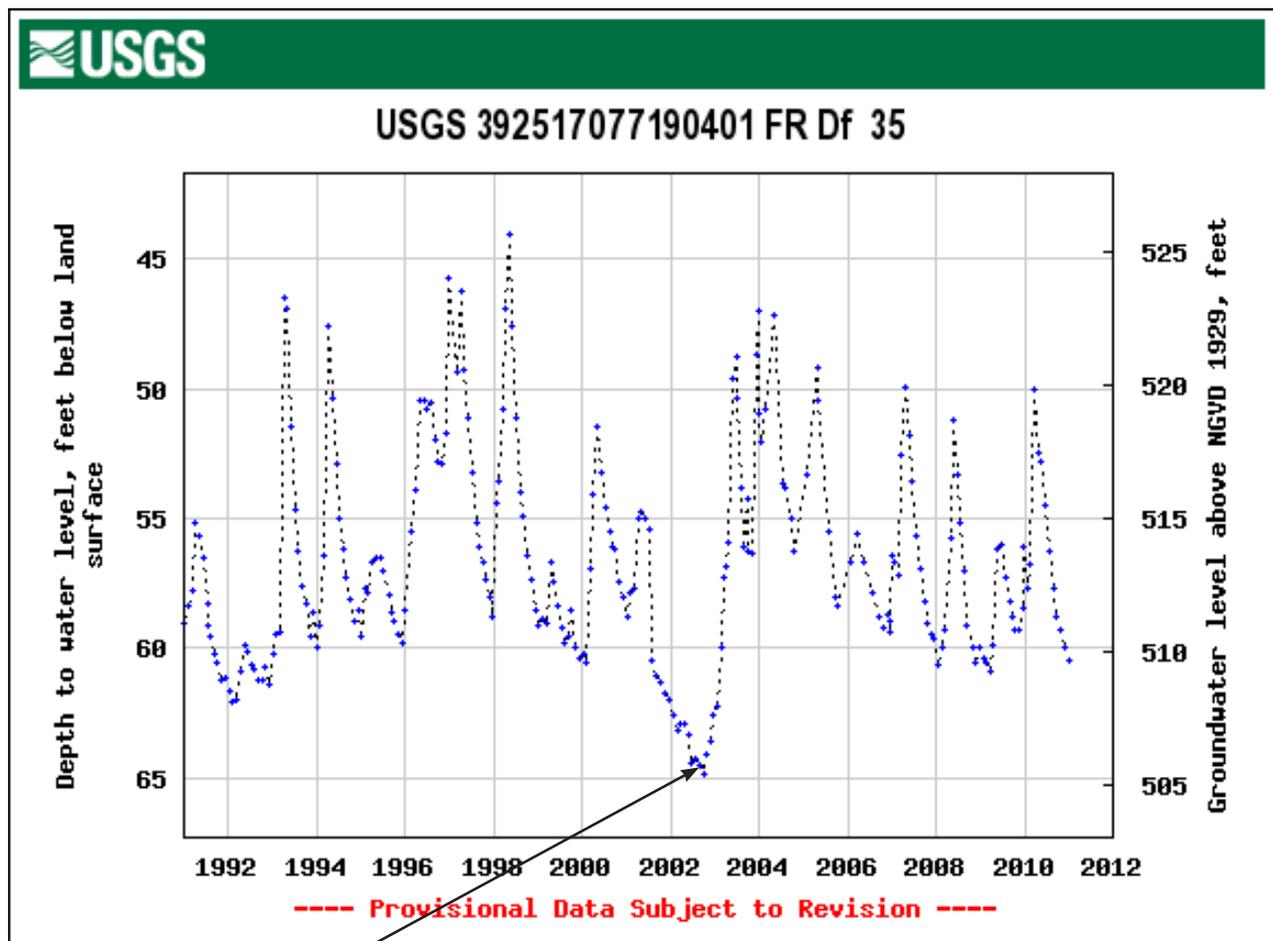
The objective of the multi-year Hydroecological Assessment Plan is to gain insight into the following management questions that were refined by the Maryland Department of Natural Resources and Maryland Department of the Environment ("the Department") in State Fiscal Year 2011:

1. Which Maryland stream species and ecosystems are most/least sensitive to flow alterations? Are there specific biological indicators of water withdrawal?
2. Which aspects of flow regimes have the most/least influence on stream species and ecosystems? How do alterations in flow affect species and ecosystems? Can the specific mechanisms responsible for flow alterations be determined and described?
3. Which components of flow-ecology relationships are most/least affected by surface and groundwater withdrawals?
4. What relationship between surface and groundwater withdrawals and stream ecological integrity can be established?
5. For past and future water-uses, how have/might surface and groundwater withdrawals impact individual species and ecosystems?
6. What spatial and seasonal aspects of flow need to be maintained for specific streams, including under drought conditions to ensure the protection of stream species and ecosystems?
7. Is additional research/monitoring needed?





Gaining insight into these management questions will allow the Department to (a) quantify hydrologic effects on stream dwelling animals, (b) identify locations of ecologically important areas for prioritization of environmental review, (c) provide an understanding of the potential environmental ramifications of hydrologic alteration, and (d) gain a comprehensive understanding which will aid the Department in the decisionmaking process for ground water and surface water withdrawal permit applications in the areas of Maryland underlain by fractured bedrock. The results of this project should lead to the development of improved methods for regulating water withdrawals, and for planning programs and activities that will help sustain diverse stream communities and imperiled aquatic species in Maryland.



Drought conditions in 2002 are illustrated by the depth-to-water level from the surface in this groundwater well at Linganore, MD (Frederick Co.)