

# Storm inflows and sensitive species: Two new frontiers of karst hydrogeology

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Investigations of ground water in karst now need to consider how management of a limestone aquifer may affect – and be affected by – drainage, sediment influx and sensitive-species management considerations. Three recently-completed investigations in the California Coast Ranges have been shaped by questions regarding habitat requirements of four species that are listed or are of special concern. Seasonal and year-to-year variations, as well as effects of land use on hydrographs and the quality of water entering karst aquifers all have required analysis. We present the differing approaches used for protection of aquatic, wetland and cavern species.

Demands upon drainage through karst can change substantially with urbanization and other land uses that alter storm runoff patterns. Capacities of sinkholes and swallowholes, which accepted nearly all runoff under natural conditions, can be exceeded following urbanization or other uses that increase peak flows. The higher flows not only accelerate sediment delivery to the karstic sinks, but also introduce sediment from further away. The more distant sediment is more likely to be from non-carbonate parent material; slow to weather, it can contribute to blockage of flow paths. Sediment loads also increase because peak flows are more likely to exceed the capacity of the karst drainage network, promoting surface overflows, channel formation or enlargement, and accelerated sedimentation. We show how these effects may be altering drainage patterns at one site – the University of California at Santa Cruz.

A key measure for evaluating changes is the peak flow capacity of a sinkhole or swallowhole. We present a method for accurately measuring the peak flows using hardware and electronic systems available to most hydrogeologists, and show how the results can be applied to mitigating drainage- and sediment-management issues in karst.

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