Nevada GDE Water Needs Explorer Tool Frequently Asked Questions

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What are GDEs?
Groundwater-dependent ecosystems (GDEs) are ecosystems that rely on groundwater for some or all of their structure and function. They include springs, wetlands, phreatophyte (plants with roots that can tap into groundwater), and rivers and lakes that are fed by groundwater. To learn more about GDEs in Nevada, see https://nature.org/NVgde.

What is the tool's purpose?
This tool enables users to get insights on how GDE groundwater needs vary across climate, soils, and vegetation type.

How can the tool be used?
The tool can generate scientifically defensible first-approximation estimates of groundwater requirements for GDE vegetation in Nevada and the Great Basin based on the type of GDE and its environmental setting. The tool provides estimates of the amount of groundwater vegetation consumes (ET_{GW}) and the sensitivity of vegetation productivity (as indicated by leaf area index (LAI)) to changes in groundwater availability. The tool enables visualization of year-to-year variability and can be used in a relative sense (e.g., which soil textures provide more groundwater subsidy, or which locations may have more vegetation productivity at similar rooting depths, etc.). This information can help inform discussions about water allocations, conservation opportunities, and tradeoffs between the ecosystem services GDEs provide and water for human needs to enable decision-making with science-based information.

What shouldn't the tool be used for?
The tool does not provide exact quantities because it is an idealized representation of vegetation at a location. There are no guarantees that there are GDEs at the chosen location, and the soil classification is at a coarse scale and neglects heterogeneity. Rooting depths can be an indicator of groundwater level but can vary widely for vegetation types and soils. Seasonal changes in the water table are not captured by the tool. Tool estimates are based on model results that used observed data at specific sites for calibration and validation and incorporate a number of assumptions as described in Albano et al. (forthcoming). Thus, estimates have a large range of variability and are not to be used for legal purposes (see our disclaimer on this page).

What is the difference between groundwater use by vegetation (ET_{GW}) and groundwater subsidy?
Groundwater use by vegetation (ET_{GW}) is simply the amount of groundwater that is extracted by vegetation roots below the water table. *ET_{GW} is the quantity that a groundwater manager might find most useful for quantifying the impact of GDEs on groundwater resources.* The groundwater subsidy is the additional water available to a plant through root water uptake compared to what would be available if the water table were very deep (i.e., free drainage through the root zone). The groundwater subsidy may include water extracted by roots below the water table (specifically ET_{GW}), but it also includes water that doesn't drain as quickly from the soil due to moist conditions above the shallow water table or capillary rise of water from the water table. The groundwater subsidy is a measure of how reliant groundwater dependent vegetation is on shallow groundwater, or stated a

different way, it is a measure of how much less water would be available for plants if the water table were to fall substantially. Thus, *the groundwater subsidy can be useful for quantifying the impact of management of the water table on GDEs*.