



### ***A Backstory of Hart Prairie's Ongoing Environmental Issues***

A recent peer-reviewed technical study (Hereford, 2023) identified the ongoing negative environmental issues affecting Hart Prairie: erosion and chemical contamination. The erosion results from runoff in Arizona Snow Bowl's stormwater drainage system. Erosion is not the only issue; the stormwater is contaminated with nutrients (phosphorus and nitrogen) at concentrations thousands of times greater than recommended EPA levels. The strengths are also significantly higher than the modeled natural runoff of similar mountainous andesitic volcanic terranes. With these unnaturally high levels, the prairie's ecosystem will be degraded. Thus, the ecosystem is compromised by erosive runoff and contaminated stormwater. Pollution is reasonably attributed to snowmaking with reclaimed water that began in 2012.

***How did this happen?*** The entire runoff of the 1 square mile-3,000-foot vertical relief watershed is funneled onto the prairie. This is not within the watershed's natural drainage channel, which can accommodate the runoff. Instead, it is on the uneroded prairie surface that formed before the end of the last Ice Age, about 11,000 years ago.

The path of this problematic drainage was designed to accommodate a new parking lot on the head of the prairie. The lot was to house 400 cars on 3.3 acres, but as constructed, the lot covers 13.7 acres of pristine prairie. Engineering plans for the parking lot, drainage system, and erosion control were approved by Coconino National Forest as part of the Record of Decision for improvement of ASB facilities as in the 2005 FEIS (S. Watts, 2020, written comm.). The initiation of the ongoing erosional cycle closely coincides with the installation of the present drainage system in 2012. Previous gully erosion of the prairie is unknown

***Who is to blame?*** The blame is not entirely CNF's, although the 10.4-acre increase in the constructed parking area is unexplained (L.J. West, 2019, on file CNF). Decisions regarding runoff and erosion were based on available hydrological data (FEIS, 2005, Sections 3H and 3I; *ibid.* Watts). However, the conclusions regarding runoff in the FEIS are erroneous. Modeling indicated there would be little to no runoff on Hart Prairie, and damage would be nonexistent. It was claimed that all of San Francisco Mountain is undrained despite abundant topographical and geological evidence to the contrary. Moreover, the modelers did not account for deforestation. Sixty percent of the principal ski-area watershed is deforested, substantially increasing natural hillslope runoff. In response to relatively frequent monsoonal rainfall, total basin flow rates of up to 45 cubic feet per second occur; these potentially contaminated waters flow 1/2 mile down the prairie. Despite the claims of the FEIS, this runoff damages the prairie by gully erosion.

***What is the primary source of increased nutrients in basin runoff?*** Generally, erosion of hillslope soils provides nutrients in runoff and streams. Vast quantities of relatively nutrient-rich reclaimed water are applied to ski slopes seasonally, suggesting that the slopes are a source of introduced nutrients. Research shows that chemicals accumulate in the artificial snowpack, where they can migrate into ski-slope soils during seasonal melting. Hypothetically, erosion of these soils will yield nutrient-rich runoff to the stormwater drainage system that leads directly to Hart Prairie.

Richard Hereford, Research Geologist (Emeritus), October 2023