SENSOR-FIELD

making social-ecological place across spacetime

MAPPER: a new online tool that interrelates data + textual information with layers of visual information to help the Fly Ranch community 'map' and better understand its evolving natural & cultural systems

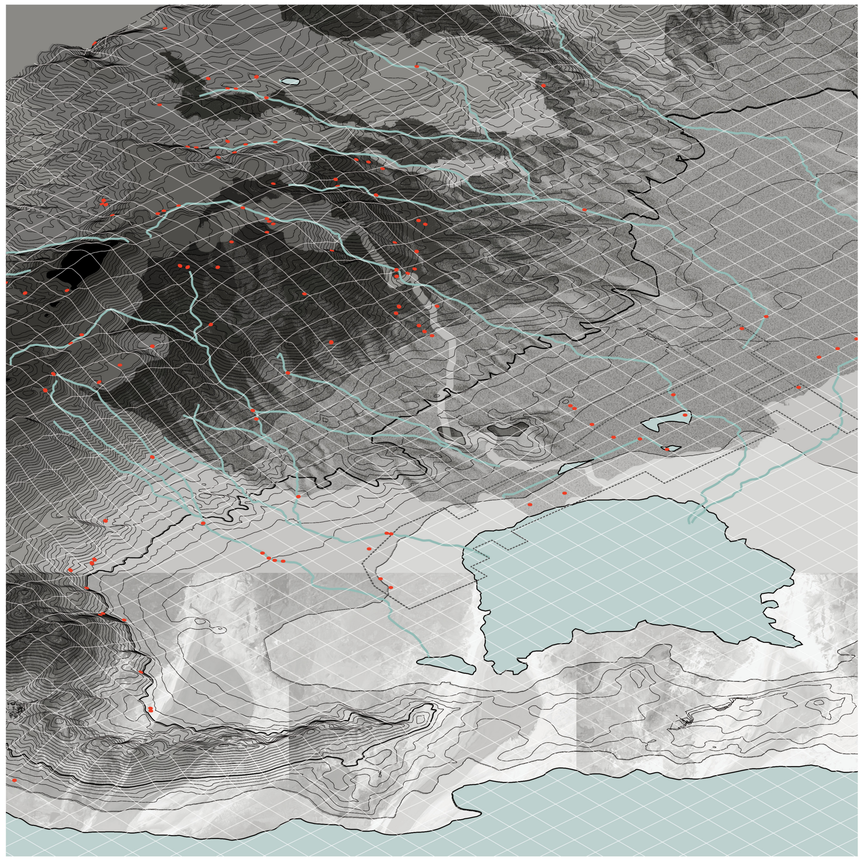
WATER_*relating to* topography, geology, weather/climate + culture

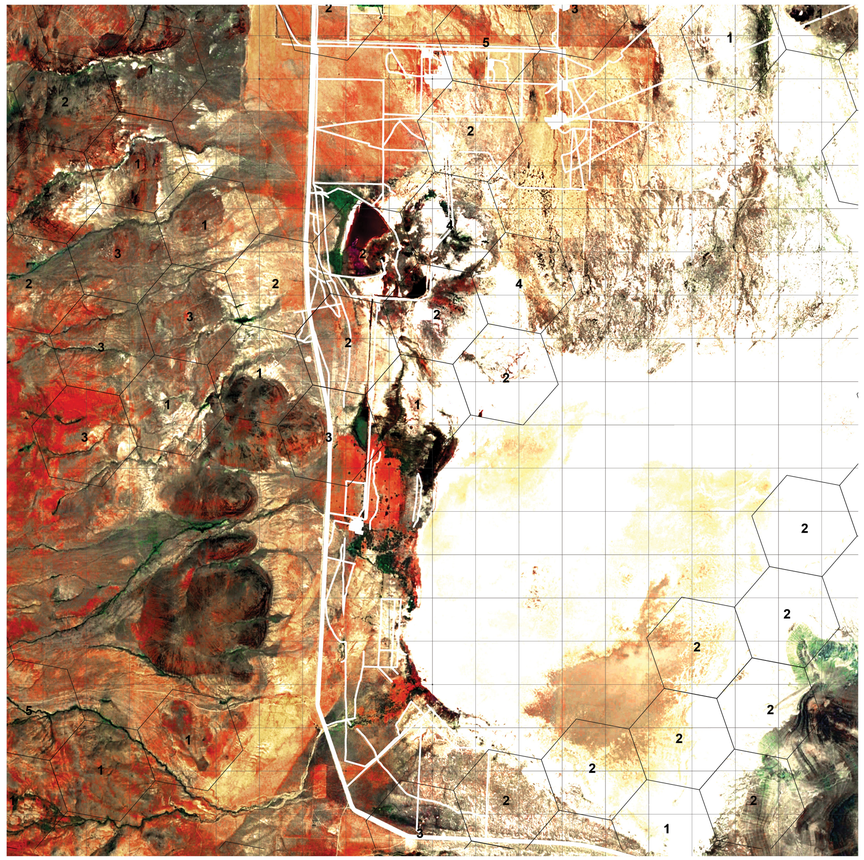
Between wet and dry cycles at Fly Ranch and its hydrological processes interacting with geological ones—water [pa in Paiute] is the substance most critical to its formation and evolving life-forms. Annual precipitation, limited by the sectional 'rain shadow effect' of the Granite Range, now varies from 20 inches at higher elevations to 5 inches in the lower ones of the Flat. Drops flow downhill in a dendritic pattern of ephemeral streams of variable volumes and speeds, eroding and depositing silt and nutrients in deep-cut creeks or broader alluvial fans at entry points to the site along Route 34, to be absorbed, recharging groundwater or intercepted by irrigation canals and reservoirs or channeled to the wetlands via creeks, creating a mosaic of surfaces of variable moisture. The network of wells perforating the ranch provide additional logics of conservation and development. Beyond these current water-related phenomena, this mapping recognizes the significance of Pleistocene Lake Lahontan's still visible shoreline 270 feet above the ranch that reveals its aquatic system history before transitioning to its current cold desert, terrestrial system. A core concept of water emerges of ebb & flow in endorheic basins within larger ones—of their mirrored surfaces 'reflecting' the collective memory of indigenous peoples living along its fluctuating shores for millennia—revealing its deeper, social-ecological meaning.

question: How best to sustain water and its cultural significance at Fly Ranch?
answer: Monitor its shifting levels, remember water stories, then educate, conserve, and develop accordingly.

key *Mapper* texts:
Adams, K. & Sada, D. (2013) "Surface water hydrology and geomorphic characterization of a playa lake system."
Fowler, C. (1990) Tule Technology: North Paiute Uses of Marsh Resources in Western Nevada.
Sinclair, W. (1962) Ground-Water Resources of Hualapai Flat, Washoe, Pershing, and Humboldt Counties.

key *Mapper* layers:
_ primary flow systems: cultural + natural dendritic
_ bodies of water (temporary and annual)
_ human extraction points (wells)
_ gradient topography (indication of basin depth)
_ watershed region
_ USGS 1 kilometer / ½ kilometer coordinate grid
_ USGS topography model built by our team





BIOME_*relating to* water, landscape-ecosystem structure and function

With the greatest area of Fly Ranch and surrounding Federal land being devoted to conservation, this mapping looks at available information on ecosystem structure and function—those processes that can best conserve its natural 'assets.' It focuses on drivers of biodiversity like climatic and hydrological processes, primary productivity, biophysical habitat formation, movements and interactions between species, and natural disturbance regimes like lightning-strike wildfires, and adaptation cycles that will follow. It looks at the particular structure of its patches, edges, corridors, and mosaics, and their causes: a.) patches of varied composition, size, number---a function of location relative to topography, soil types, and natural sources of water (e.g. creeks, alluvial washes, wetlands, etc.), and man-made sources (e.g. canals, reservoirs, etc.) and b.) natural and man-made corridors of long, straight edges determining connectivity and interior- versus edge-located habitats where its 140+ plant species live. Natural edges and boundaries in this landscape mosaic transact with man-made ones (e.g. road, fences) as well as virtual, cadastral ones of County, State and Federal jurisdictions located within changing mapping coordinate systems, collectively co-producing the singular landscape of Fly Ranch. The importance of tracking cultural systems transacting with natural biotic/abiotic processes is understanding shifting dynamics of biodiversity and resilience within the greater social–ecological system within a broader reference system.

question: How best to sustain water naturally and culturally at Fly Ranch?
answer: Monitor full range of processes key to conservation, then educate, conserve & develop accordingly.

key *Mapper* texts:
Bennett, A. et al. (2009) "Ecological Processes: a key element in strategies for nature conservation."
Morris, L. & Rowe, R. (2014) "Historical land-use and altered habitats in the Great Basin."
Schile-Beers, L. (2017) "Making Sense of Fly Ranch," five-part blog series.

key *Mapper* layers:
_ Crucial Habitat Assessment Tool for biodiversity
_ site paths_human + animal
_ Landsat saturated
_ Fly Ranch species list / biodiversity graph
_ land parcel system
_ USGS 1 kilometer / ½ kilometer coordinate grid
_ USGS topography model built by our team

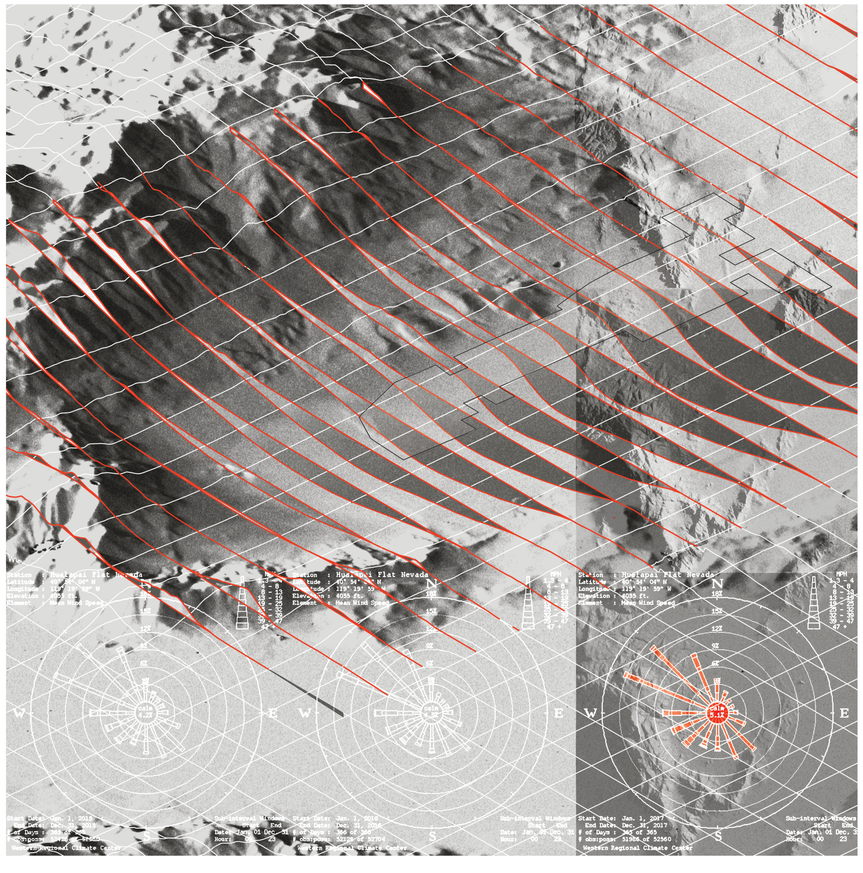
ENERGY_*relating to* solar, wind and geothermal systems fluxes + flows

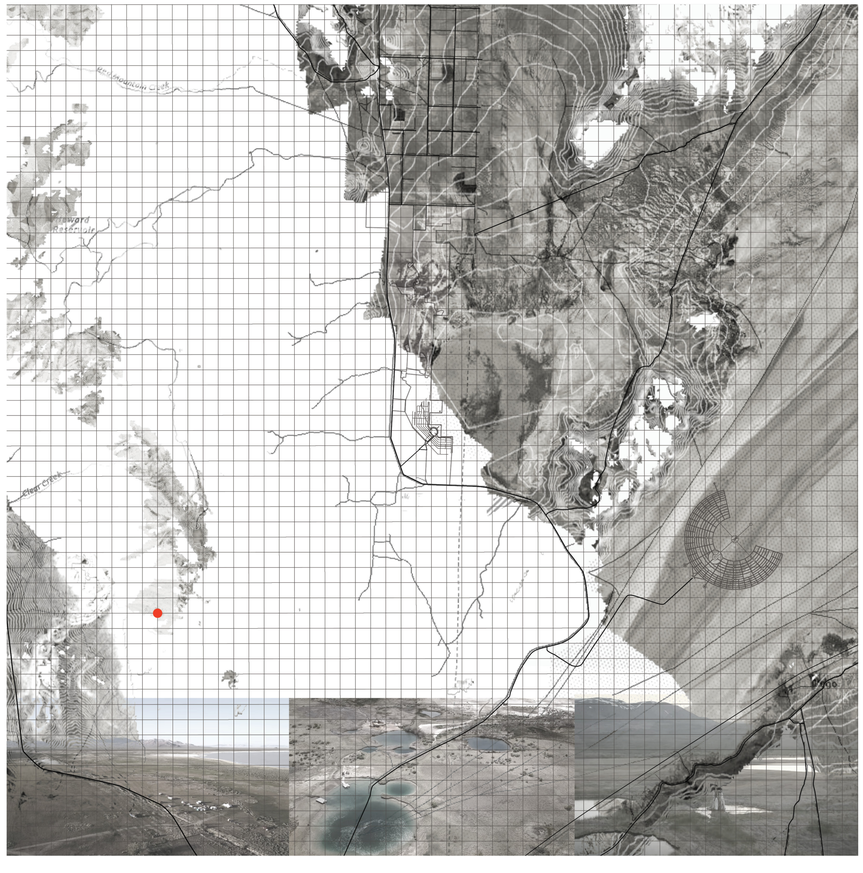
This mapping considers the energy continuum in every dimension of Fly Ranch: planetary scale of biosphere, hydrosphere, lithosphere and atmosphere (e.g. surface albedo, greenhouse effect and climate change); micro scale flowing through its ecosystems (e.g. primary production to consumption to decomposition to the recycling of nutrients), to the key renewable energy resources available on site. It searches for those phenomena, and laws of energy flows and storage under transformation on site to guide the greater project of conservation and development. Carbon capture and storage on site is also important to know as well as any ongoing contribution from the ranch to atmospheric CO_2 through things like land-use and the burning of fossil fuels. Solar is an optimal source renewable energy the length of the ranch zones of shadow. Wind is a less consistent natural phenomenon but enhanced by air channeled through the valley. Geothermal sources exist but require a costly process of discovery. Understanding of the site's greater need for heating than cooling by national averages, a concept of energy emerges of things that can respond to seasonal weather/thermal conditions and the shifting availability of solar, wind, and geothermal conditions on site, by opening and closing themselves as energy-efficient active and passive systems.

question: How best to deploy energy in comprehensive ways at Fly Ranch?
answer: Monitor the full continuum, then educate, develop and conserve accordingly.

key Mapper texts:
Grose, L.T. & Sperandio (1978) "Geology of the Gerlach Hualapai Flat Geothermal Area, Northwestern Nevada.
Hualapai Flat, Nevada Weather Station, "Historical Weather Data," and "Data Table for Graphs."
Welch, A. + Preissler, A. (1990) "Geothermal Resources of the Western Arm of Black Rock Desert, Northwestern Nevada."

key Mapper layers:
_ Fly Ranch Weather Data
_ subsurface water + soil movement potential above bedrock
_ composite annual wind rose
_ solar radiance composite or composite shading _ study (haven't decided between these two yet)
_ USGS 1 kilometer / ½ kilometer coordinate grid
_ USGS topography model built by our team





PLACE _*relating to* position, view-shed, horizon, light + sensate-body phenomena

Central to lived experience at Fly Ranch the are perceptions of its layout by humans and non-humans in relation to the spatial distance around them—personal space, action space, and vista space. Information like occlusion, relative size, and height in the visual field determine their grasp of viewshed and horizon in relation to fluxuating texture gradients of vegetation, ground surfaces, and bodies of water reflecting light. Our mapping finds key optical phenomena framed by Lake Lahontan's nested basins: its 'foot-slope' valley sloping up to the horizon north, and west to the Granite Range ridges stepping down around to the southern 'bay spit' and across to the one of the Calico Hills, separating the ranch's playa from the lower one of Black Rock Desert. Within this, networks of diverse paths subdivide the ranch into a mosaic of diverse optical terrain types with lived experience situating differently within and between them, along the primary (yellow) boundary. Acuity of perception is determined by light-shadow conditions shifting dawn to dusk; orientations pivoting from horizontal ones of the day to vertical ones of brilliant night-skies while the ground comes alive with wildlife and human visitors roaming the site. A core concept emerges of a full sensory, spacetime-relational experience grounded in this sublime landscape—situated knowledges of its scents, wildness and the expanding imagination these give rise to.

question: how best to sustain social-ecological place at Fly Ranch?
answer: Fully-engage and remember it, then educate, conserve, and develop it according.

key *Mapper* texts:
Cutting, J. & Vishton, P. (1995) "Perceiving Layout and Knowing Distances," Perception of Space and Motion.
Fowler, C., et al. (2010) "Great Basin: people and place in ancient times."
Gibson, J.J. (1979) The Ecological Approach to Visual Perception.

key *Mapper* layers:
_ Landsat viewshed study or Fly Ranch Light Data(?)
_ Primary paths
_ drone video: key internal + external views (3)
_ Google Earth texture gradients
_ Fly Ranch landmarks/artifacts: natural/man-made
_ USGS 1 kilometer coordinate grid
_ USGS topography model built by our team