

Inventory and Monitoring of the Salt River in Phoenix

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Need for research: Many urban rivers, including the Salt River in the Phoenix metropolitan area, have been modified by damming, flow diversion, stream channelization, and floodplain conversion to urban lands. In cities throughout the world efforts are underway to restore impaired riverine ecosystem services. Along the Salt River, various federal, state and local organizations have initiated restoration efforts (Gerlak et al. 2009). At the same time, ongoing riverine processes have resulted in “self-assembled” riparian and aquatic communities. Ecological effects of some of these actions have been studied (White and Stromberg 2009; Makings et al. 2011; Banville and Bateman in press) but additional research is needed to assess restoration success and to identify effective ways to restore ecosystem services to urban riparian lands (Palmer et al. 2005; Hobbs 2007).

Experimental design: Our seven study sites along the Salt River include those that i) have undergone active restoration in the past decade; ii) are undergoing restoration; iii) are targeted for restoration; iv) have no restoration (negative controls); iv) have revegetated in response to discharge of water from urban storm drains, and v) are upstream of the urbanized region (positive controls). This spatial distribution of river sections presents an opportunity to answer:

Q1: Compared to control sites, do actively restored areas have greater diversity and different composition of species?

Q2: How do diversity levels of various taxonomic groups vary among sites that have been actively restored (terraforming, development of hydrologic infrastructure, tree planting, weeding) vs. passively restored?

Q3: How quickly do biodiversity patterns and water quality change, following restoration action?

Methods: As a first step, we are conducting multi-taxa biotic inventories (area searches), by zone, at each riparian site. Data will be collected approximately quarterly (March, May/June, August, October). The inventories focus on riparian plants, aquatic plants, terrestrial insects, reptiles, and birds. Our intent is to initiate a long-term monitoring program, and actively engage citizen scientists as well as university students in the collection of data.

Partners: We are interacting with Audubon Arizona to establish bird census protocol. We are working with the University of Arizona Extension Office (and Master Watershed Steward Program) to obtain measurements of streambed profiles and stream flow rate, and to establish photo points.

Opportunities: We invite collaborators to join us at this early stage of research.

No restoration;
El Mirage Road

Restoration underway;
B&M Wildlife Area

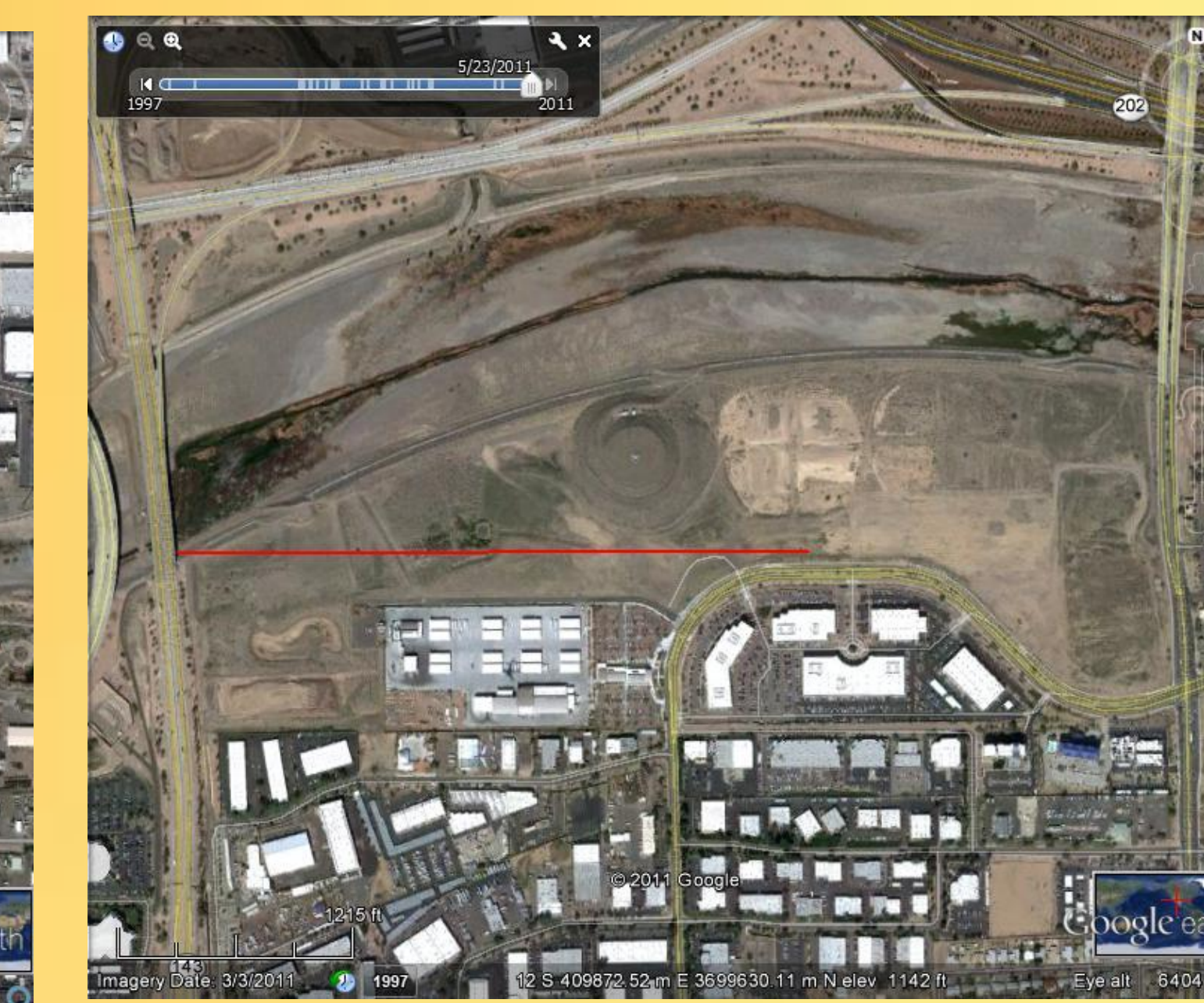
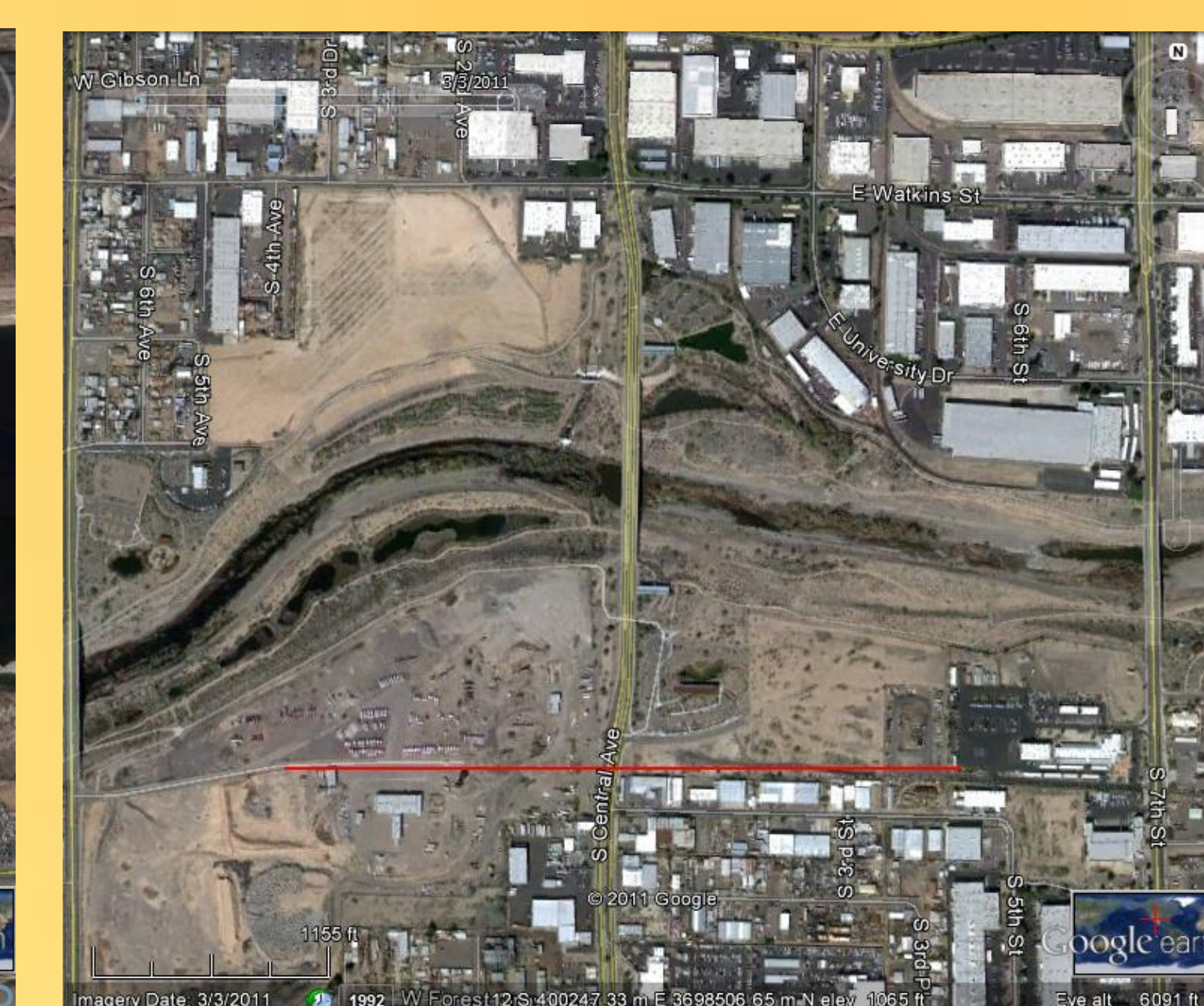
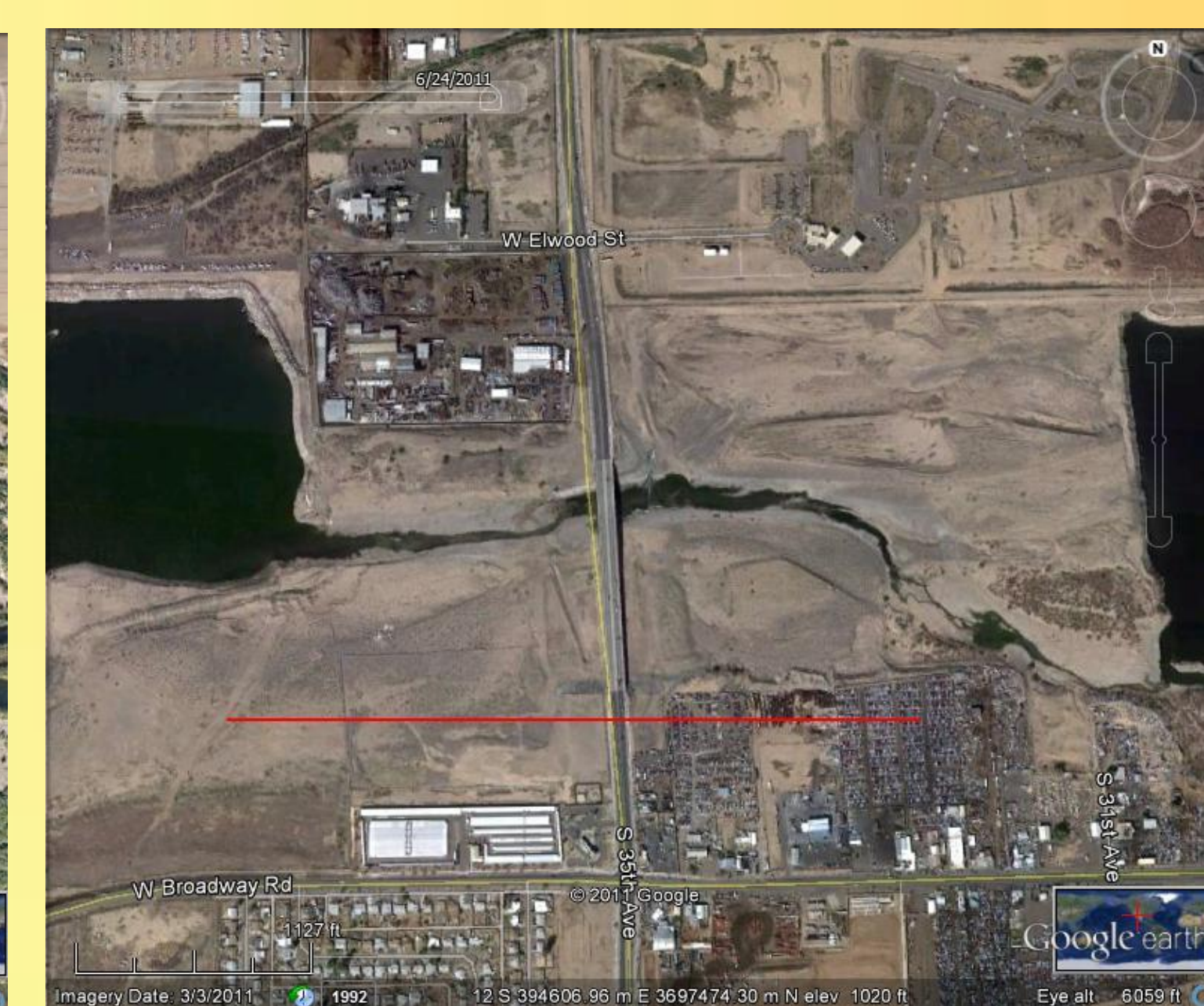
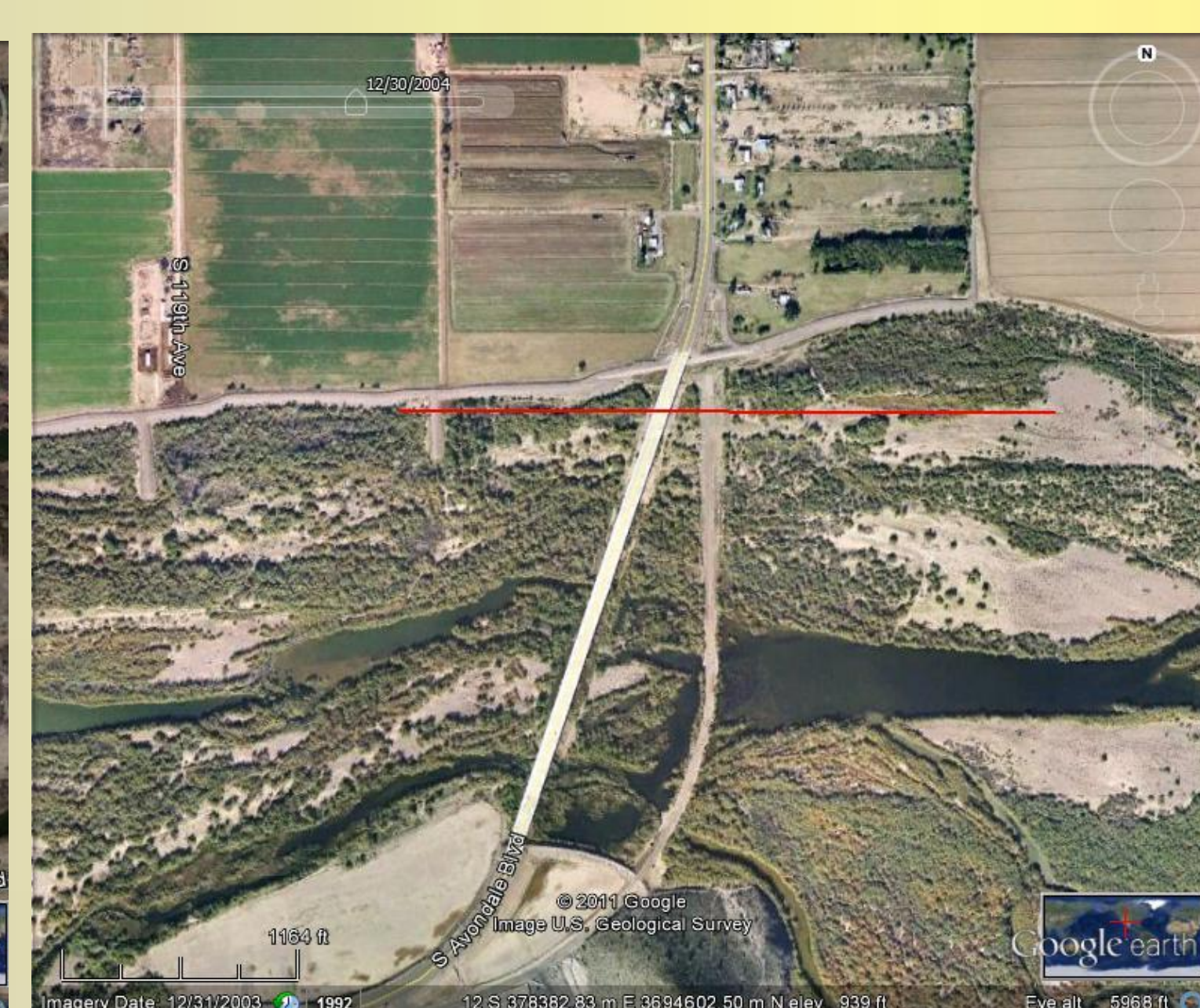
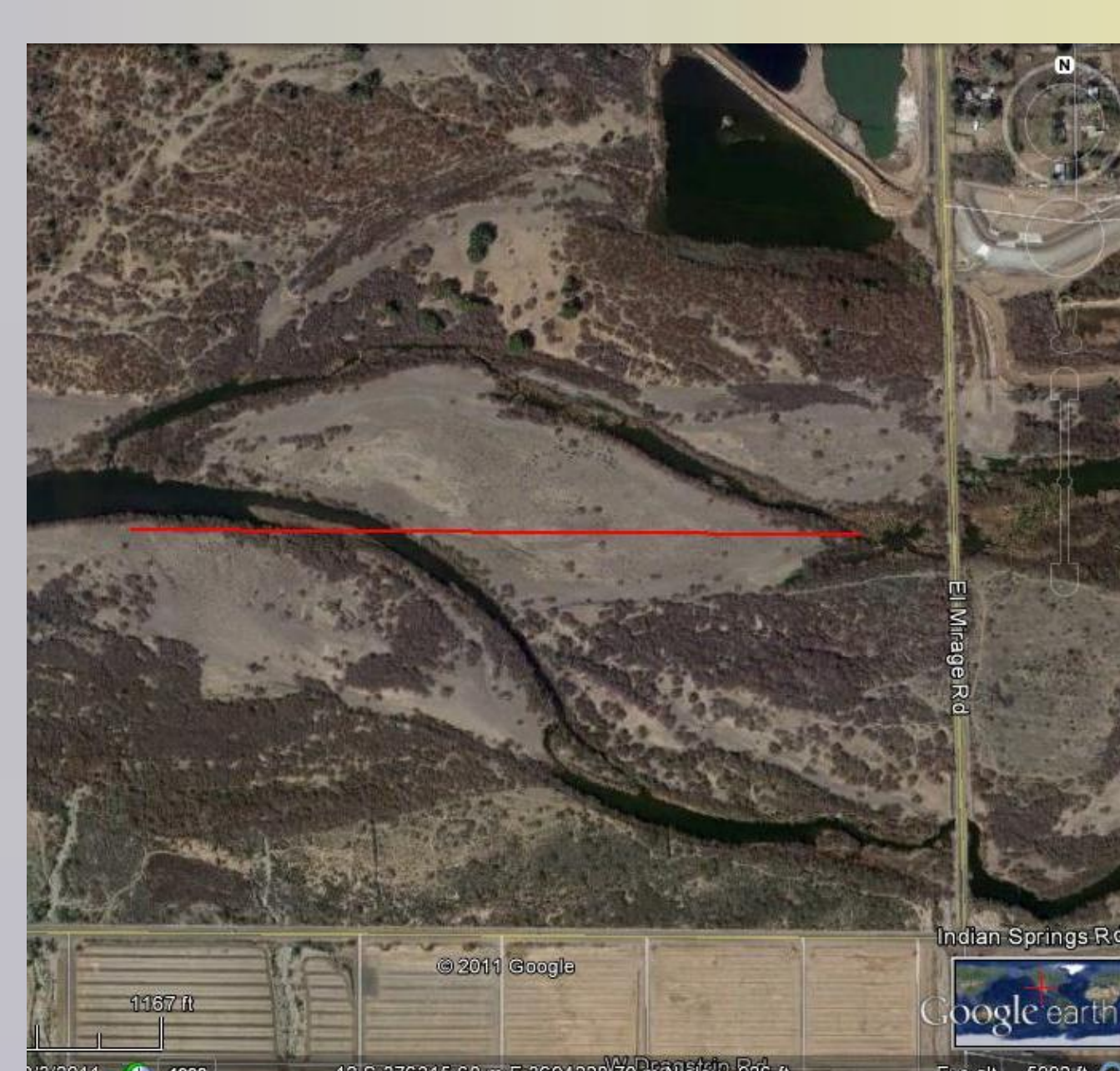
Restoration planned;
Rio Salado O’este

Active restoration;
Phoenix Rio Salado Habitat

No restoration;
Tempe-Priest Drive

Passive restoration;
Effluent, Price drain

Non-urban control;
Tonto Nat’l Forest



Synopsis of prior research: reptiles. Banville and Bateman (in press) compared herpetofauna between a restored site (Rio Salado), wildland control site (USFS) and unrestored urban site (Priest Drive). Herpetofauna abundance was similar in the urban restored reach and wildland control, however species diversity was lower in both urban reaches compared to the wildland site. Some lizard species, which are habitat generalists, are abundant in urban areas whereas more specialized arboreal species may take longer to colonize. The degree to which food resources and predator diversity limit lizard species diversity in urban reaches remains unknown.



Sceloporus magister, one of 4 species found at a wildland site but not at a restored urban site.

Synopsis of prior research: riparian vegetation. A comparison of urban storm drains, dry urban river sites, and an upstream control revealed that outfall from storm drains produces plant communities with similar or higher levels of richness than wildland sites. Diversity at the dry river reach was low, as expected, but the soil seed banks revealed potential for development of species-rich communities (White and Stromberg 2009). Floristic sampling of the marshy bed of Tempe Town Lake, exposed after dam failure, indicated that many opportunistic riparian plant species are present in the Salt River drainage and become abundant in the bare, wet sediments created by flood disturbance (Makings et al. 2011).

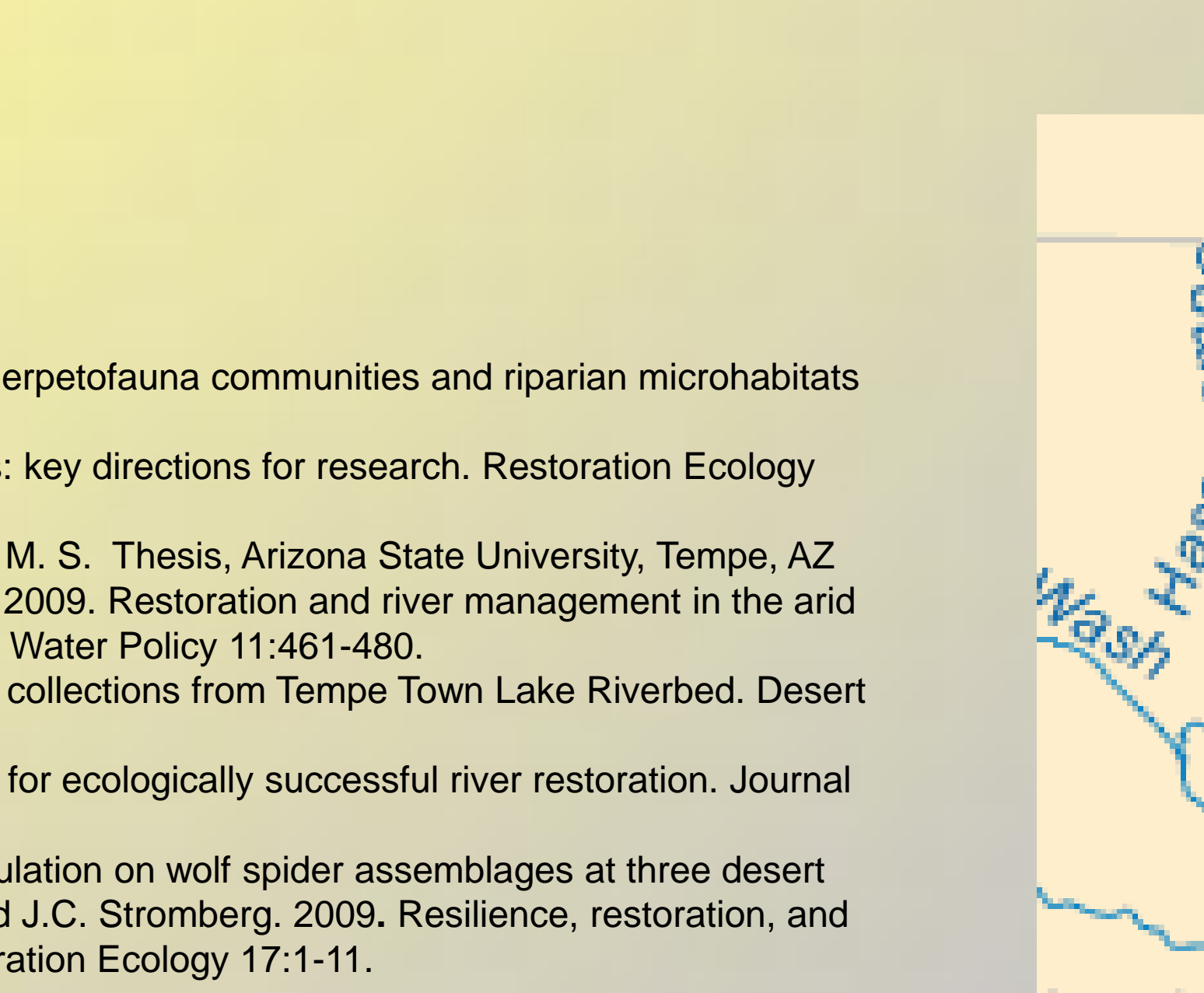
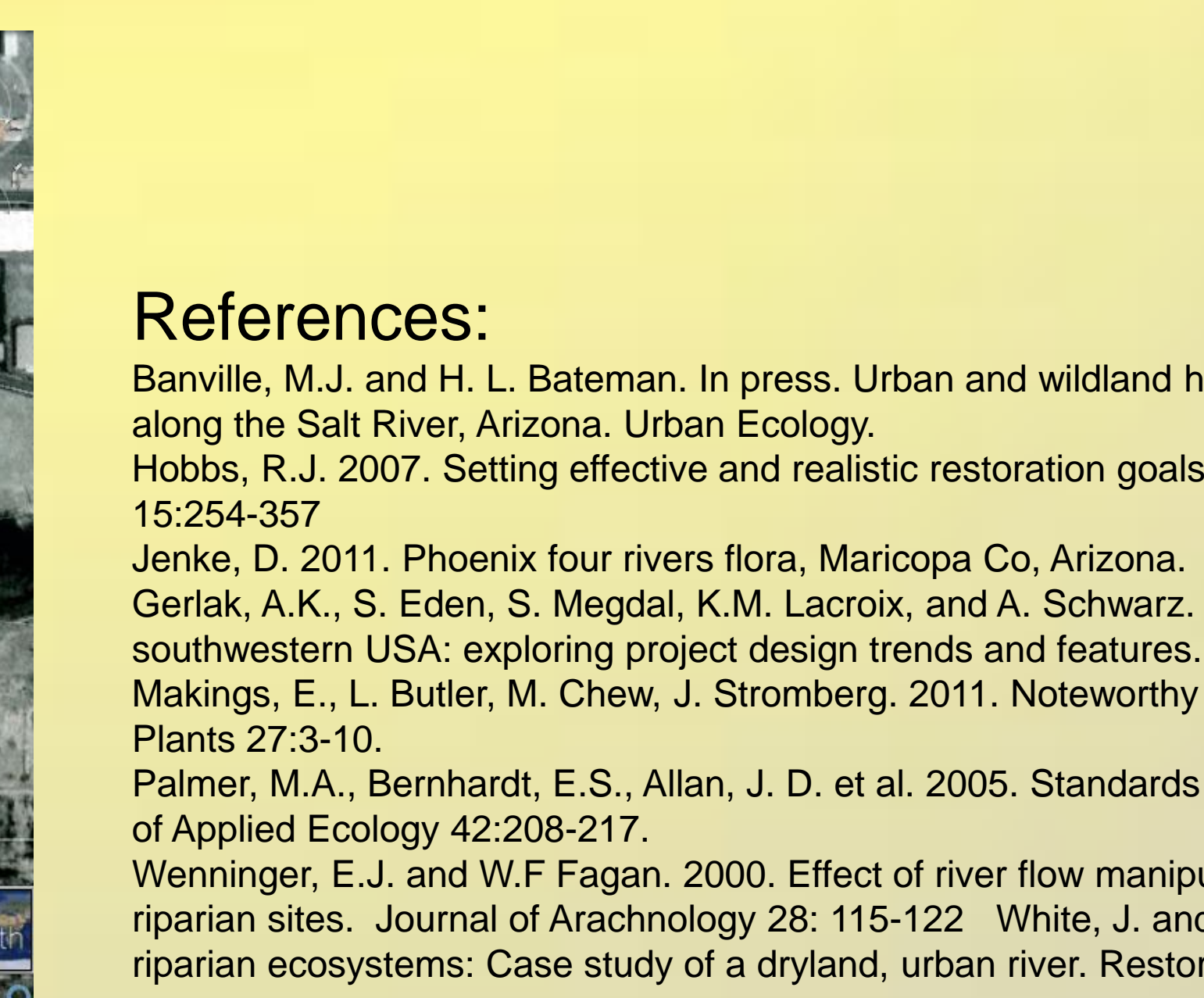


Ammania coccinea, one of several wetland plant species present in soil seed banks of the Salt River.

Synopsis of prior research: spiders. A comparison of 1) a riparian site above Granite Reef Diversion dam, 2) a site in in dry reach below the dam, and 3) a site along a drainage canal revealed diversity of spiders to be highest at the above-dam site. Moisture and temperature, rather than prey availability, were speculated to be controlling factors (Wenninger and Fagan 2000).

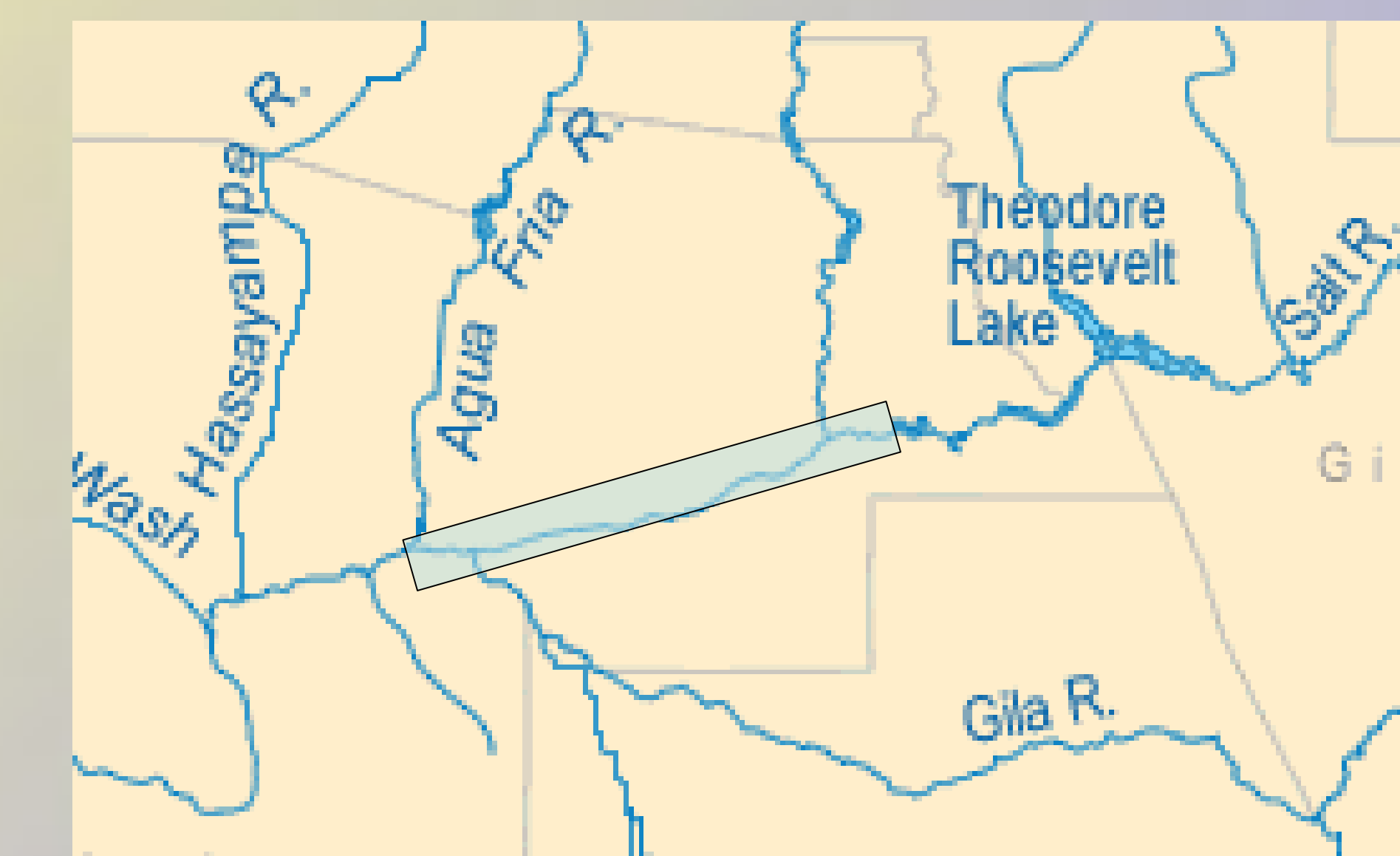


Sosippus californicus, a spider found only in wet reaches of the Salt River



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