

Arroyo Grande Creek Levees Project - Modeling Update

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Agenda

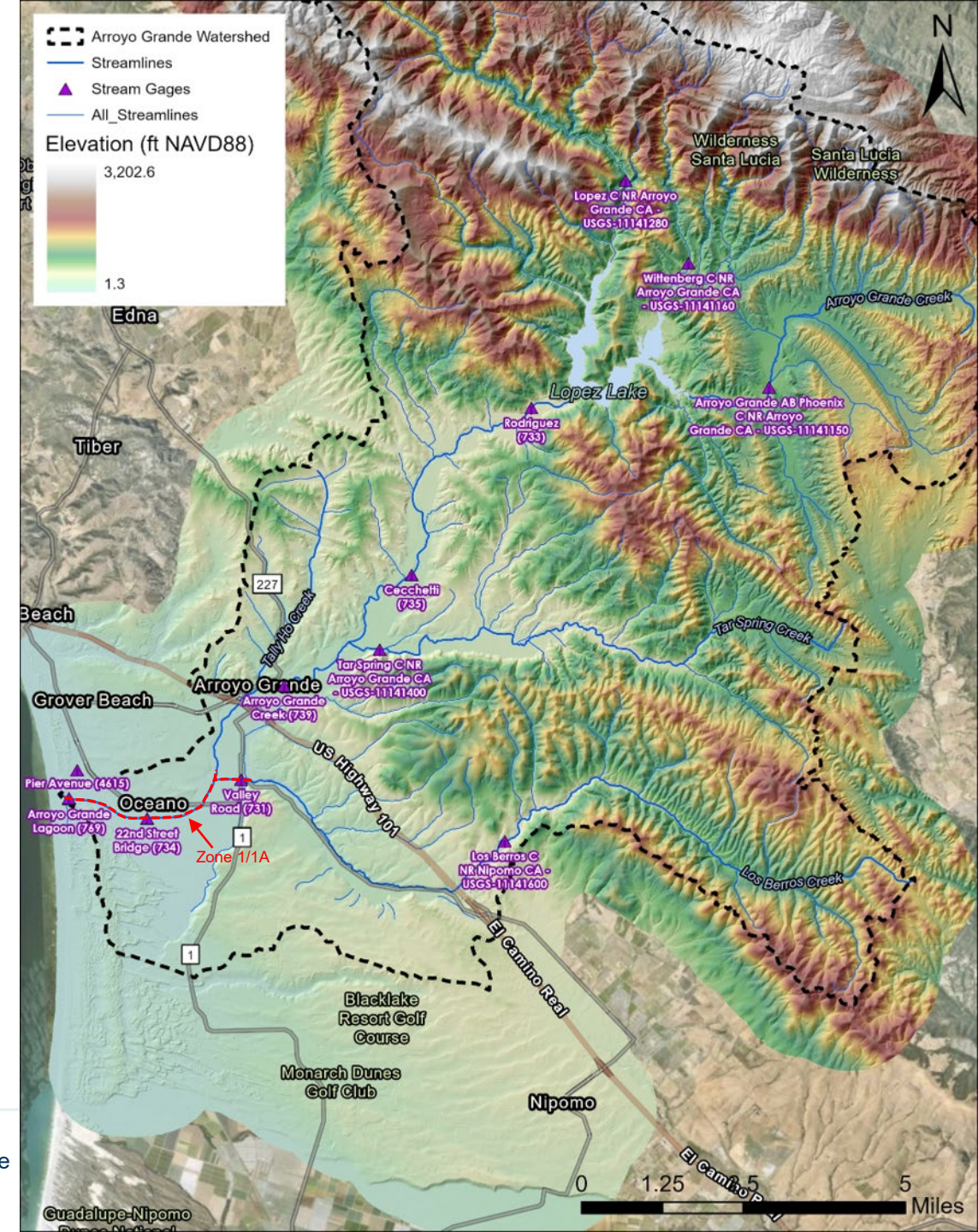
- ▶ Introduction
- ▶ Hydraulic Model Development
- ▶ EcoFIP Overview
- ▶ Modeling Results by Reach
- ▶ Evaluation Criteria
- ▶ Next Steps

Introduction

Project Goal: Increase flood storage in the Arroyo Grande Creek watershed using nature-based solutions

Approach: HEC-RAS hydraulic model using existing LiDAR terrain, paired with EcoFIP floodplain analysis. This can be updated/re-iterated for potential projects

Presentation Purpose: Present/discuss initial hydraulic modeling and EcoFIP Tier 1 results as well as potential project site locations

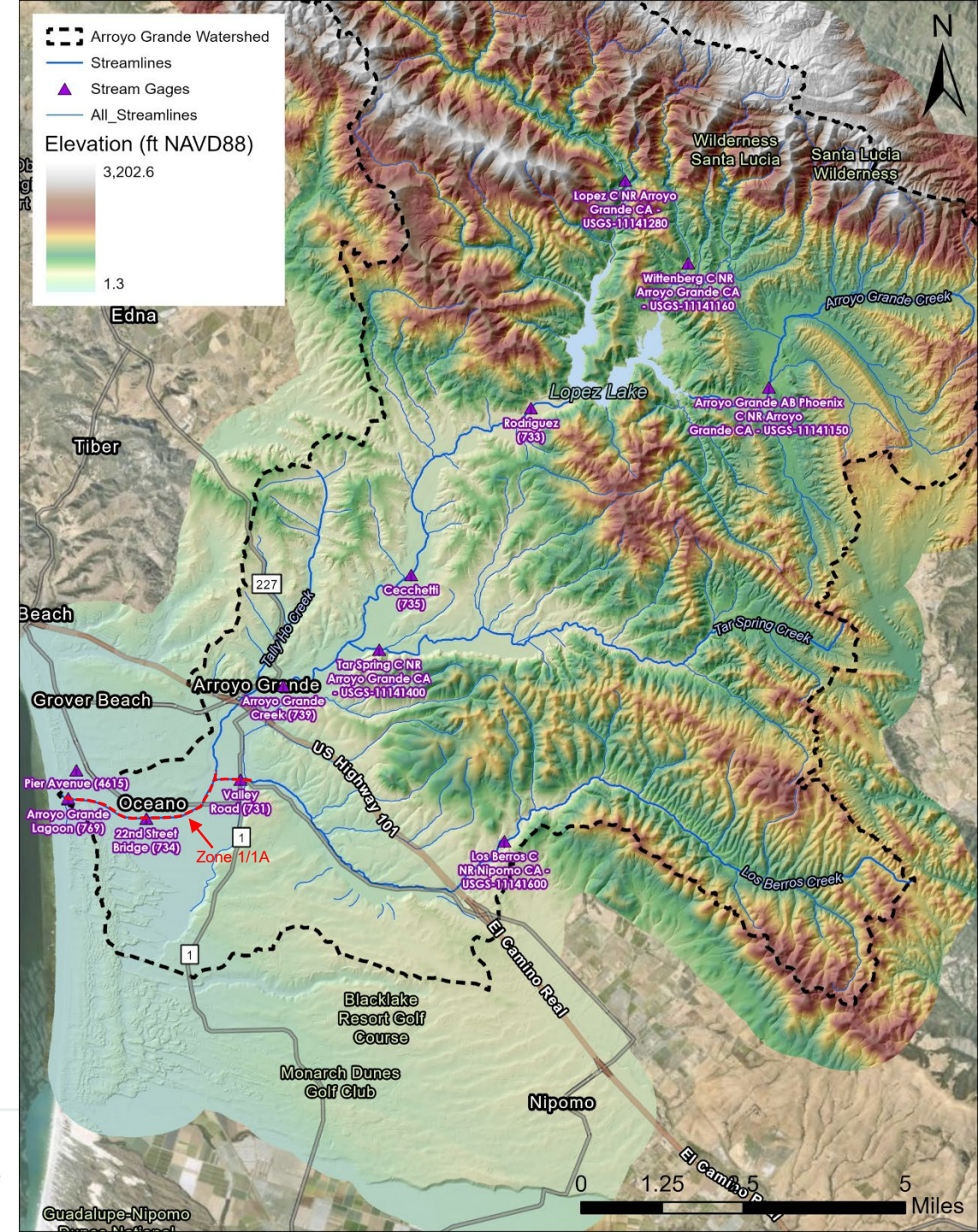




Hydraulic Model Development

Hydraulic Model

- Utilizing County LiDAR from FEMA 2018
- Stairstep hydrograph modeled on Arroyo Grande, Tar Springs, and Los Berros creeks
 - Tally Ho is not well resolved in the LiDAR and will require additional bathymetric data to resolve in the model
 - Reaches modeled separately
- Stream flow gages as well as FEMA and USACE recurrence flows have informed our model boundary conditions
- Downstream tidal boundary at the ocean (MHHW)
- Different land use conditions with spatially varying roughness

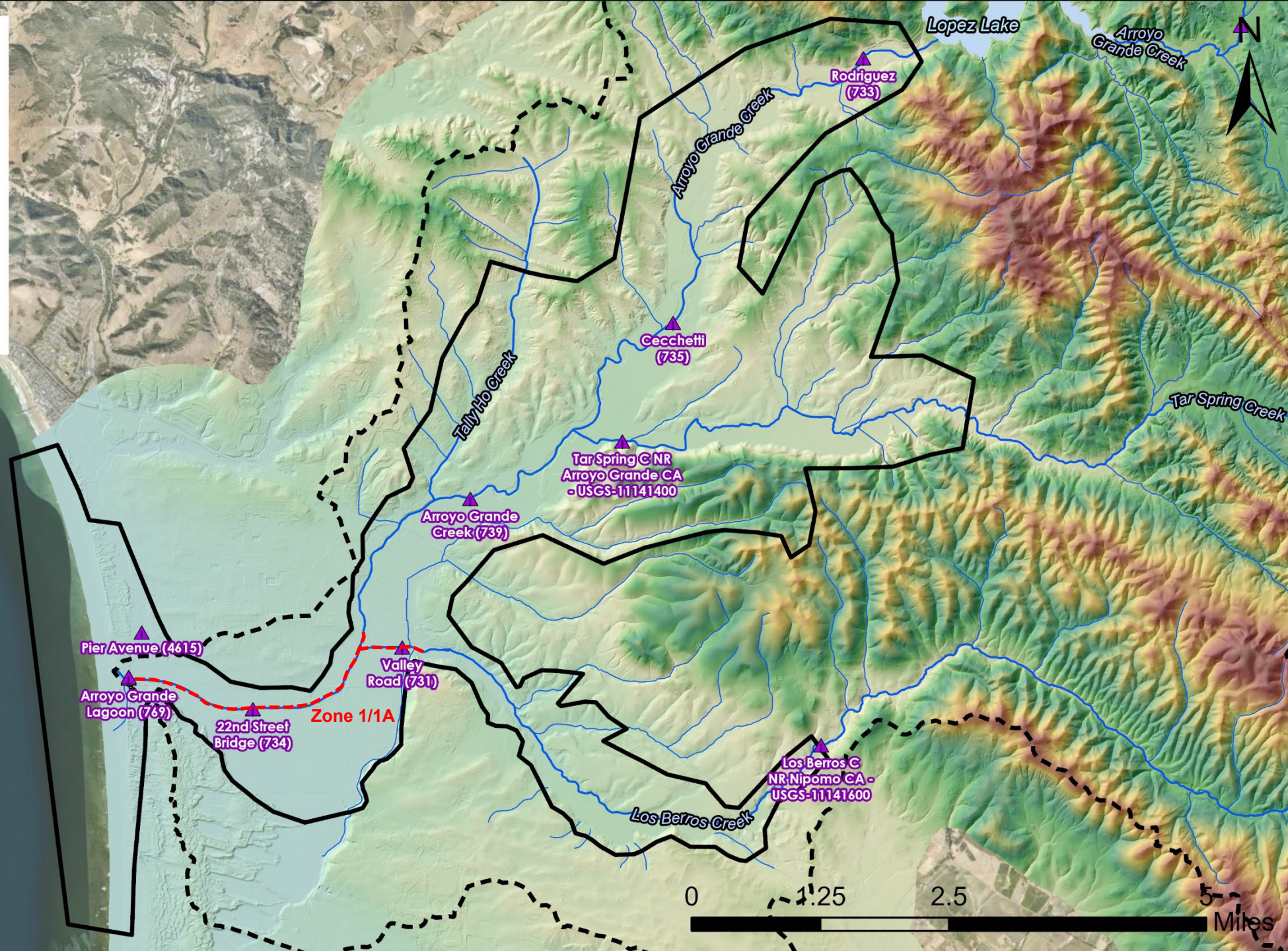


- Streamlines
- Stream Gages
- Arroyo Grande Watershed
- Model Domain

Elevation (ft NAVD88)

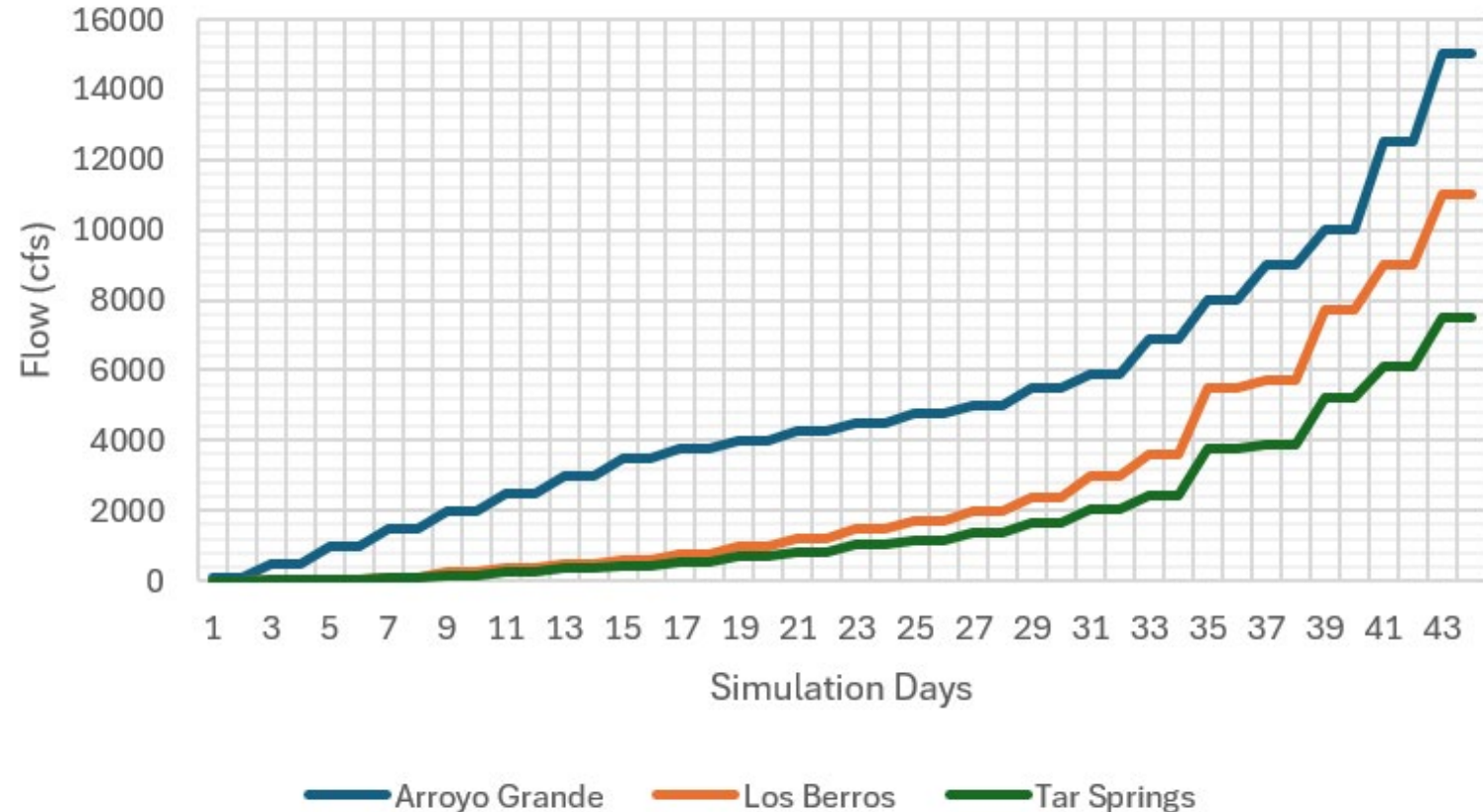
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1.3



Hydraulic Model Development

- Key tributaries modeled:
 - Arroyo Grande
 - Tar Springs
 - Los Berros
- Modeling challenges:
 - Dated/limited flow gauge data
 - FEMA/USACE recurrence interval flood flow values are also dated
 - LiDAR does not fully resolve Tally-Ho
 - Structures need to be better understood within the model domain

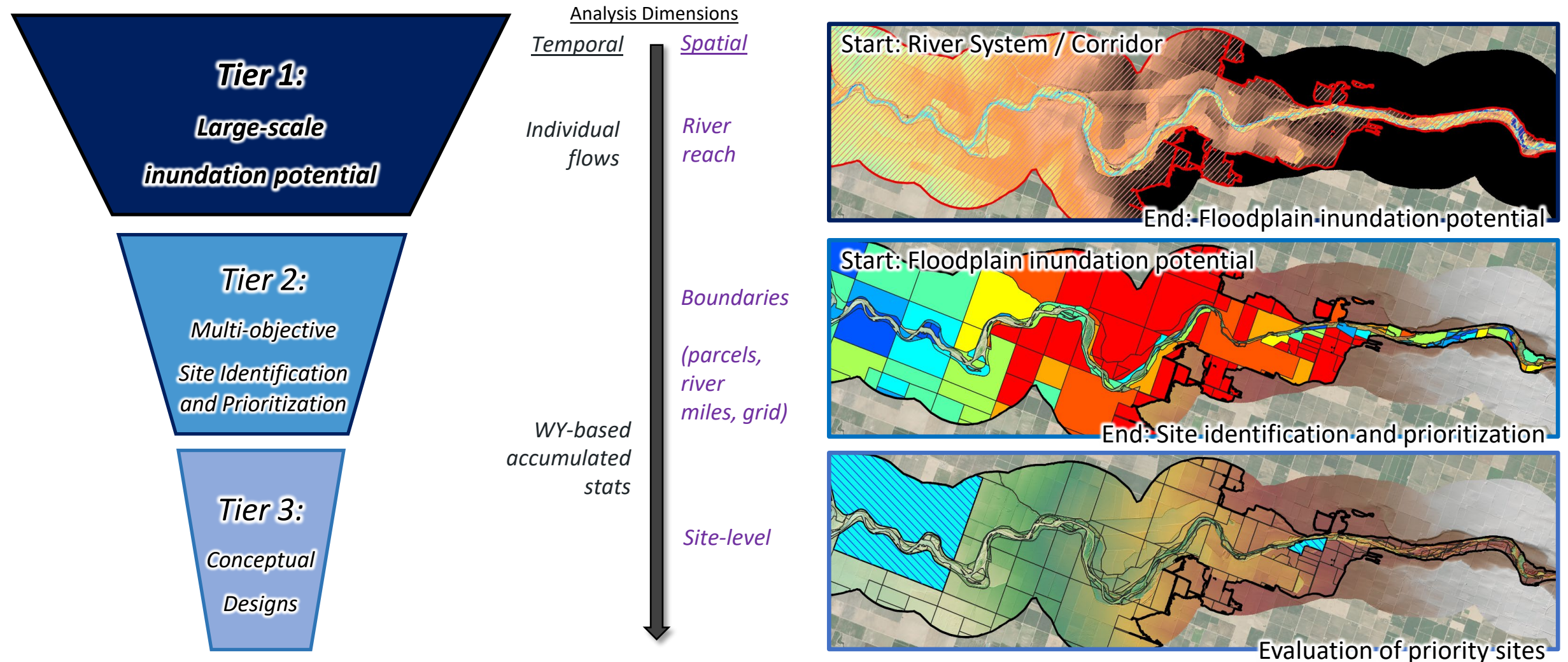


- Simulate a complete range of flows (baseflow to 100-yr flood) to look for project opportunities



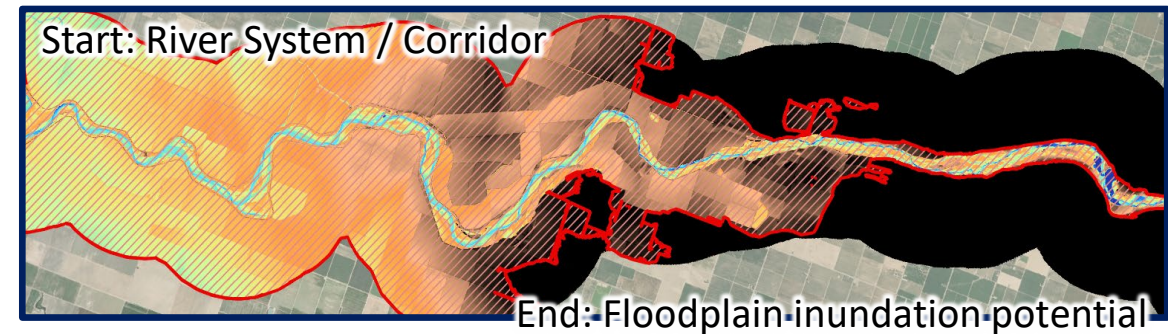
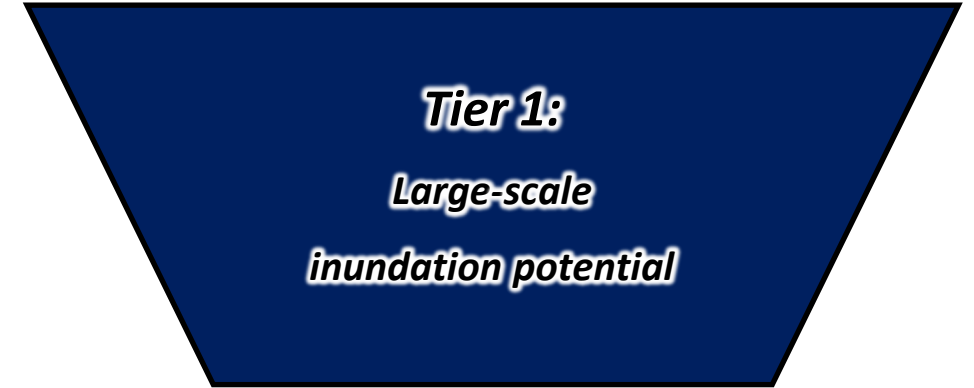
EcoFIP Overview

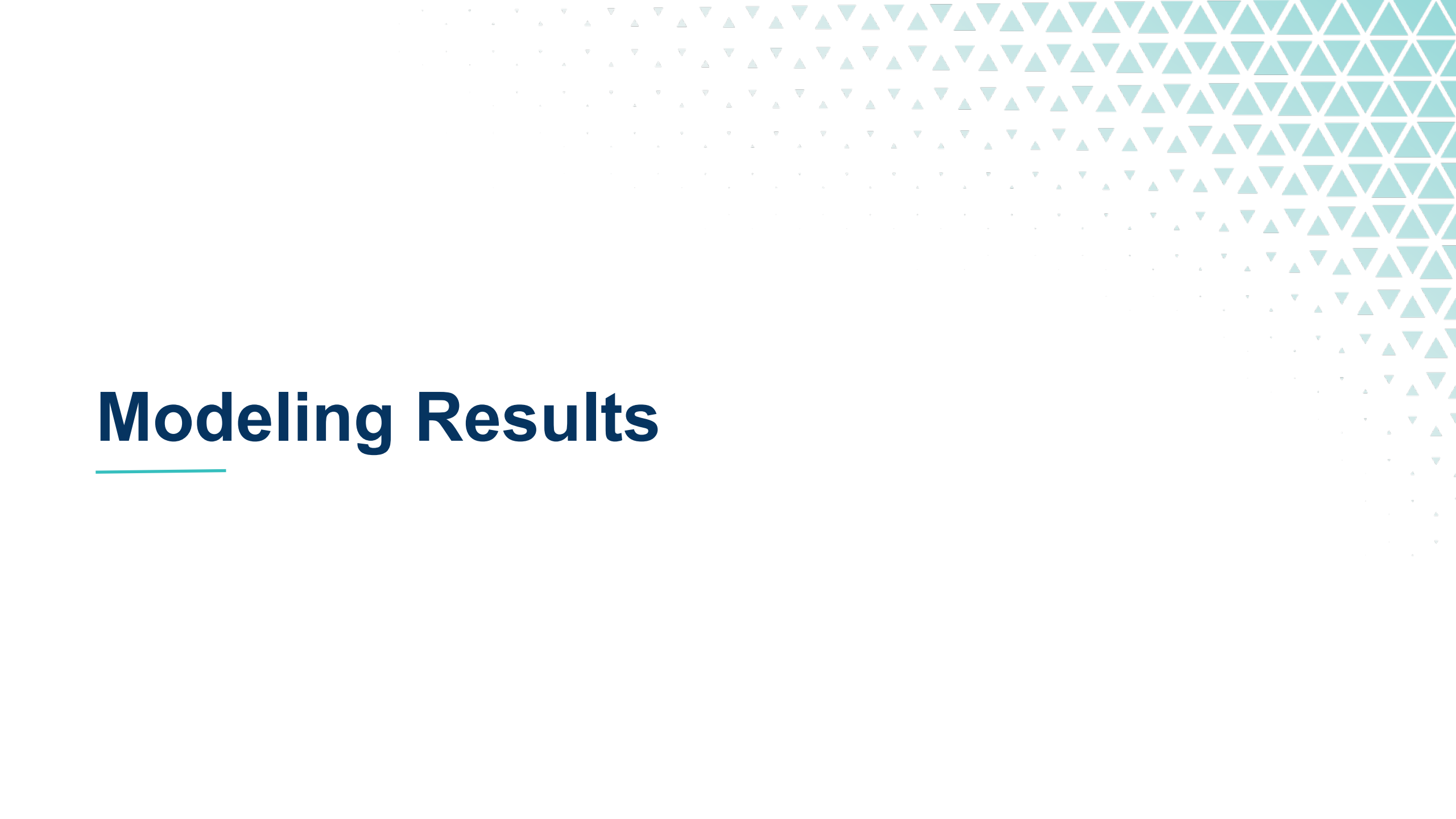
The EcoFIP Methodology



EcoFIP Overview

- Initial Tier 1 EcoFIP modeling is complete for Arroyo Grande, Tar Springs, and Los Berros creeks
- Reaches were analyzed individually to isolate backwater effects and avoid cumulative downstream flow impacts
 - They will be combined in Tier 2/3
- EcoFIP Tier 1 is **NOT** a flood model – it extrapolates river WSE onto the floodplain to show **where** there is **opportunity** to reconnect river and floodplain, not where flooding will happen
- Activation maps show the flow needed to match floodplain elevation, assuming equilibrium flow

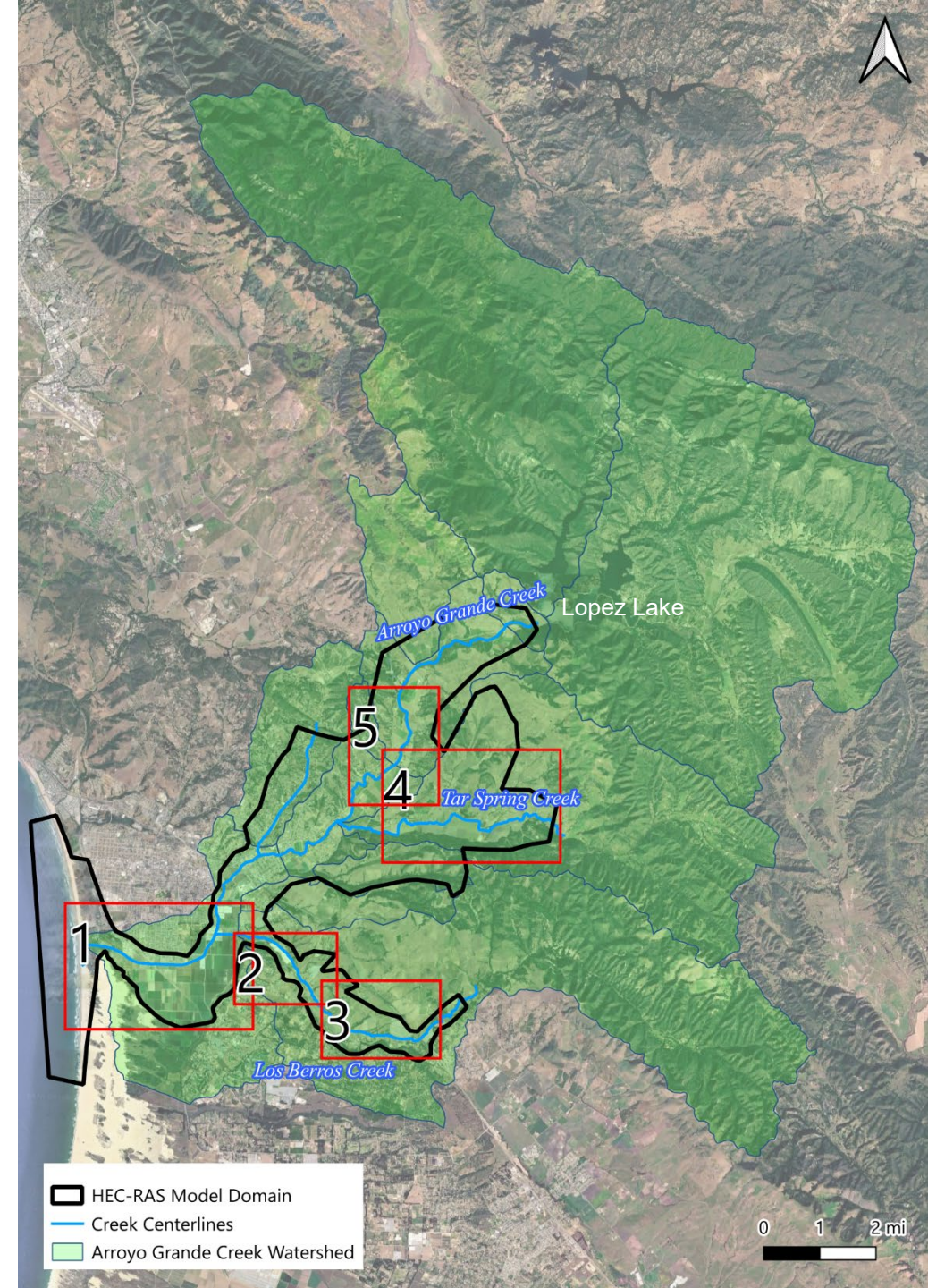




Modeling Results

Hydraulic Model

- Extends from the Pacific Ocean to Lopez Lake
- Spatially varying resolution
- High points (i.e. levees) are enforced with breaklines
- Hydraulic results used as input for EcoFIP analysis



**Voluntary Property Purchase
2325 Creek Rd., Oceano, CA**

Area of low freeboard
and first overtopping

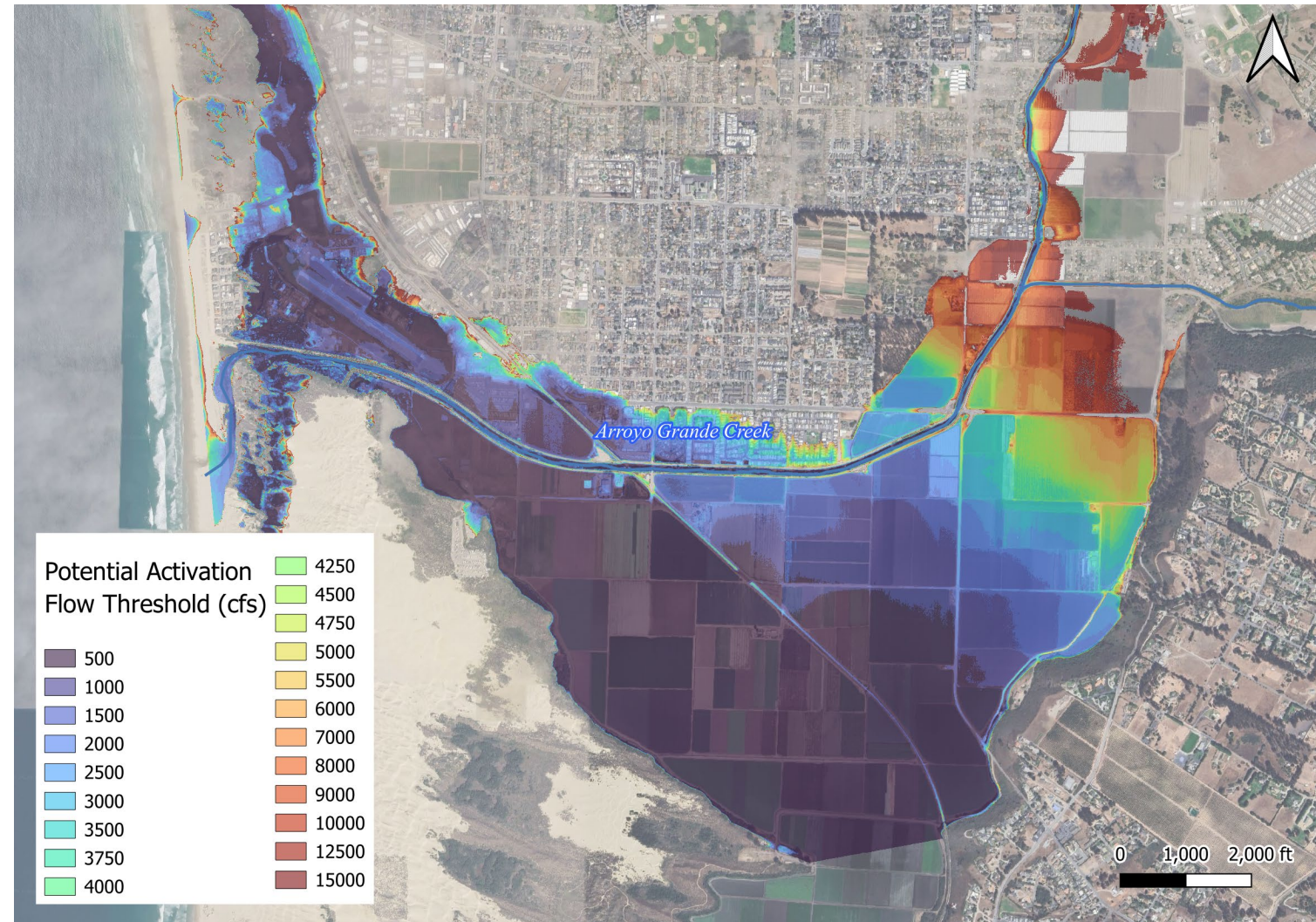


500 ft

EcoFIP Results

Arroyo Grande - DS

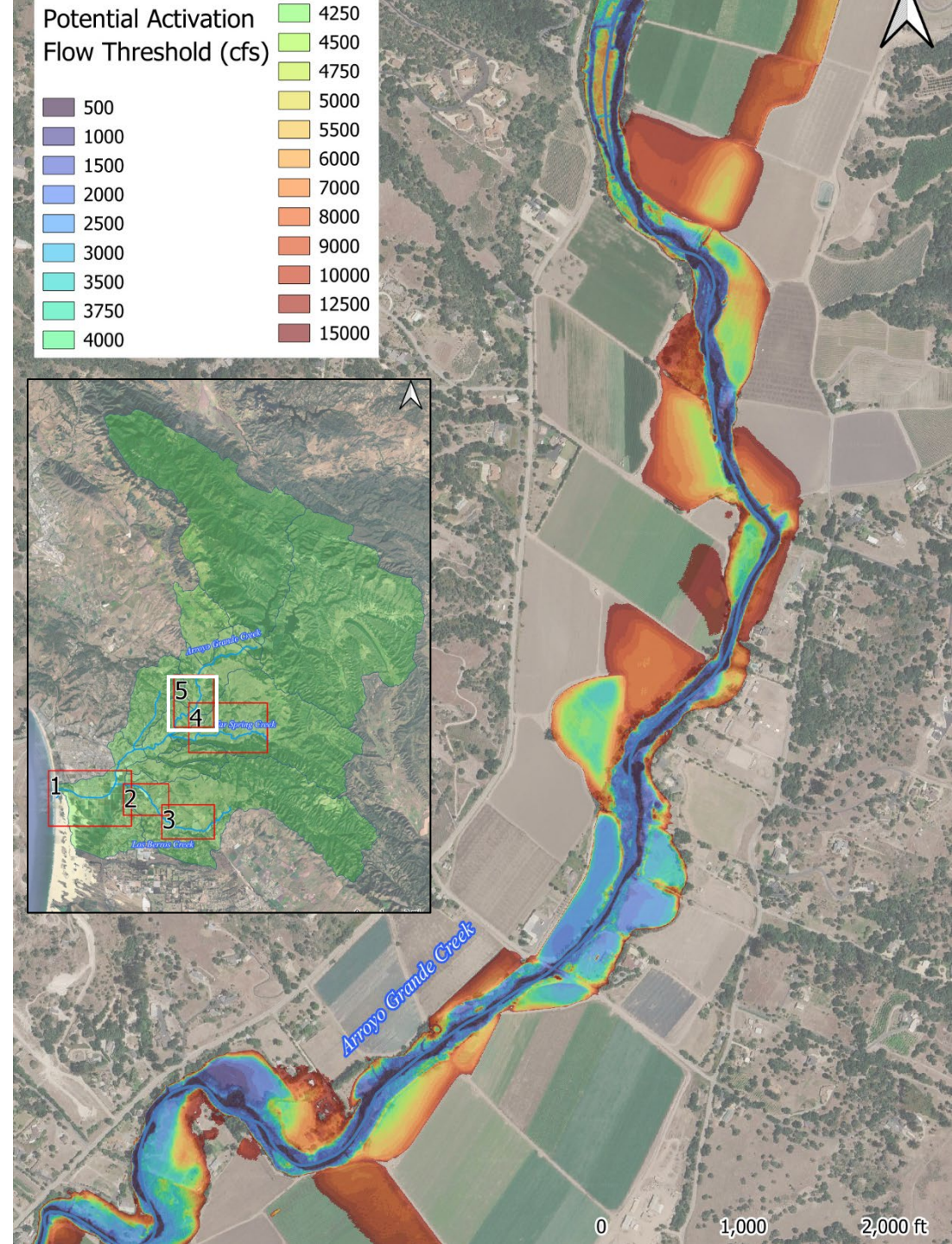
- Downstream Arroyo Grande
Comparison of DEM elevations to
in-channel WSE
- Potential activation flow threshold
combines height above river maps
- Project specific results – first tool
that we use without making
alterations to the terrain. These
maps help point out locations
where we may have project
potential.



EcoFIP Results

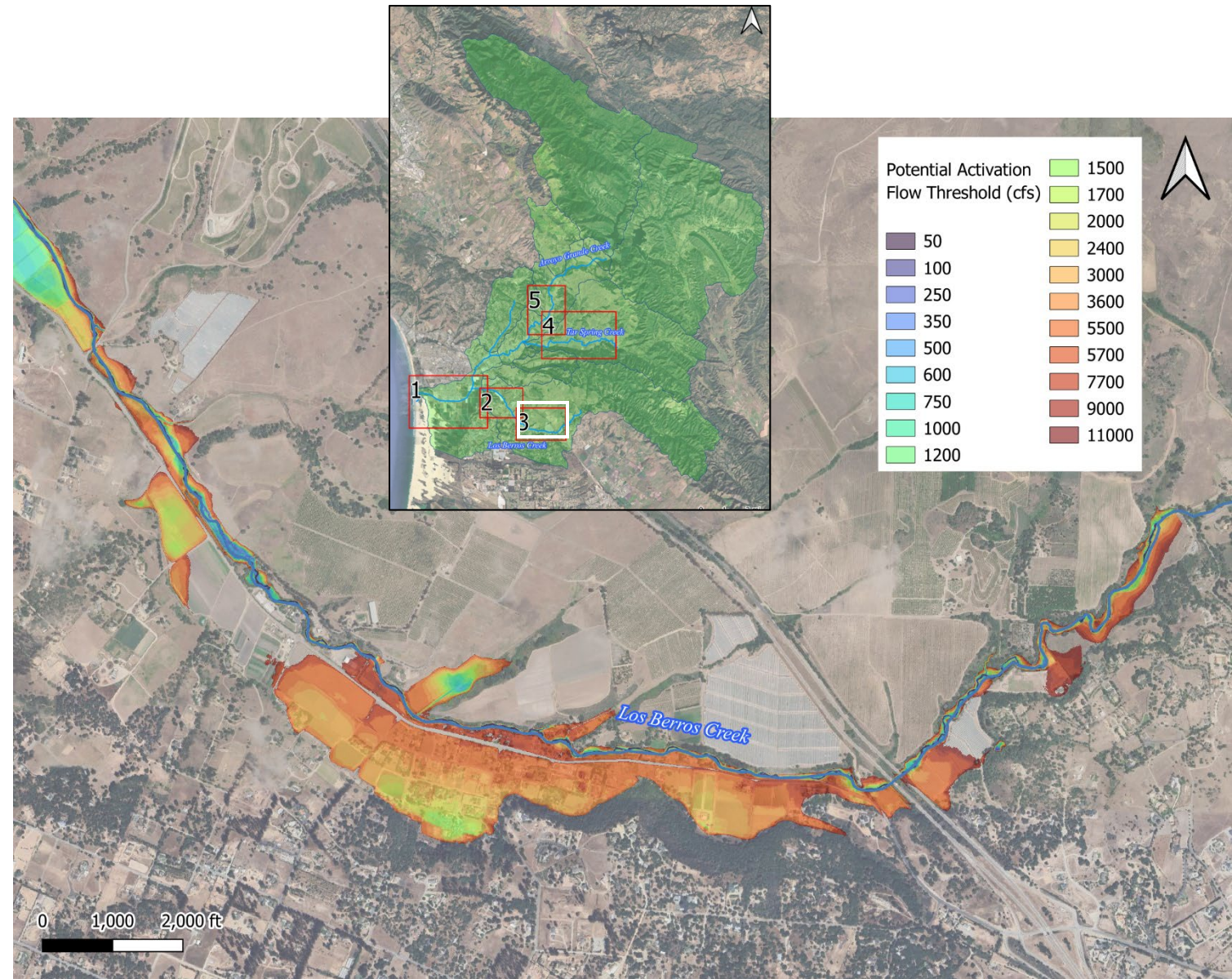
Arroyo Grande - US

- Colors highlight areas with potential connectivity to creek
- Blue/green colors highlight areas that activate at lower flows – good for habitat
- Areas that activate at higher flows may highlight potential for backwater areas or flood water basins
- Opportunity to create a “string” of projects
- Do blue/green areas currently flood?



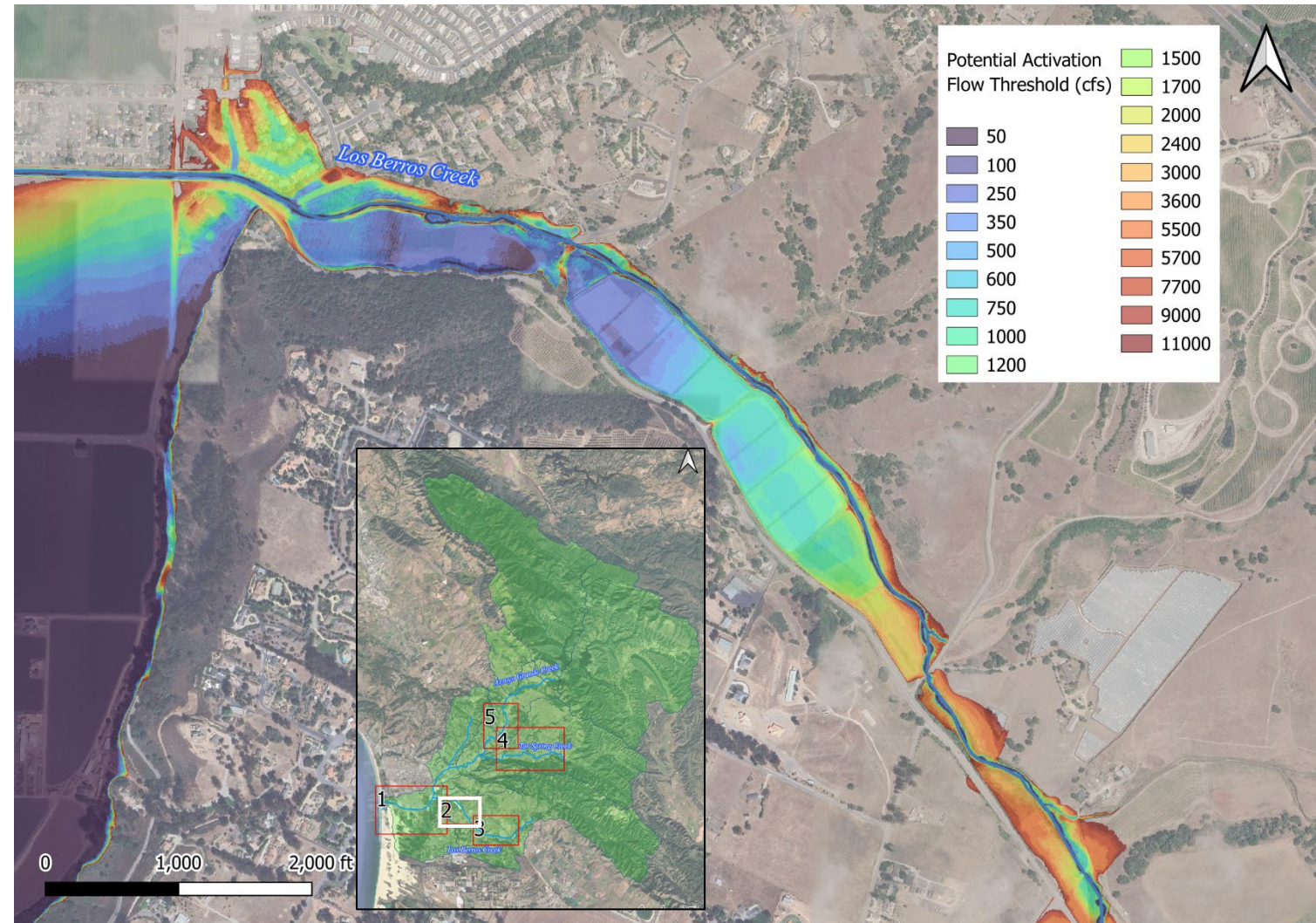
EcoFIP Results Los Berros - US

- Upstream Los Berros comparison of DEM elevations to in-channel WSE
- Roadway and housing constraints
- Lower elevations on the south side of valley – creek located to north side of valley?



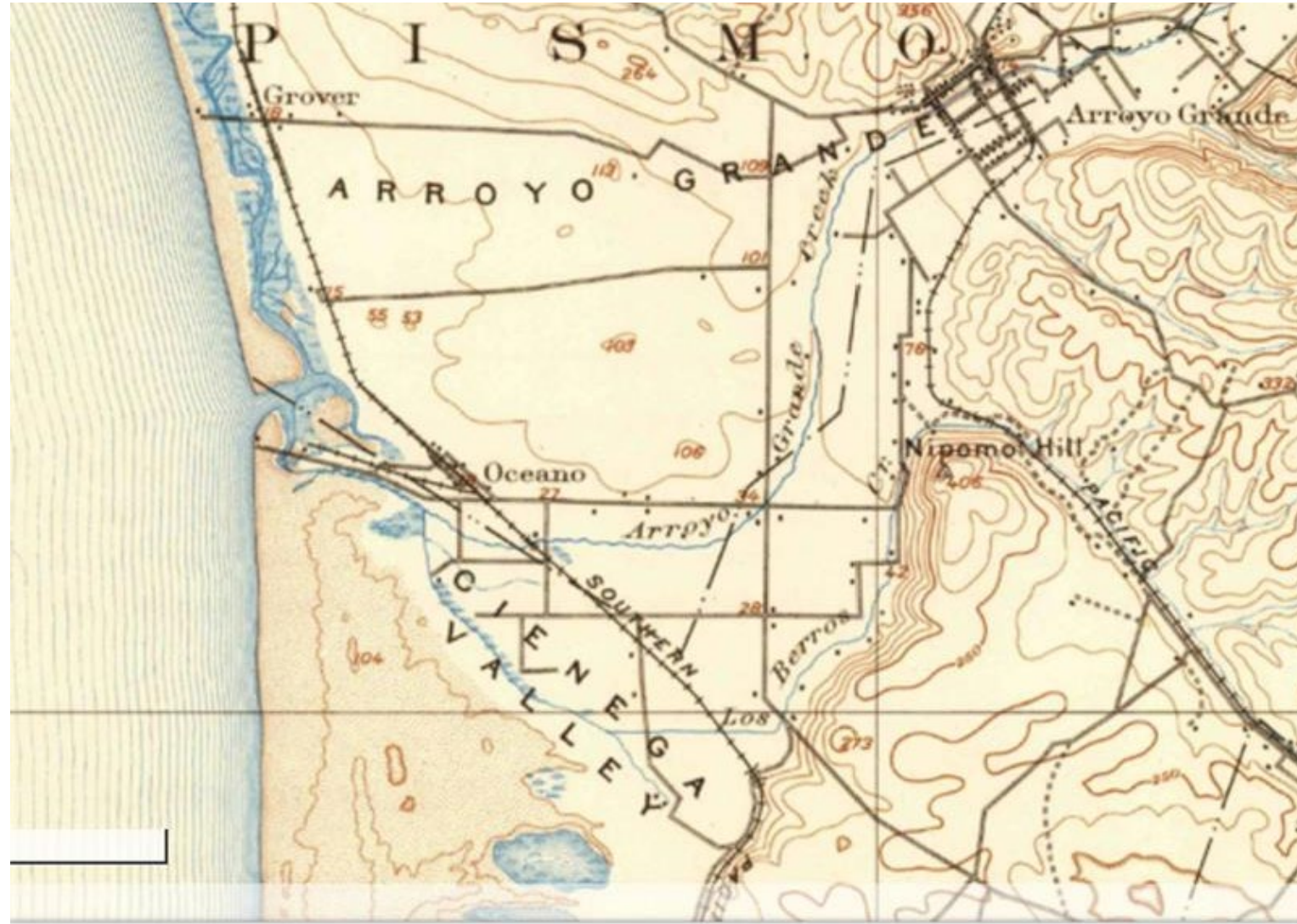
EcoFIP Results Los Berros - DS

- Downstream Los Berros comparison of DEM elevations to in-channel WSE
- Better connection – no roadway constraint
- Historic alignment of Los Berros on south side of valley? (lower el.)



1900's Los Berros Alignment

- Los Berros historic U-shaped alignment flowed south before reconnecting back to main AG channel
- Why was Los Berros redirected originally in 1950s?
- Should reestablishing the original alignment be considered for potential flow reduction to AG?
- Is there a need for more groundwater recharge in the valley?



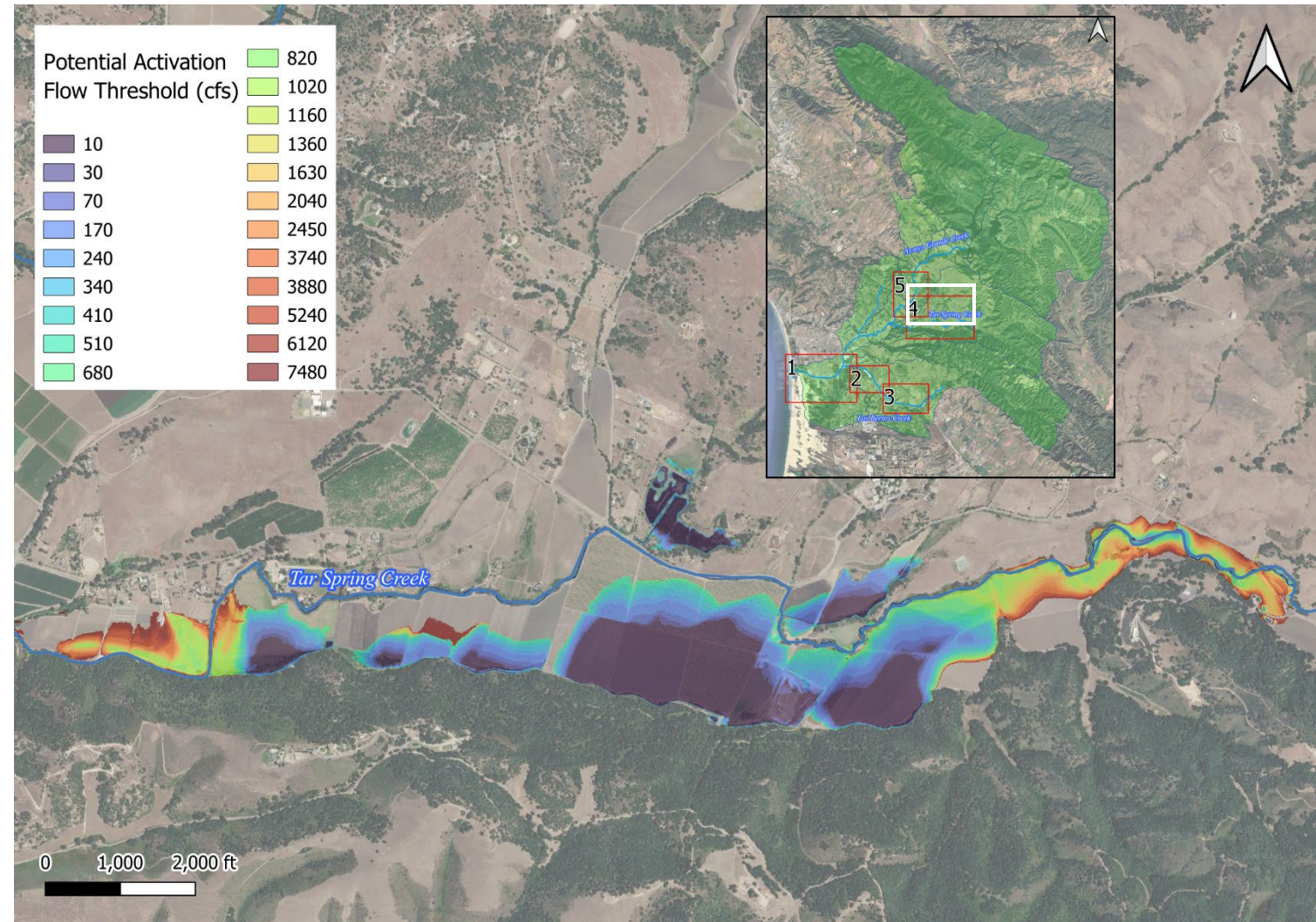
1939 Los Berros Alignment

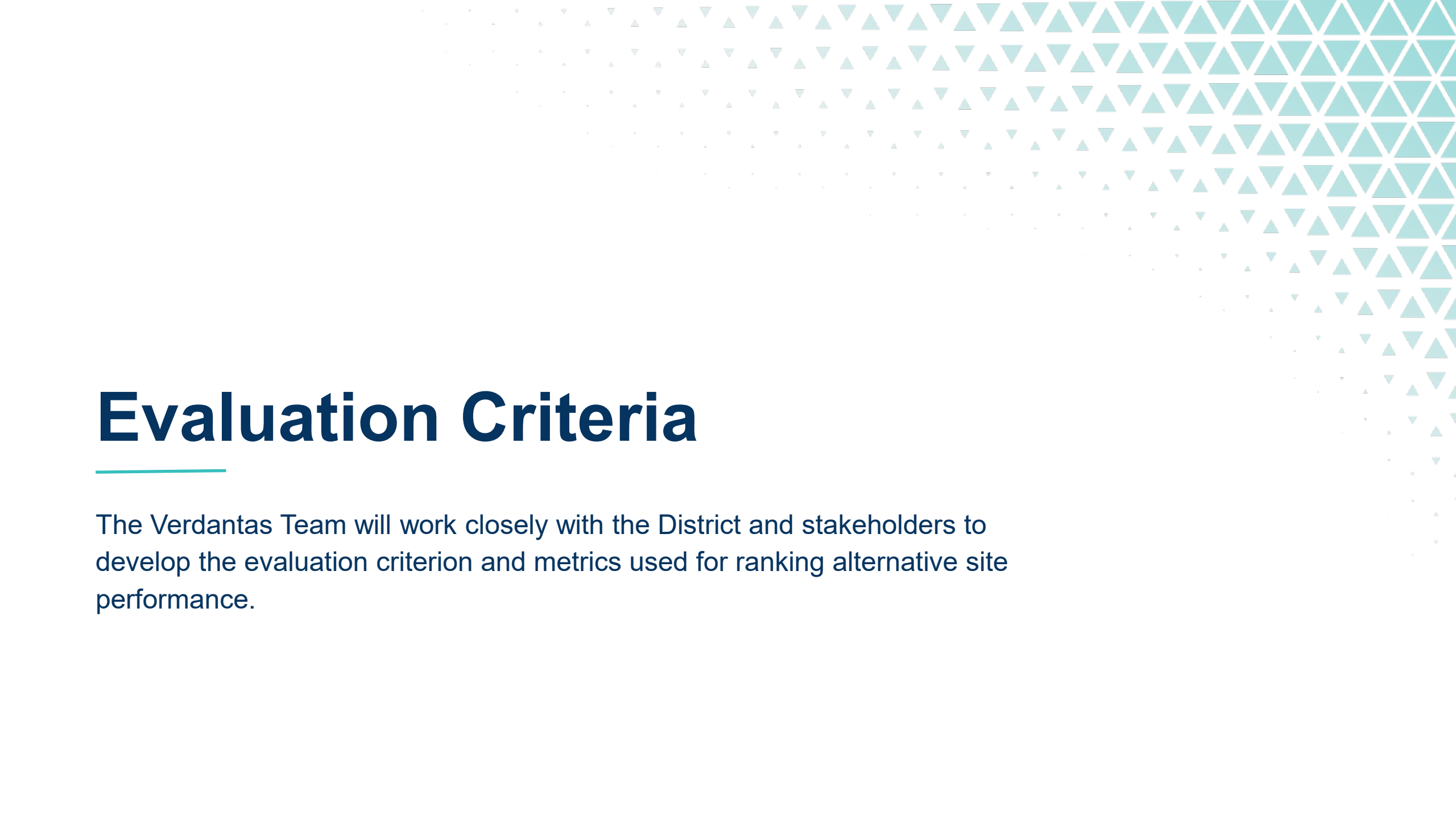
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EcoFIP Results Tar Springs

- Tar Springs comparison of DEM elevations to in-channel WSE
- Channel perched above south side of valley
- Potential for flood storage – large space for peak flood flow to spread out
- Incised areas where there is no activation potential





Evaluation Criteria

The Verdantas Team will work closely with the District and stakeholders to develop the evaluation criterion and metrics used for ranking alternative site performance.

Preliminary Evaluation Criteria

Criteria grouped into four categories

Hydrology & Flood Risk

- Flood risk reduction
- Hydraulic/geomorphic stability
- Groundwater recharge impacts
- Climate change resilience and alignment with regional climate adaption goals

Ecological Performance

- Ecological uplift/habitat function
- Habitat suitability for steelhead (spawning, passage, and rearing)
- Habitat suitability for other species (CRLF, TWG, SW pond turtles, waterfowl, shore birds, etc.)
- Riparian habitat enhancements
- Lagoon habitat impacts
- Invasive species management

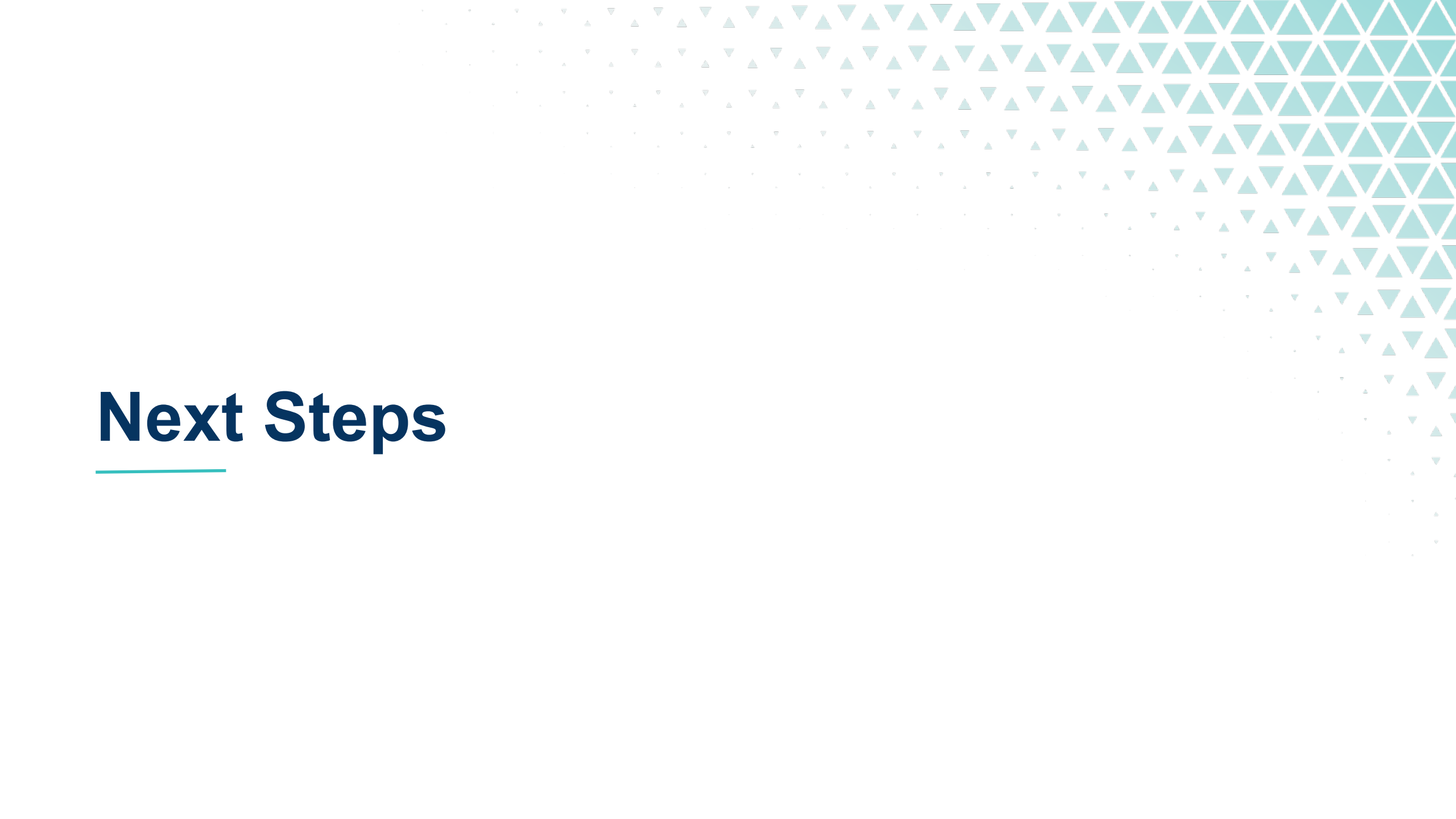
Compatibility & Resilience

- Stakeholder and other programs compatibility / acceptance
- Agricultural compatibility
- Parkland and Open Space compatibility
- Managed wetlands compatibility
- Adaptability and resilience

Feasibility & Cost

- Land acquisition feasibility/cost
- Capital cost
- Constructability & phasing
- O&M requirements/cost
- Regulatory and permitting feasibility/complexity
- Landowner/community/stakeholder support





Next Steps

Next Steps

- Finalize hydrology and RAS calibration (Jan & March storms in 2023)
- Next EcoFIP Tiers
 - Tier 2 will give us an idea of inundation and habitat under typical flow regime
 - Identify a minimum of 9 Nature Based alternative sites with flood storage potential and consider alternatives to advance to Tier 3 design
- Field work to inform structures in model such as bridges to be completed during Tier 2
- **Questions?**



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Thank You