SITE-SCALE RESTORATION PLANNING ON THE LOWER VIRGIN RIVER, NEVADA

MORMON MESA CASE STUDY

B. Orr, T. Dudley, E. Bickmore, R. Vaghini, A. Lambert, G. Leverich

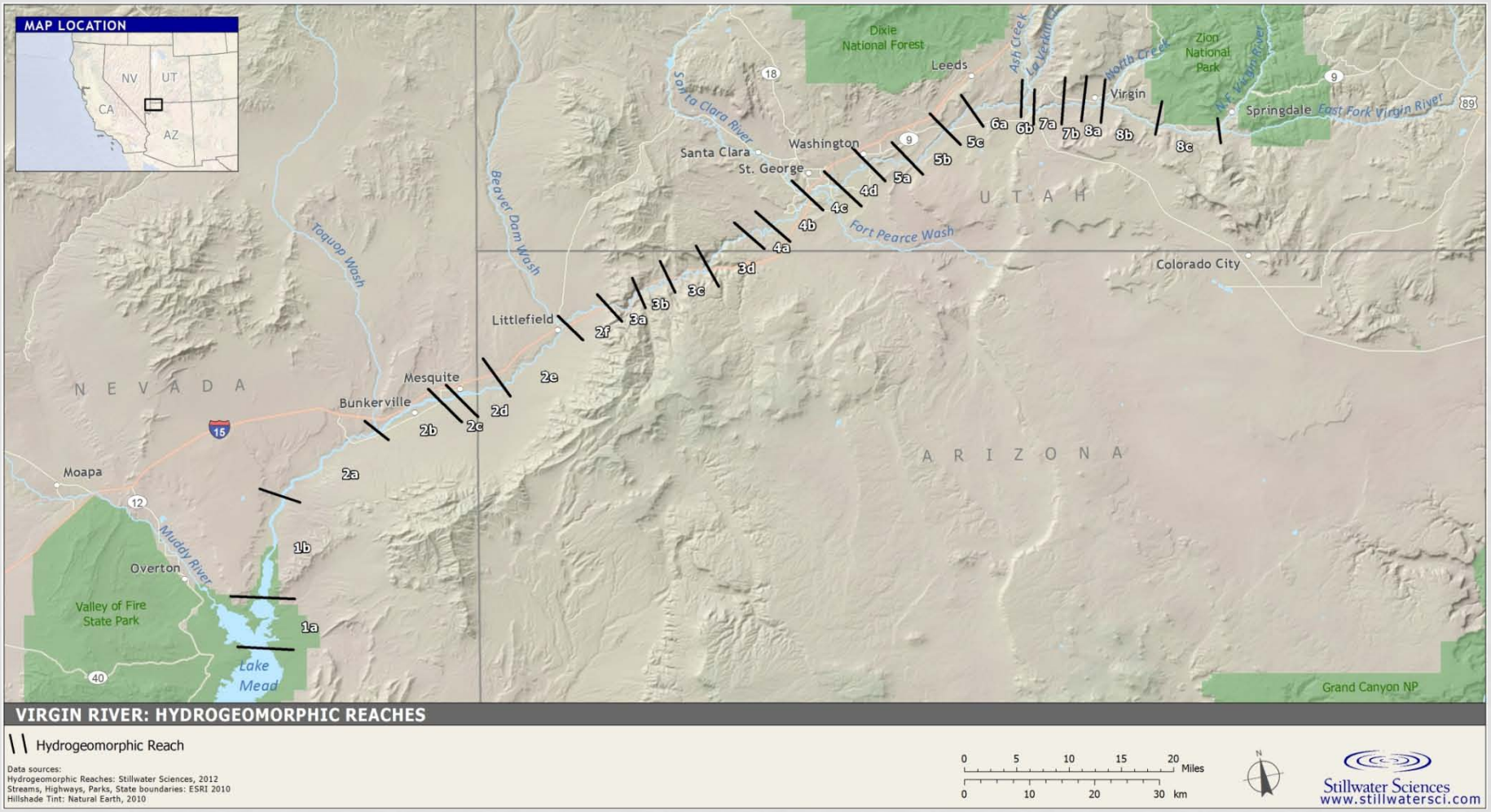
CLARK COUNTY VIRGIN RIVER RESERVE UNIT 1

- Goal: Develop a restoration plan to enhance and expand existing habitat for the SWFL and other MSHCP covered riparian birds
- 80 acre parcel
  - Existing Vegetation: Dense Tamarisk, scattered Goodding's willow and a few other natives

Project Partners

- Clark County Desert Conservation Program
- Great Basin Institute
- Partners in Conservation
- Stillwater Sciences
- UC Santa Barbara
- Walton Family Foundation

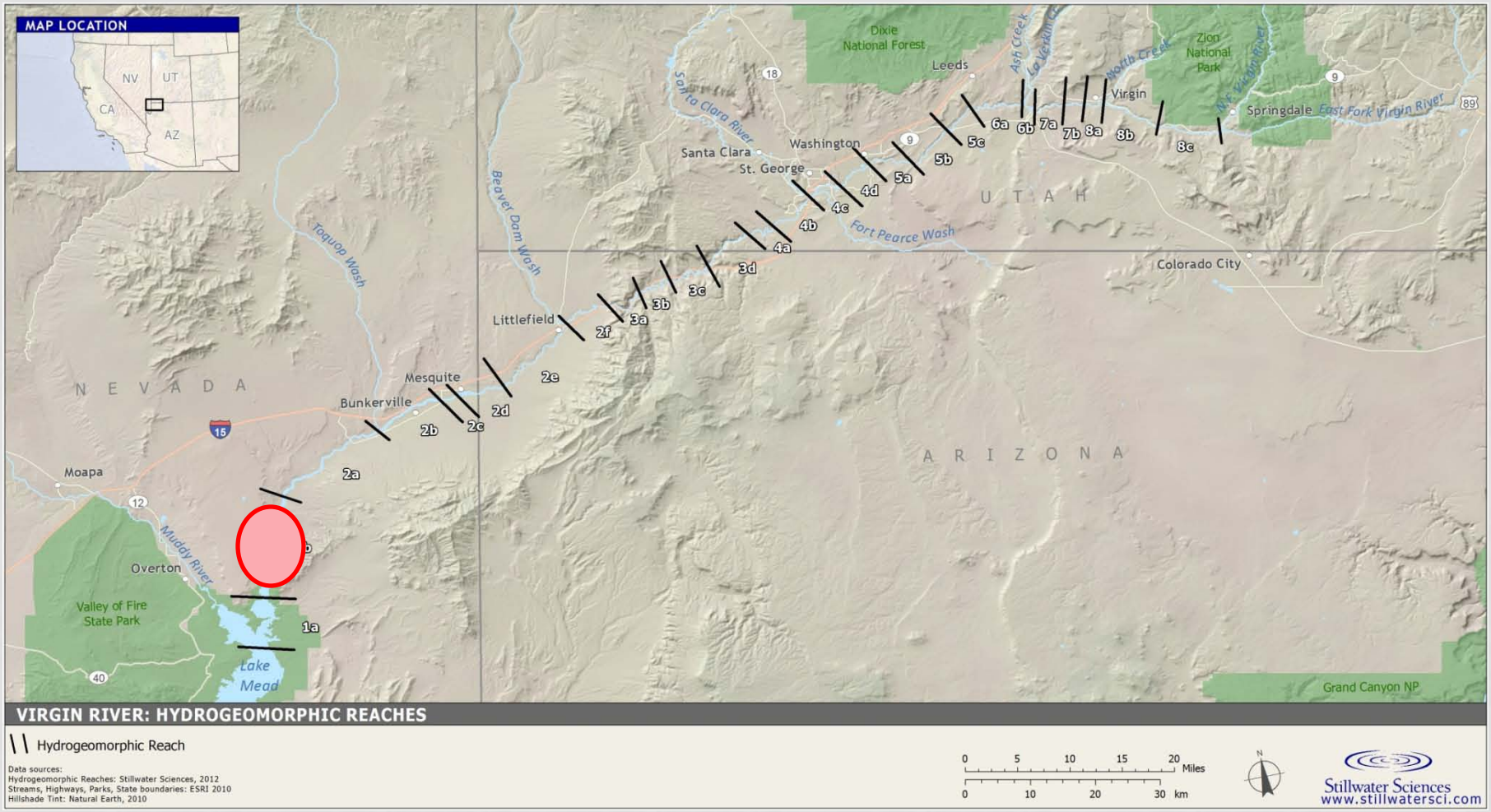
VIRGIN RIVER

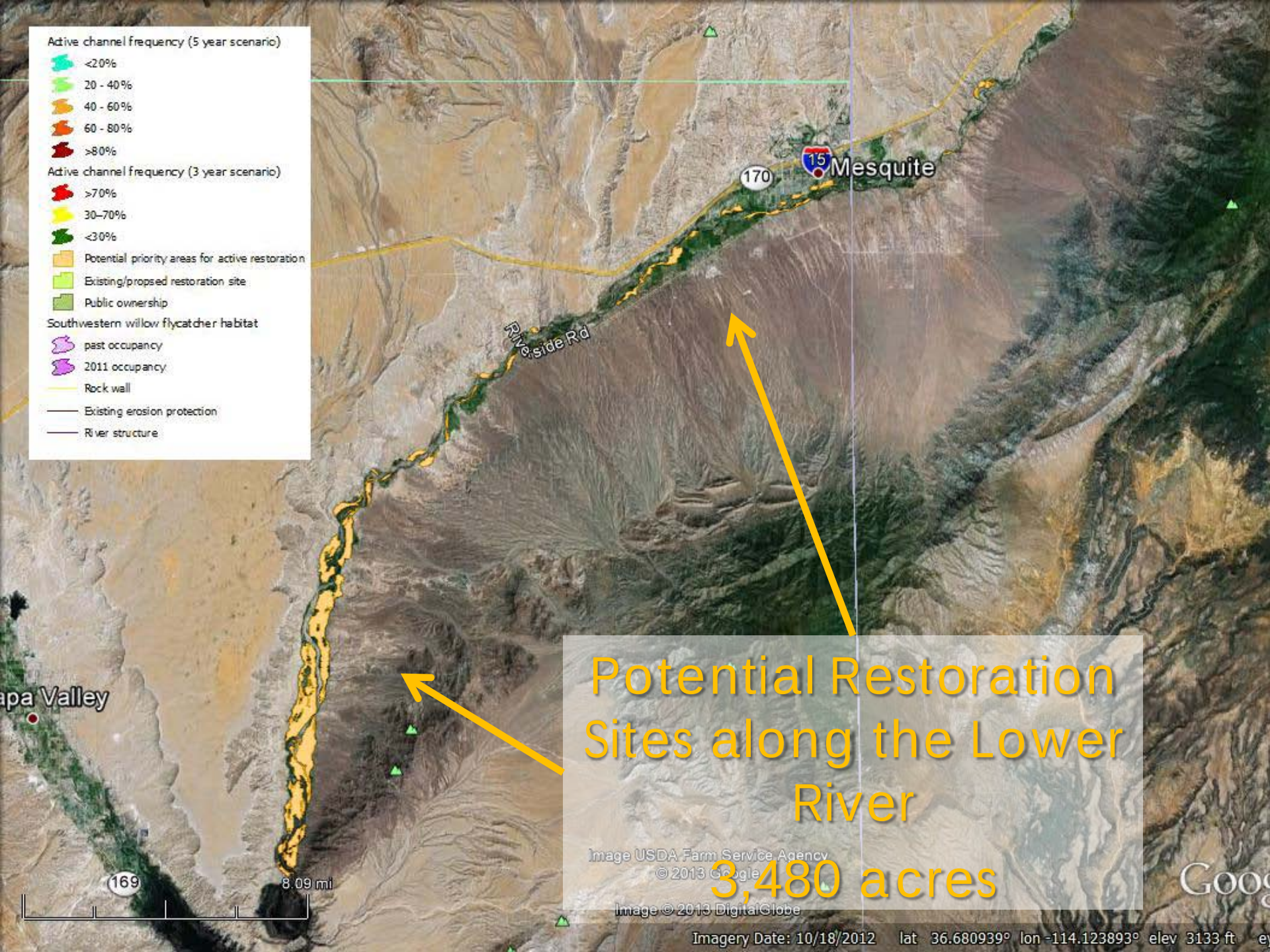


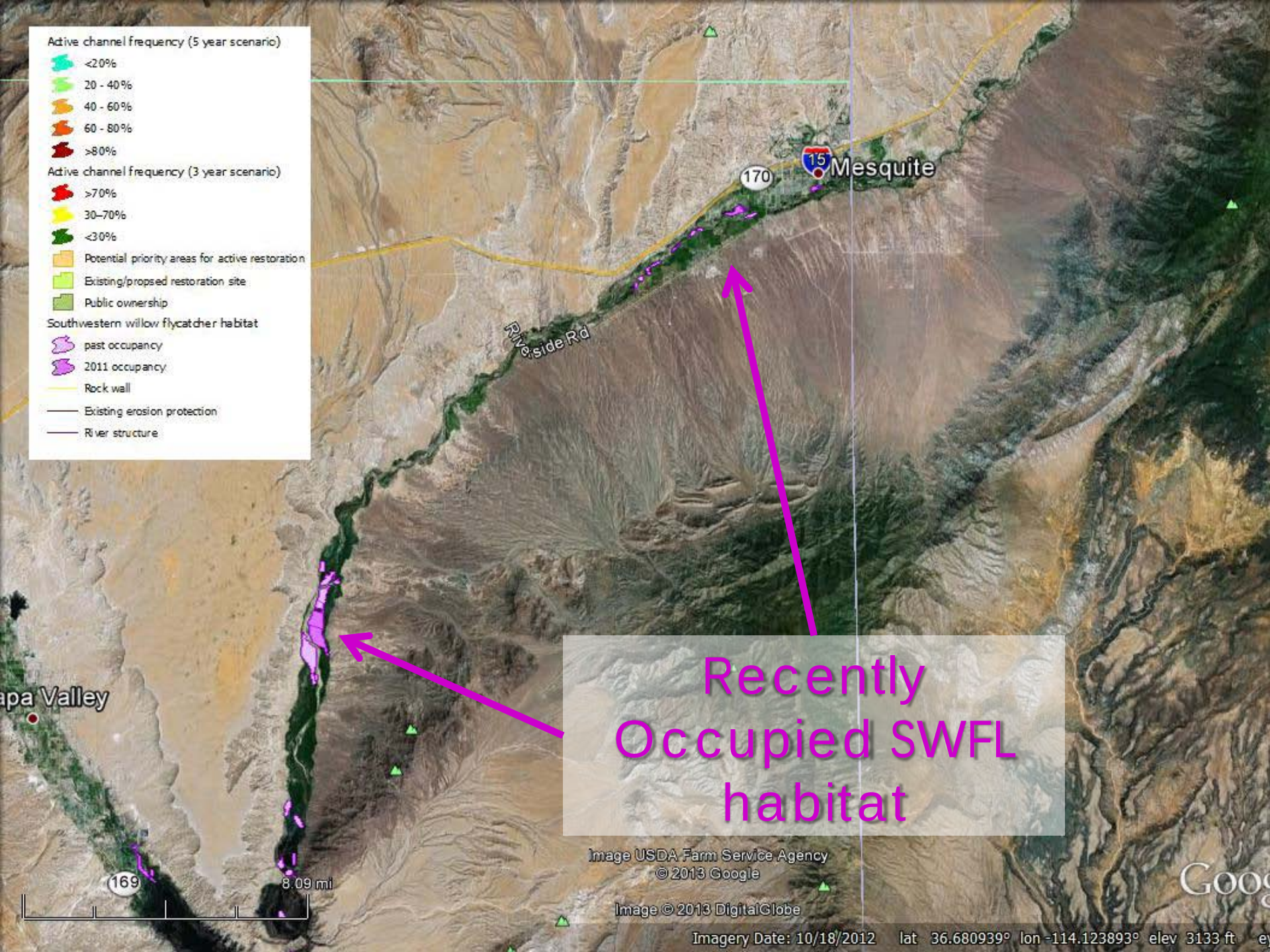
CONCLUSIONS FROM PHASE 1 ASSESSMENT

- **Hydro-geomorphology:** Virgin River is an episodic system prone to large, channel-resetting floods
- **Vegetation:** tamarisk dominated in lower river and greater riparian diversity in upper river – ***but vegetation will change*** with defoliation and mortality from leaf beetle
- **Potential Active Restoration Sites:**
  - Lower River = 3,480 acres—expansive with greater continuity, co-occurrence with SWFL, opportunities on public lands
  - Upper River = 665 acres—smaller, isolated areas
- **Phase 2:** plan and implement site-specific restoration projects

VIRGIN RIVER
STUDY AREA: MORMON MESA REACH




Active channel frequency (5 year scenario)
<20%
20 - 40%
40 - 60%
60 - 80%
>80%
Active channel frequency (3 year scenario)
>70%
30–70%
<30%
Potential priority areas for active restoration
Existing/propsed restoration site
Public ownership
Southwestern willow flycatcher habitat
past occupancy
2011 occupancy
Rock wall
Existing erosion protection
River structure
Mesquite
15
170
River Side Rd
apa Valley
169
8.09 mi
Potential Restoration Sites along the Lower River
3,480 acres
Image USDA Farm Service Agency
© 2013 Google
Image © 2013 DigitalGlobe
Imagery Date: 10/18/2012 lat 36.680939° lon -114.123893° elev 3133 ft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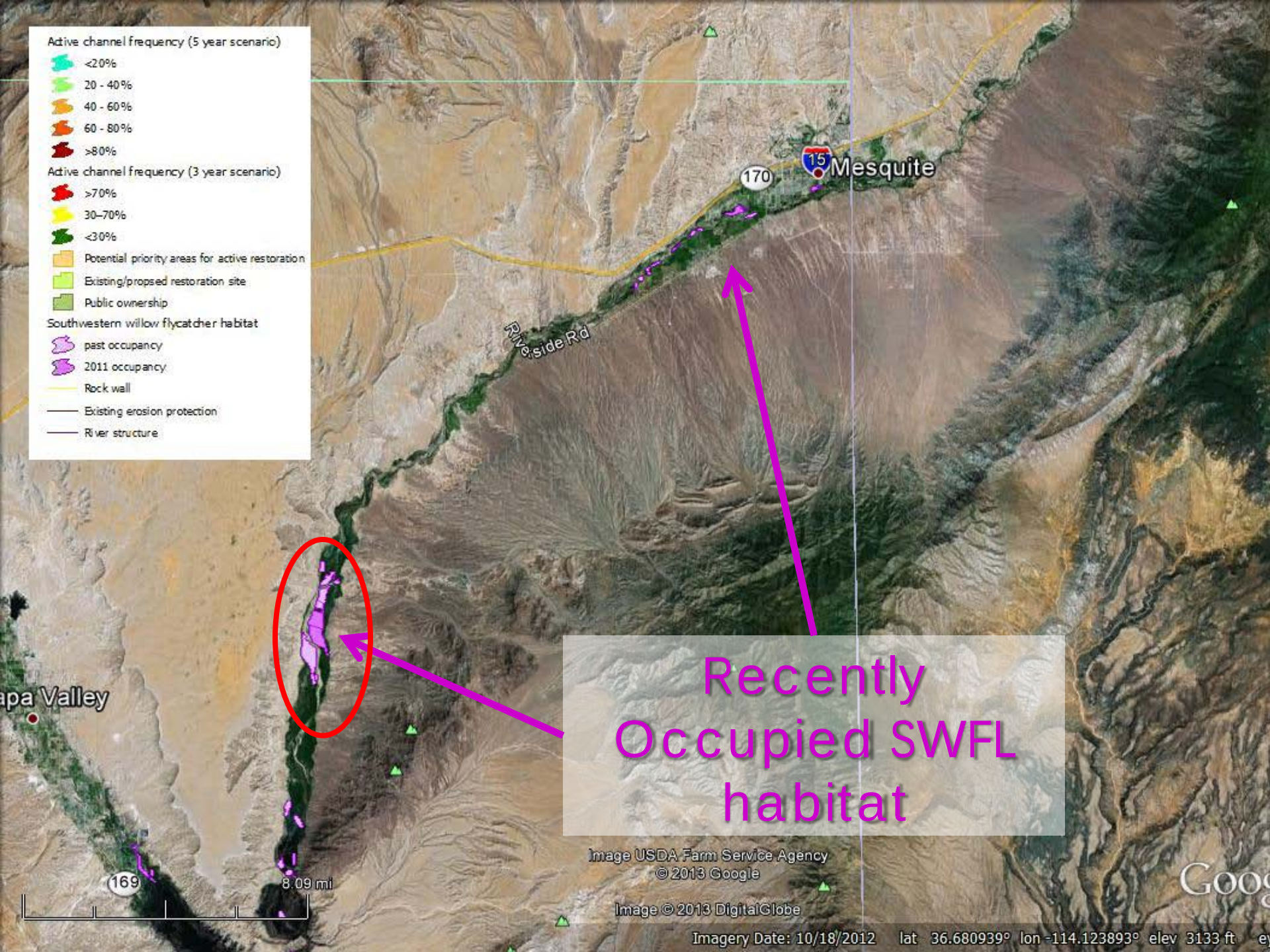
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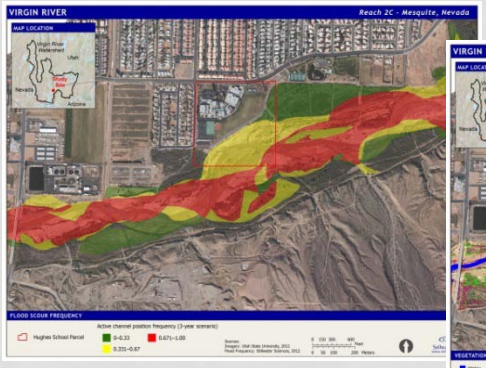
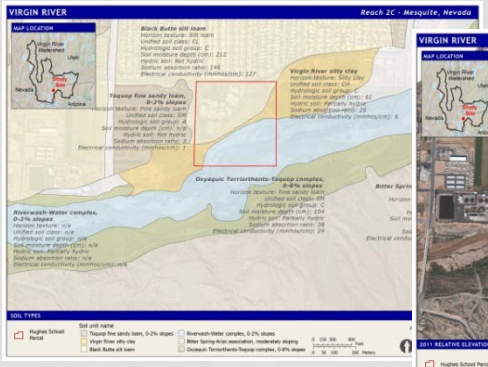
PHASE 2: REFINE PRIORITY AREAS FOR ACTIVE RESTORATION



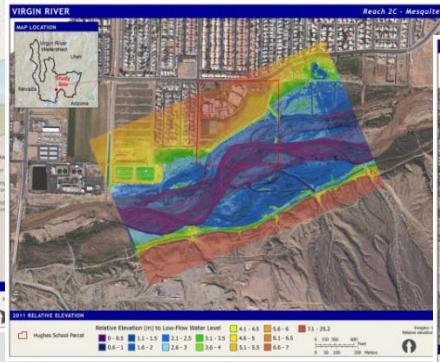
Flood Reset Zone
(>33% frequency)

Vegetation Types
(% native vs tamarisk)

Phase 1: Potential Restoration Areas



Soils



Depth to Groundwater
(Relative Elevation)

Vegetation Structure

+

SWFL Habitat

Phase 2: Refinement Using Reach- and Site-scale Data

CLARK COUNTY VIRGIN RIVER UNIT 1 INITIAL PHASE

Ecohydrological Assessment

- Reach- and site-scale assessment
- Relative elevation mapping
- Vegetation canopy height
- GIS analysis for identification of restoration zones, priorities and strategies
- Field surveys
  - Vegetation mapping
  - Surface water and soil assessment

Site Restoration Plan

- Botanical inventory
- Map of planting zones
- Recommendations for each restoration zone
  - Plant mix – species, density,
  - Restoration methods, source material
  - Plant requirements – tolerances for salinity, shade, water
  - Cattle exclusion
  - Weed management

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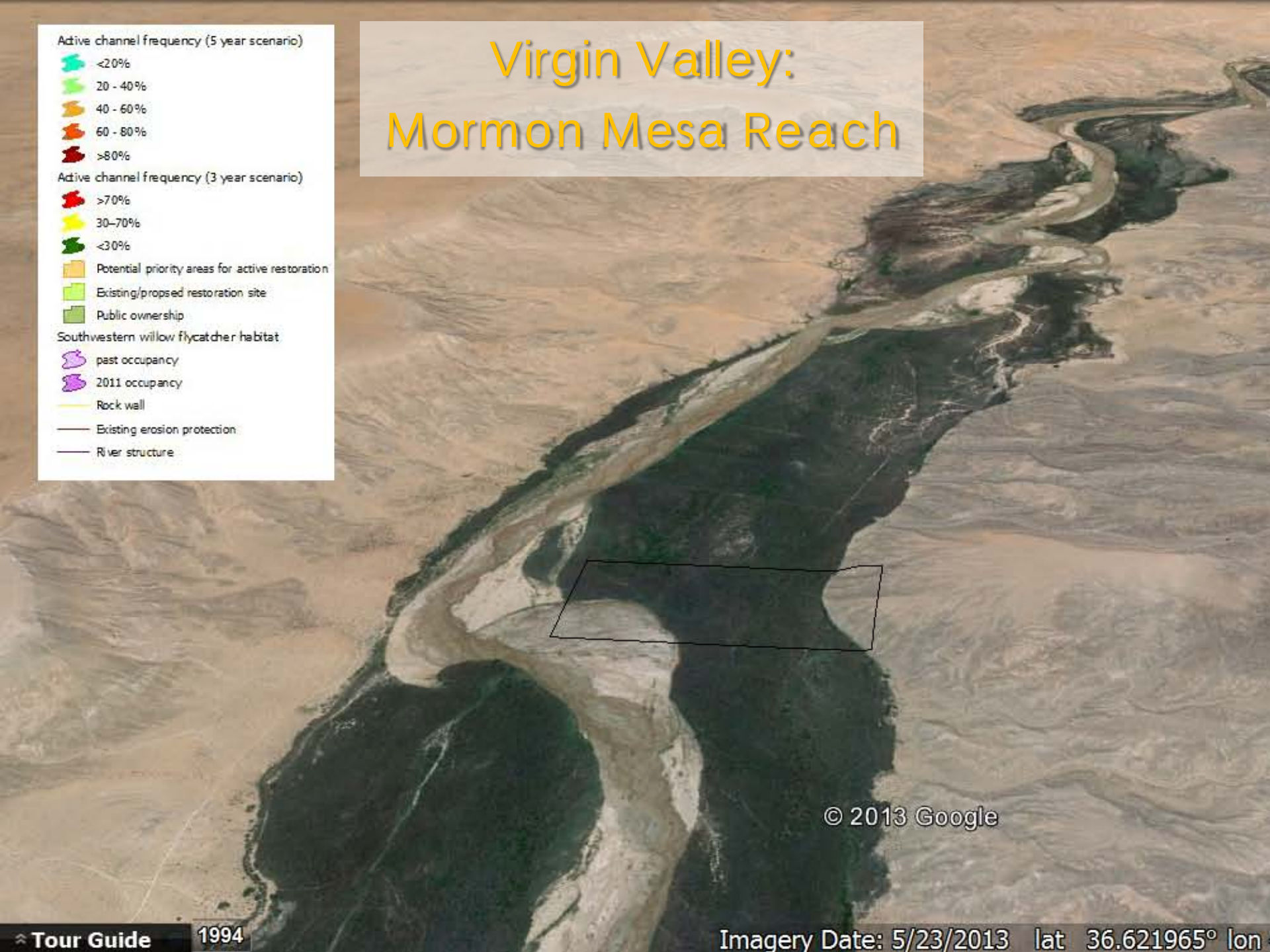
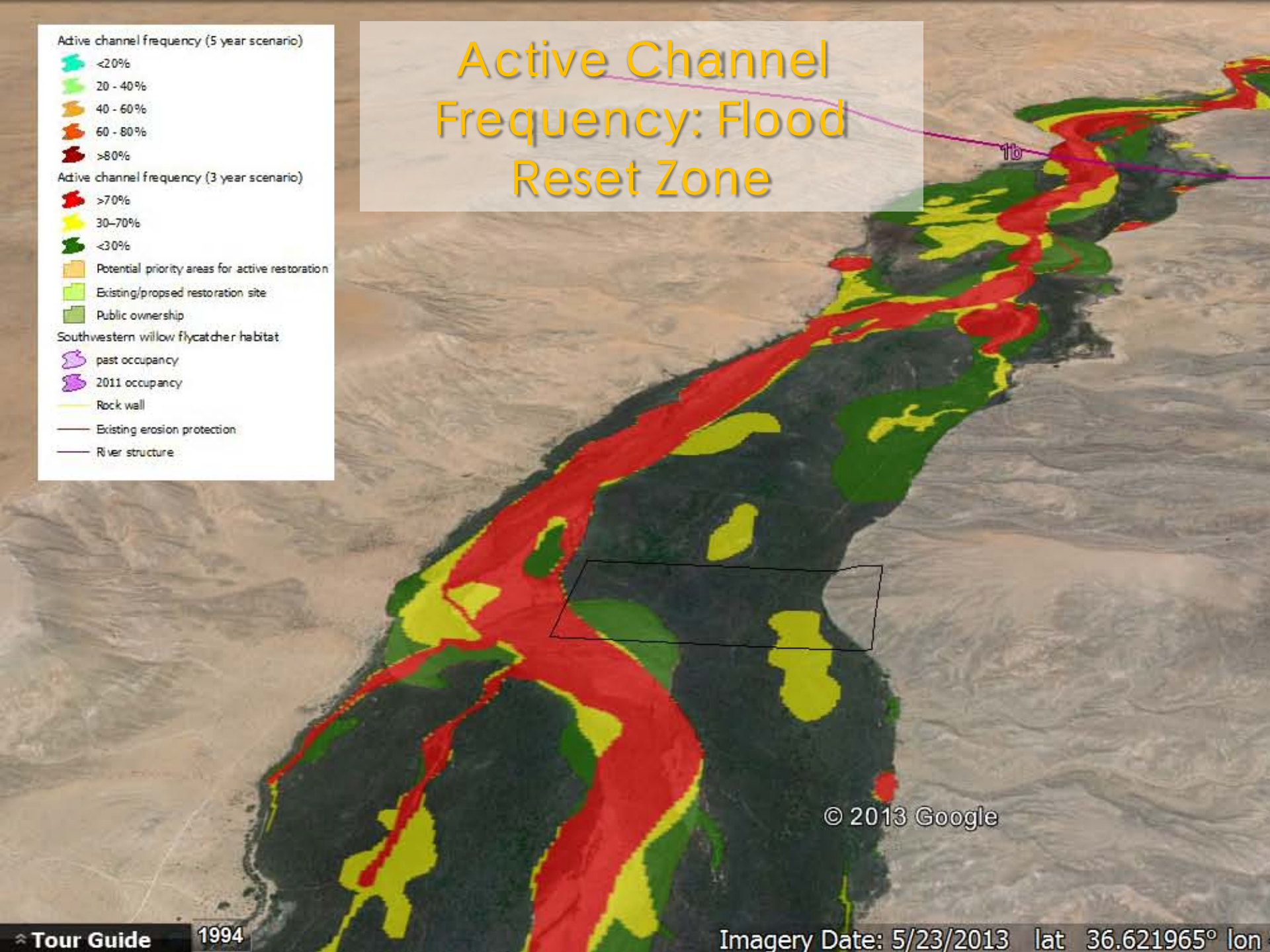
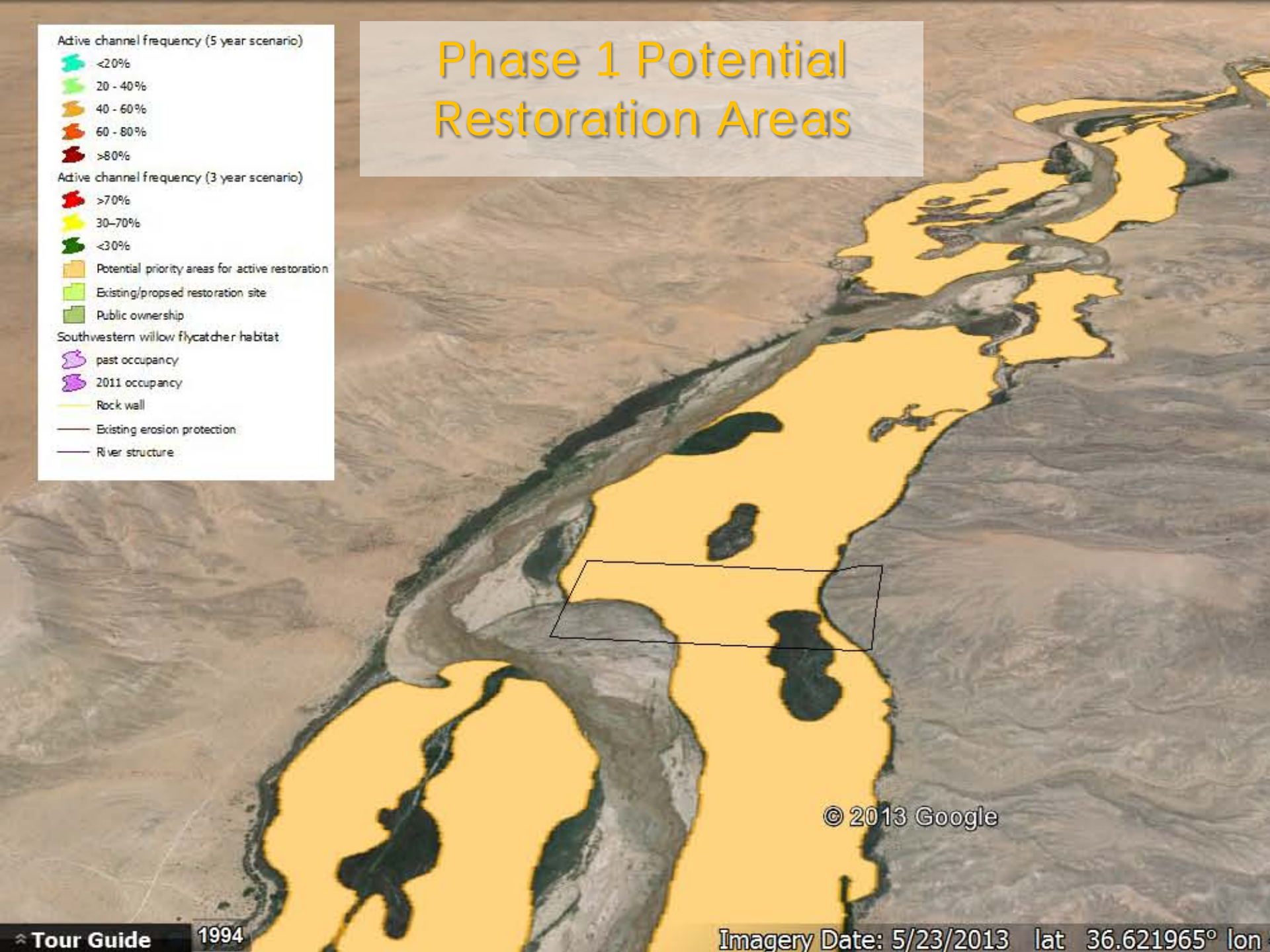
Virgin Valley: Mormon Mesa Reach



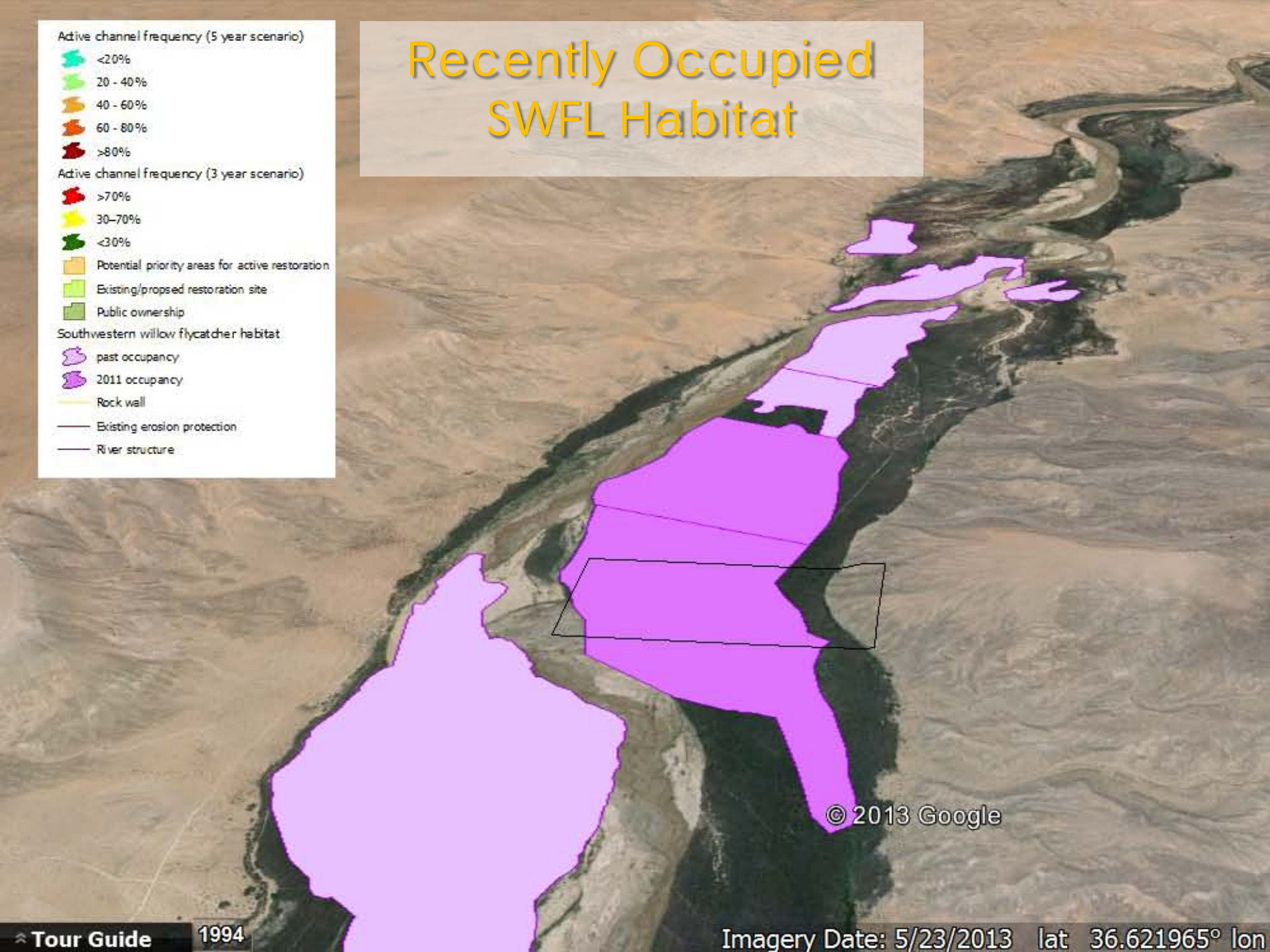
Active Channel Frequency: Flood Reset Zone



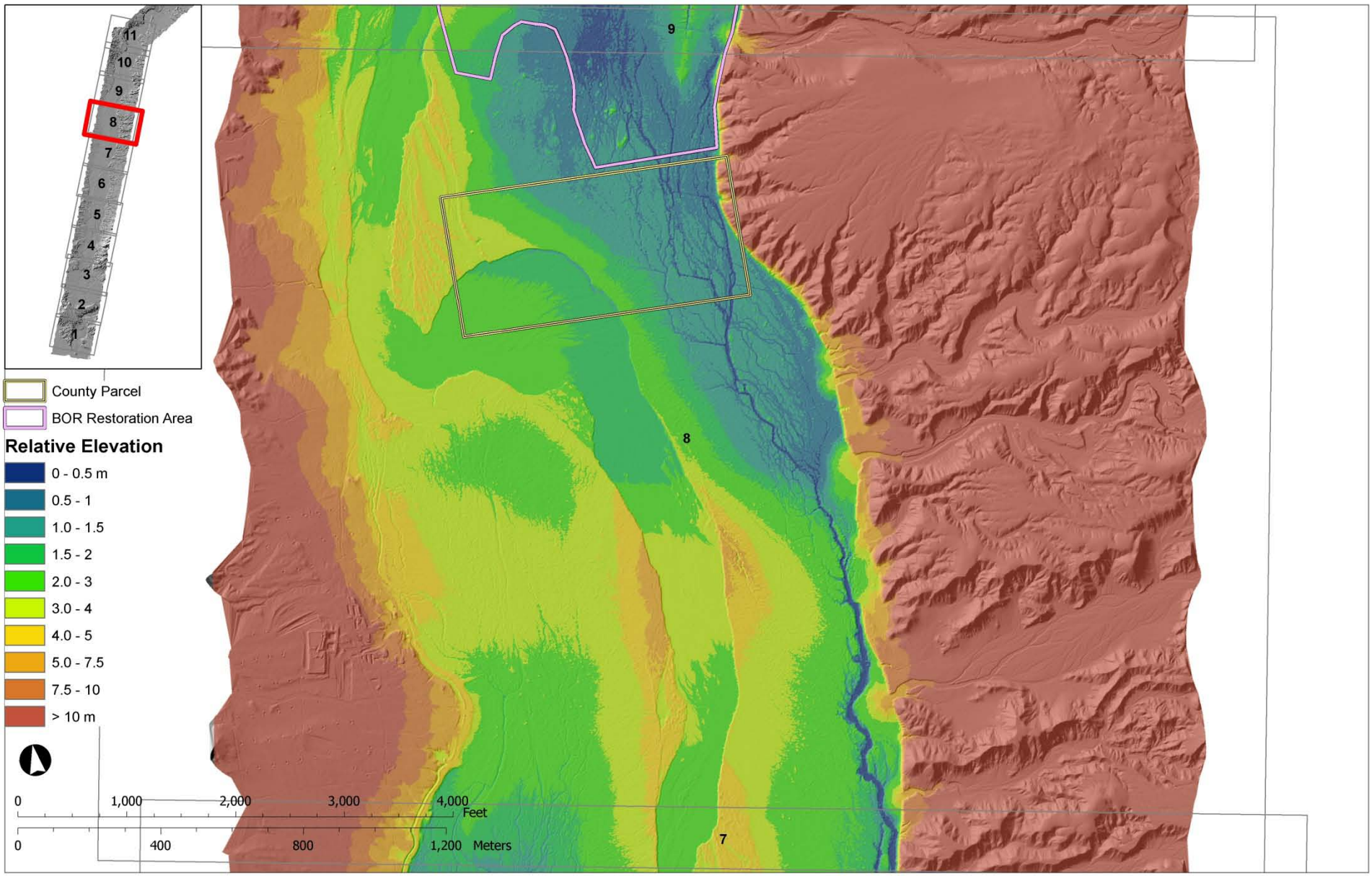
Phase 1 Potential Restoration Areas



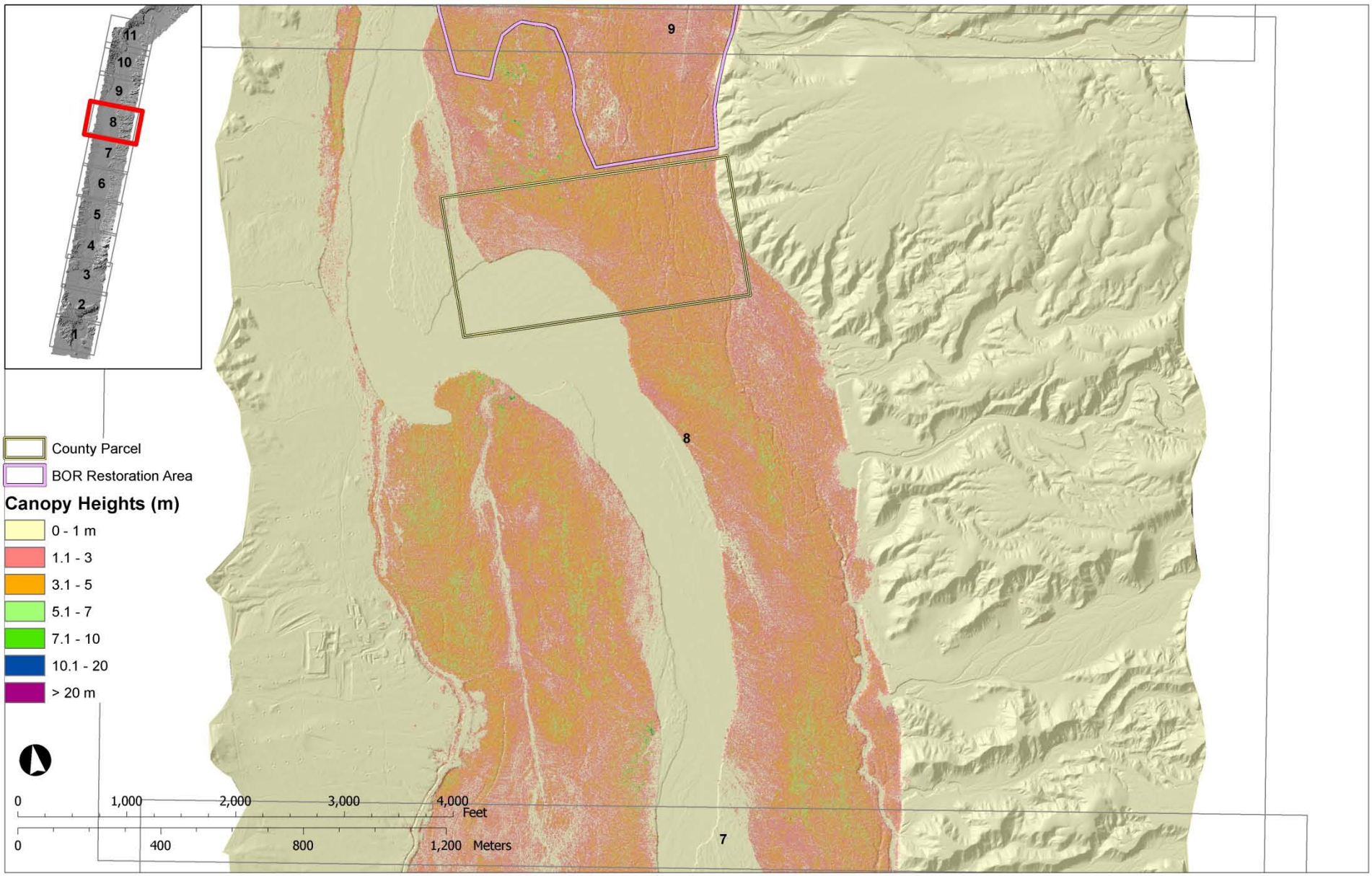
Recently Occupied
SWFL Habitat



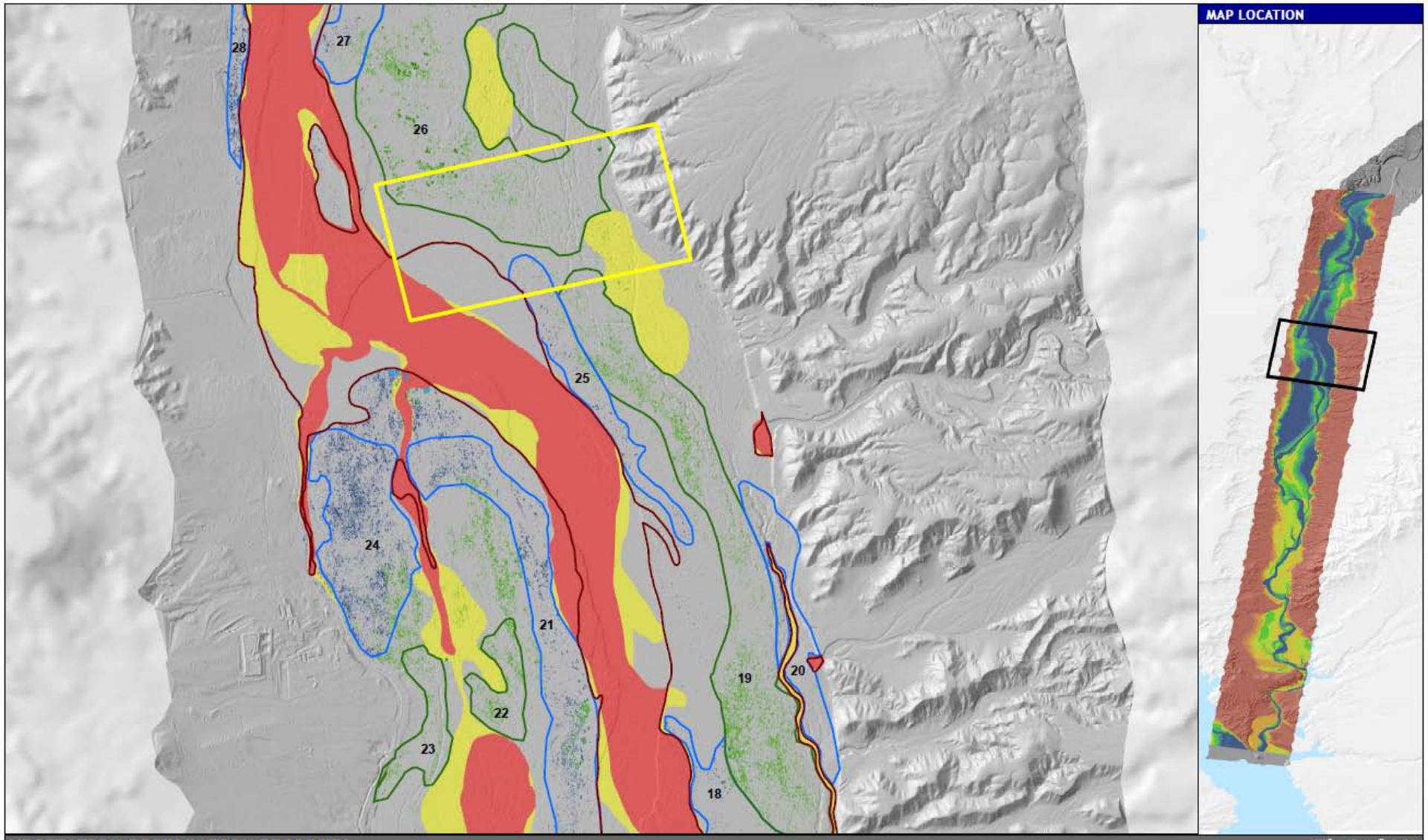
RELATIVE ELEVATION

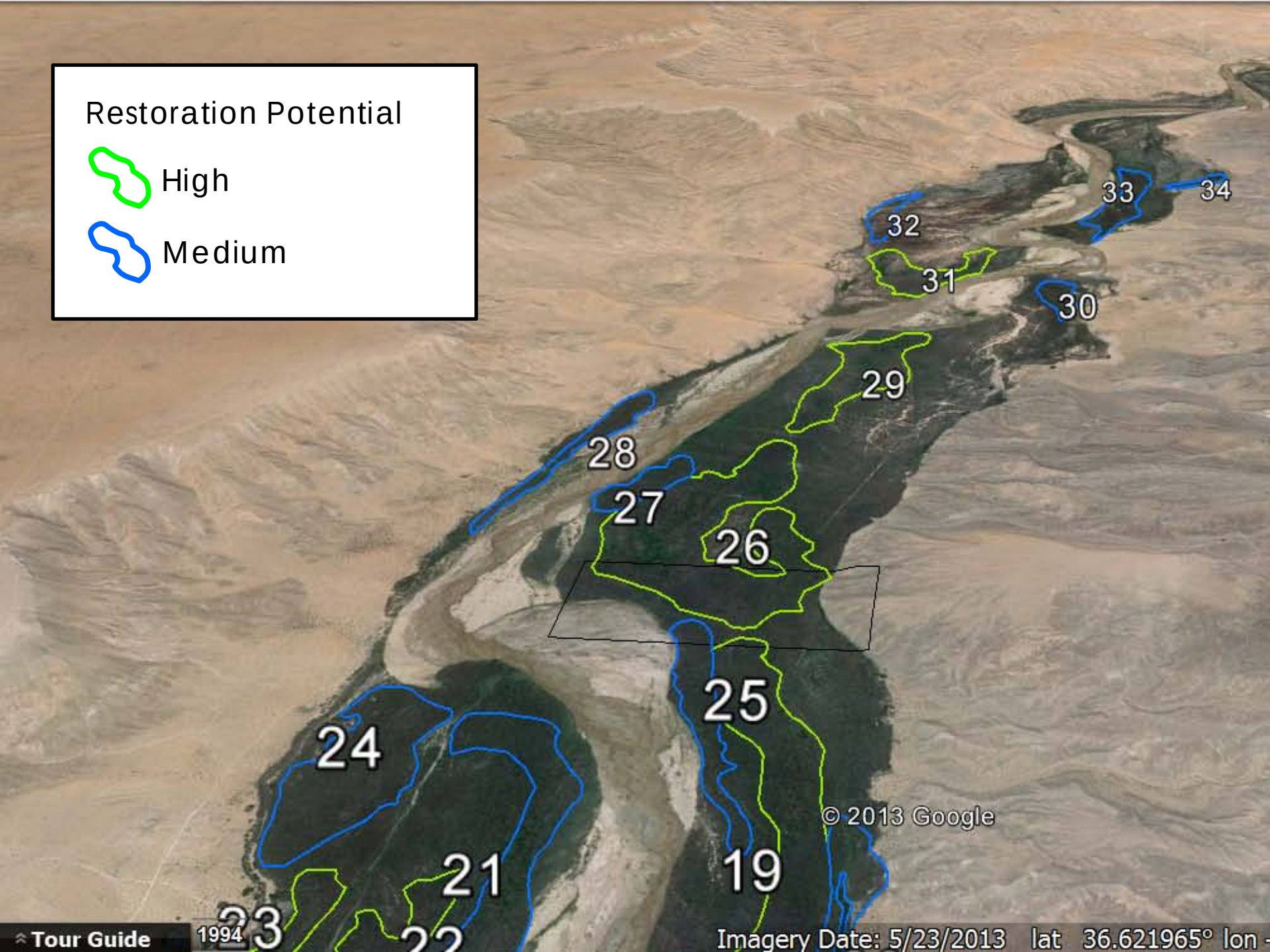


VEGETATION CANOPY HEIGHT



RESTORATION PRIORITY AREAS




Restoration Potential
High
Medium
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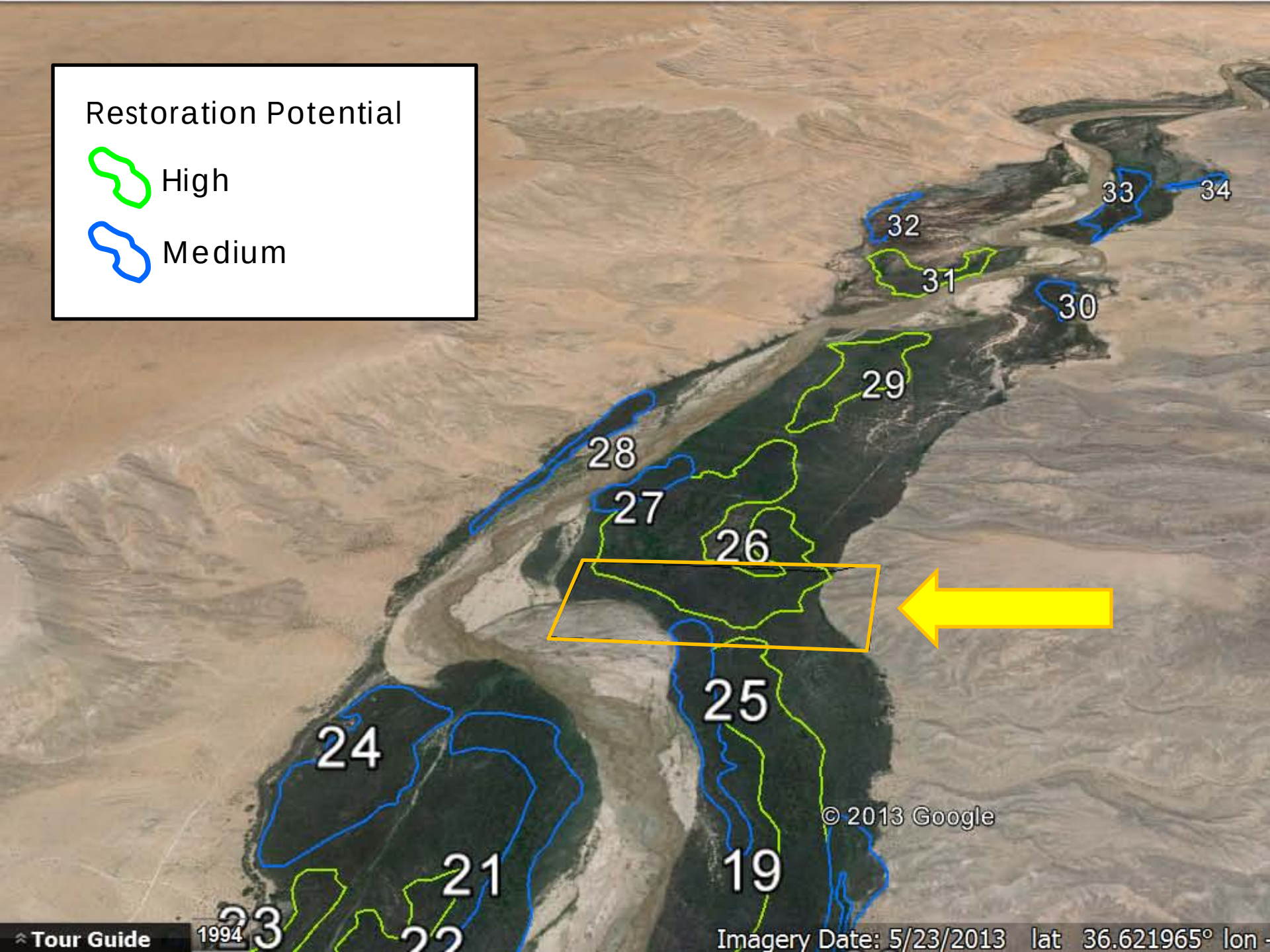
© 2013 Google
Tour Guide
1994
Imagery Date: 5/23/2013 lat 36.621965° lon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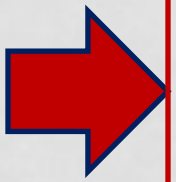

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EXISTING CONDITIONS

MAP 2. MORMON MESA, VIRGIN RIVER: NOVEMBER 2011 COLOR IMAGERY

Data sources:
Color Imagery: Utah State University, 2011
LIDAR Hillshadet: Utah State University, 2011
Hillshade Tint (Inset) Natural Earth, 2010
States, Parks, Roads, Cities, Water Bodies: ESRI, 2010

CountyParcel_Boundary

0 300 600 900 1,200 Feet
0 100 200 300 Meters

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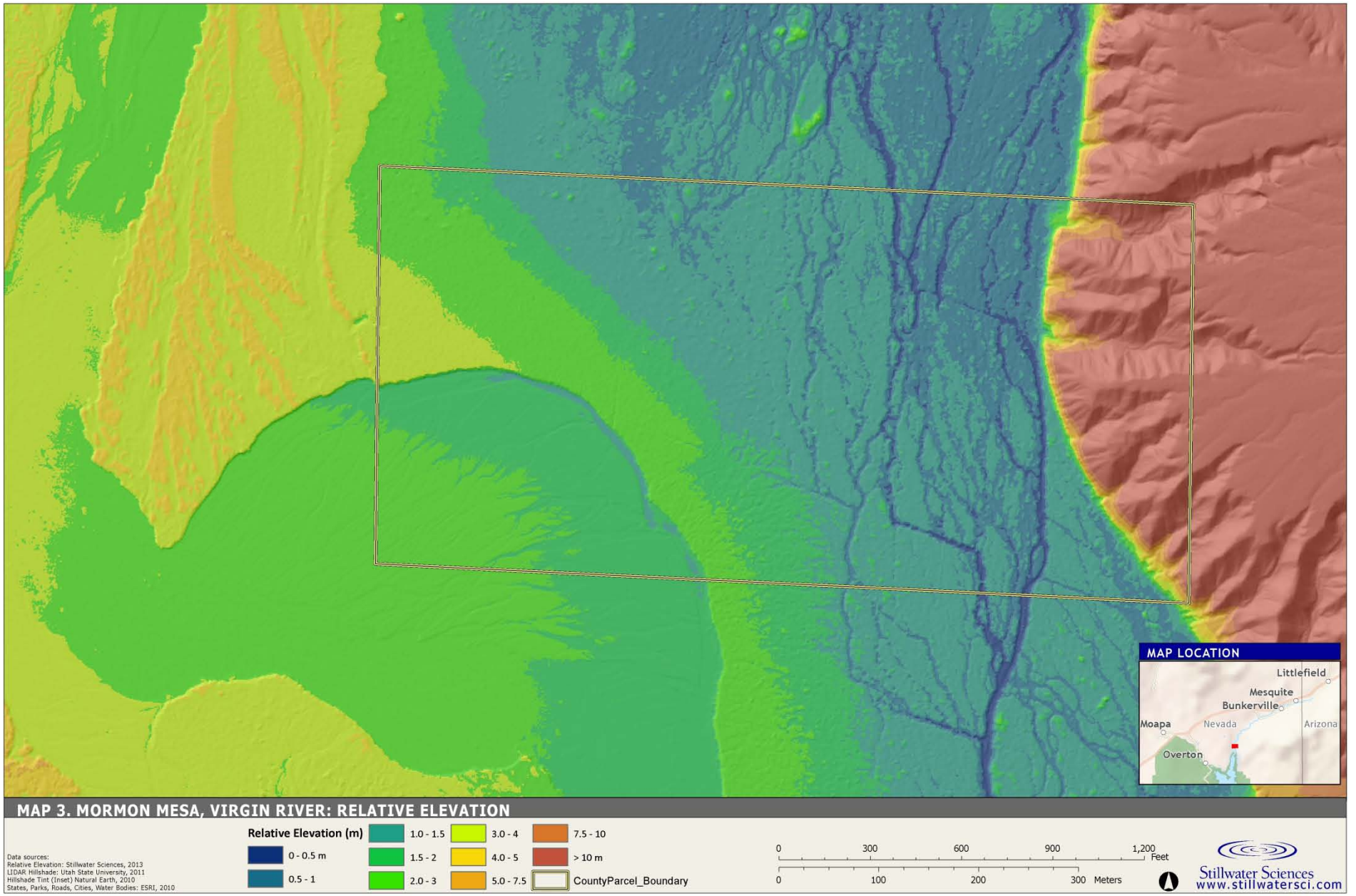
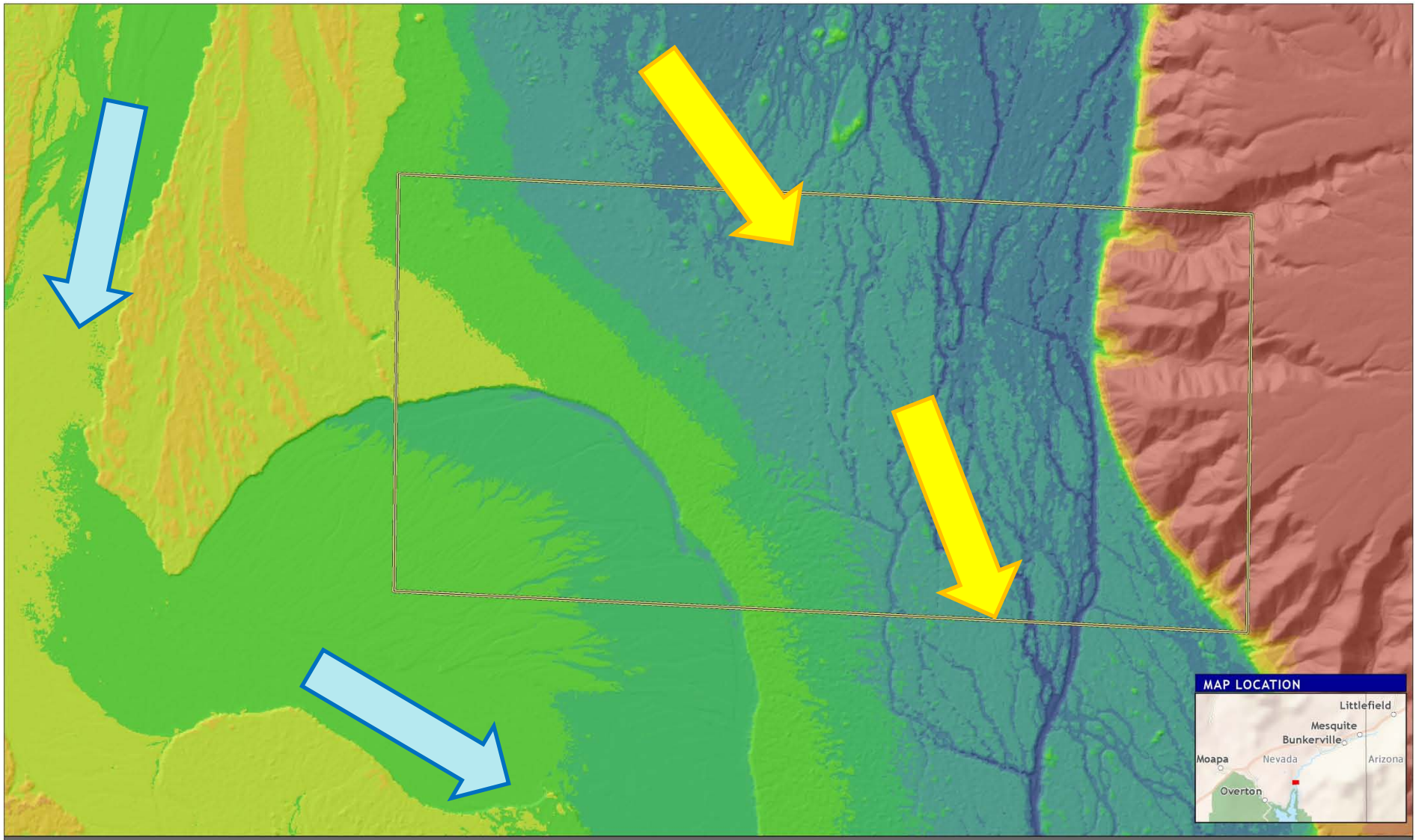
SITE SURVEYS

- September 2013 - UCSB Field Surveys
  - Vegetation composition and structure
  - Surface water and soil moisture
  - Soil texture, salinity, and pH
  - Site access routes
  - Field validation of remote sensing/GIS data
- October 2013 – GBI Field Reconnaissance
  - Refine site access and other logistics
  - Refine site plan for 2013/2014 priority areas
  - Set priorities for initial tamarisk clearing and treatment

FLOODPLAIN RELATIVE ELEVATION



SURFACE & SHALLOW GROUNDWATER



MAP 3. MORMON MESA, VIRGIN RIVER: RELATIVE ELEVATION

Relative Elevation (m)
0 - 0.5 m
0.5 - 1
1.0 - 1.5
1.5 - 2
2.0 - 3
3.0 - 4
4.0 - 5
5.0 - 7.5
7.5 - 10
> 10 m
CountyParcel_Boundary

0 300 600 900 1,200 Feet
0 100 200 300 Meters

Data sources:
Relative Elevation: Stillwater Sciences, 2013
LIDAR Hillshade: Utah State University, 2011
Hillshade Tint (Inset) Natural Earth, 2010
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VEGETATION MANAGEMENT UNITS

MAP 5. MORMON MESA, VIRGIN RIVER: VEGETATION MANAGEMENT UNITS

Wet Side Channels Observed

Vegetation Management Units

CountyParcel_Boundary

0 200 400 600 800 Feet

0 75 150 225 Meters

Data sources:
Vegetation Management Units: Stillwater Sciences, 2013
Color Imagery: Utah State University, 2011LIDAR
LIDAR Hillshade: Utah State University, 2011
Hillshade Tint (Inset) Natural Earth, 2010

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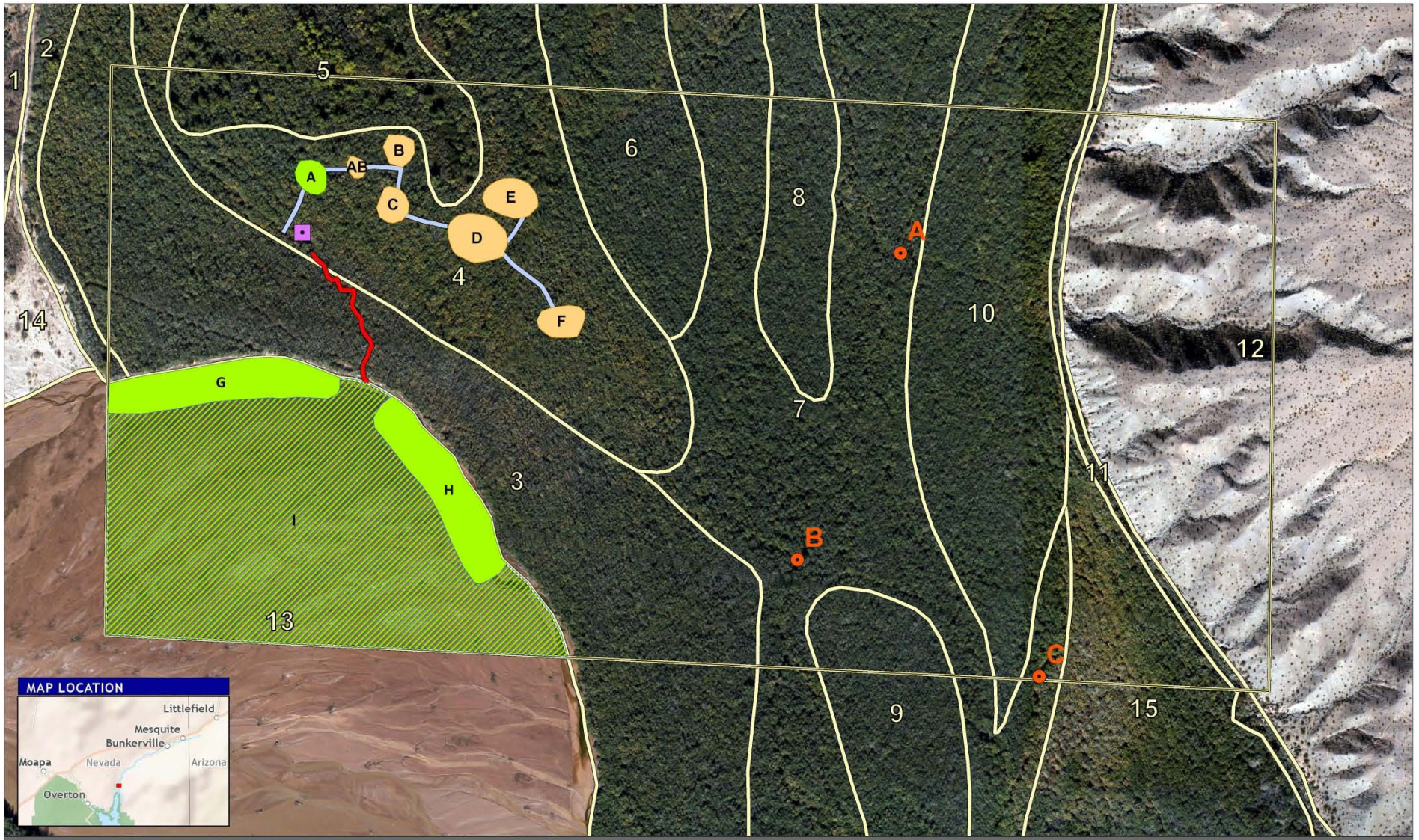
CHALLENGE: HOW TO KEEP OUT CATTLE?

BUILD A WALL OF TAMARISK!

INITIAL PLANTING AREAS



MAP 6 . MORMON MESA, VIRGIN RIVER: PROPOSED REVEGETATION SITES

Data sources:
Vegetation Management Units: Stillwater Sciences, 2013
Sites: Stillwater Sciences, UCSB, Great Basin Institute, 2013
Site Paths and Launch Point: UCSB, 2013
Color Imagery: Utah State University, 2011 LIDAR
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Proposed Revegetation Sites
Revegetation Sites -Cleared
Natural Recruitment Zone
Site Paths
Access Path
Launch Point
Wet Side Channels Observed
CountyParcel_Boundary
Vegetation Management Units

0 200 400 600 800 Feet
0 75 150 225 Meters

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PATCH D: OCTOBER 2013

PATCH F: 13 FEB 2014

PATCH G: 13 FEB 2014

IMPLEMENTATION OF PLANTING PLAN

Cleared and Treated Tamarisk (completed)

- Path to 7 locations
- 6 planting areas
- Created cattle exclusion
- Oct 2013 - Jan 2014
- Great Basin Institute
- Walton Family Foundation

Revegetation Initial Phase (in progress)

- Winter/Spring 2014
- Collect and plant willow and cottonwood poles and cuttings
- Plant native understory species
- Install fencing
- Weed control
- Monitoring, experimental plantings, and adaptive learning for later phases

FOR ADDITIONAL INFORMATION…

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bickmore@clarkcountynv.gov

Stillwater Sciences Website
www.stillwatersci.com

Virgin River Science Team
http://rivrlab.msi.ucsb.edu/VR_data/virginriver.php

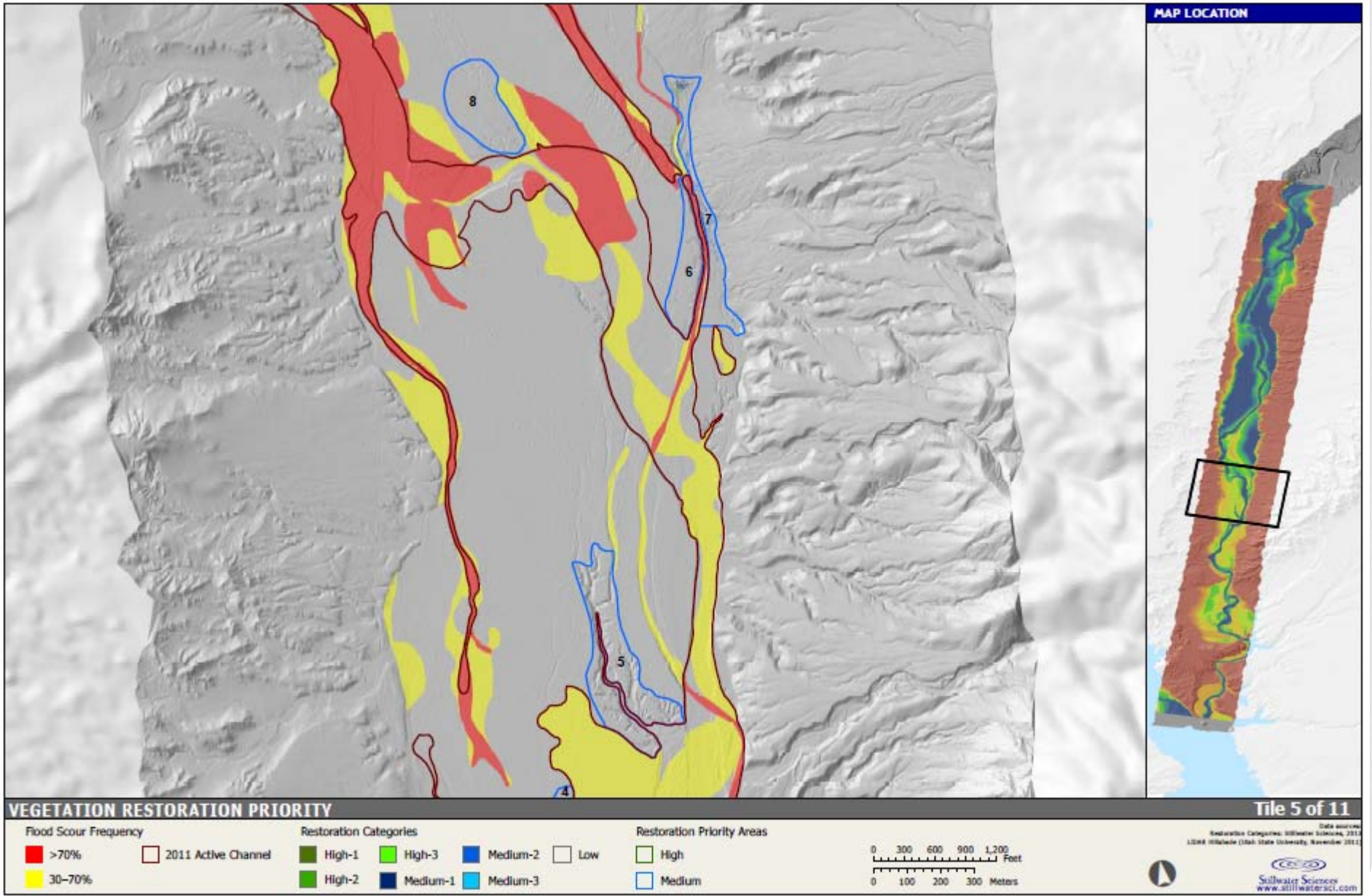
EXTRA SLIDES

Propagule Islands Restoration Strategy

Restoration Islands

N
W
E
0 1.25 2.5

RESTORATION PRIORITY AREAS



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Launch Point
Proposed Revegetation Sites -Cleared
Proposed Revegetation Sites
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