Lower Colorado River Riparian Bird Inventory and Monitoring: Testing a double-sampling method in difficult riparian habitats

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Project Goals:

1. Initiated in 2007 to provide system-wide monitoring of avian species with emphasis on 6 LCR-MSCP covered species:

   – Gilded Flicker
   – Gila Woodpecker
   – Vermilion Flycatcher
   – Arizona Bell's Vireo
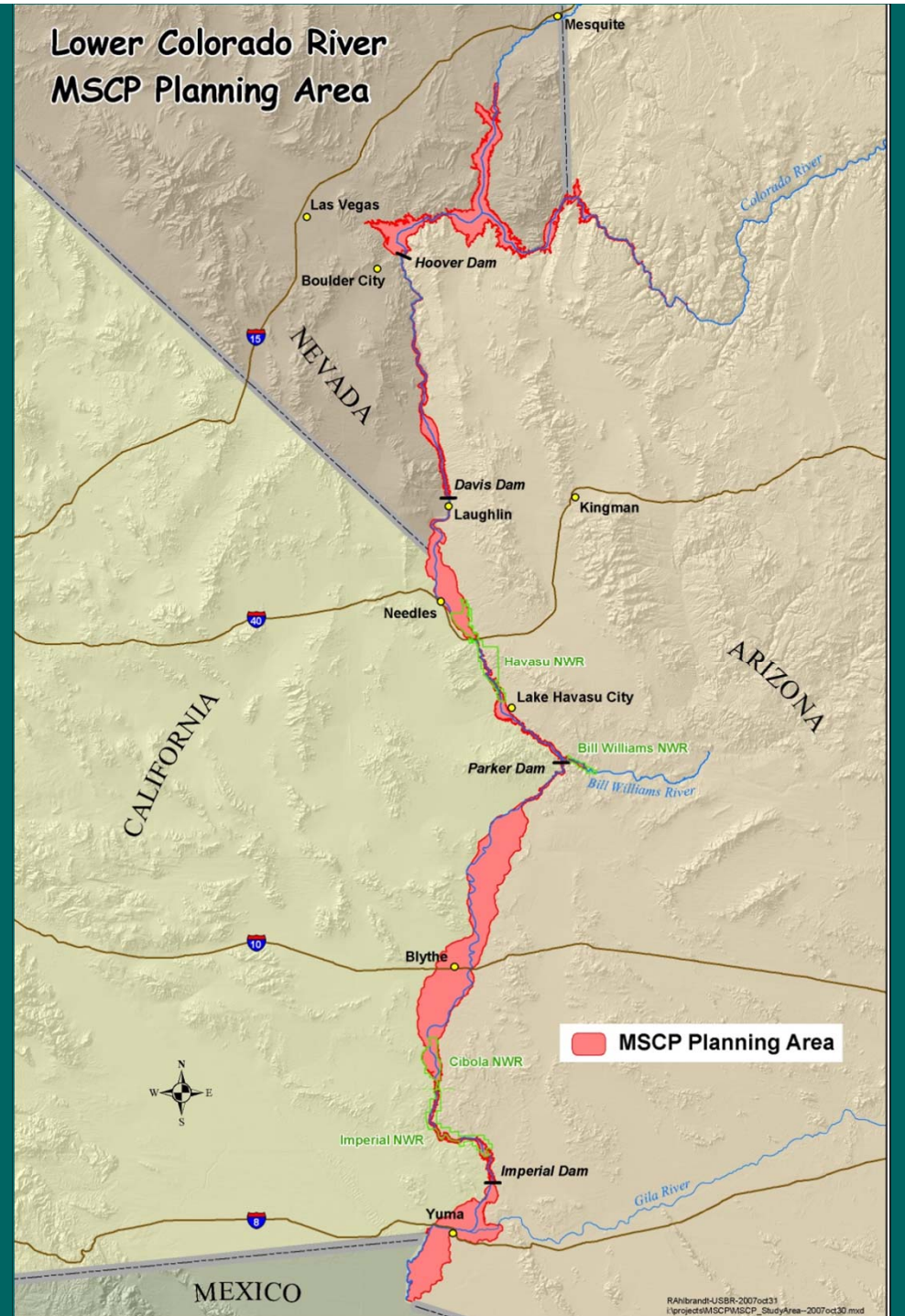   – Sonoran Yellow Warbler
   – Summer Tanager

2. Monitoring avian use of the habitat creation sites

Study Area

Riparian corridors within the historic floodplain of the Colorado River

Plots are selected using a stratified random design
— Strata defined by habitat and geographic location

Plots size based on habitat, 300m x 300m or larger

Double Sampling Method

- Two survey efforts rapid and intensive

- Rapid surveys (2 times/season) may result in biased estimates of poorly detected birds

- Intensive surveys (8 times/season) used to obtain an estimate of rapid survey biases

- Two different surveyors for each effort

- Detection ratios are estimated using birds recorded during the rapid surveys & the actual number of territories present as determined by the intensive surveys

Component 1: Population Estimates, Trends and Distribution of Riparian Birds

Use double-sampling survey method :

System-wide
   –Rapid (2 surveys /season)= 80 plots /year
   –Intensive (8 surveys/season) = 8 plots/year

Habitat Creation Sites
   –Rapid = 60 plots/year
   –Intensive = 4 plots/year

*Starting in 2011 HCS were surveyed using the same double sampling design as the system-wide plots, prior to 2011 all HCS with at least 3 years of growth were surveyed with intensive area searches.

Component 2: Pre-Development Monitoring at Laguna Dam Habitat Conservation Area

One year of double sampling surveys to develop baseline inventory

- 35 randomly selected rapid plots (shown in orange)

- 4 randomly selected intensive plots (shown in light blue)

Area surveyed represened~2/3 of the total area
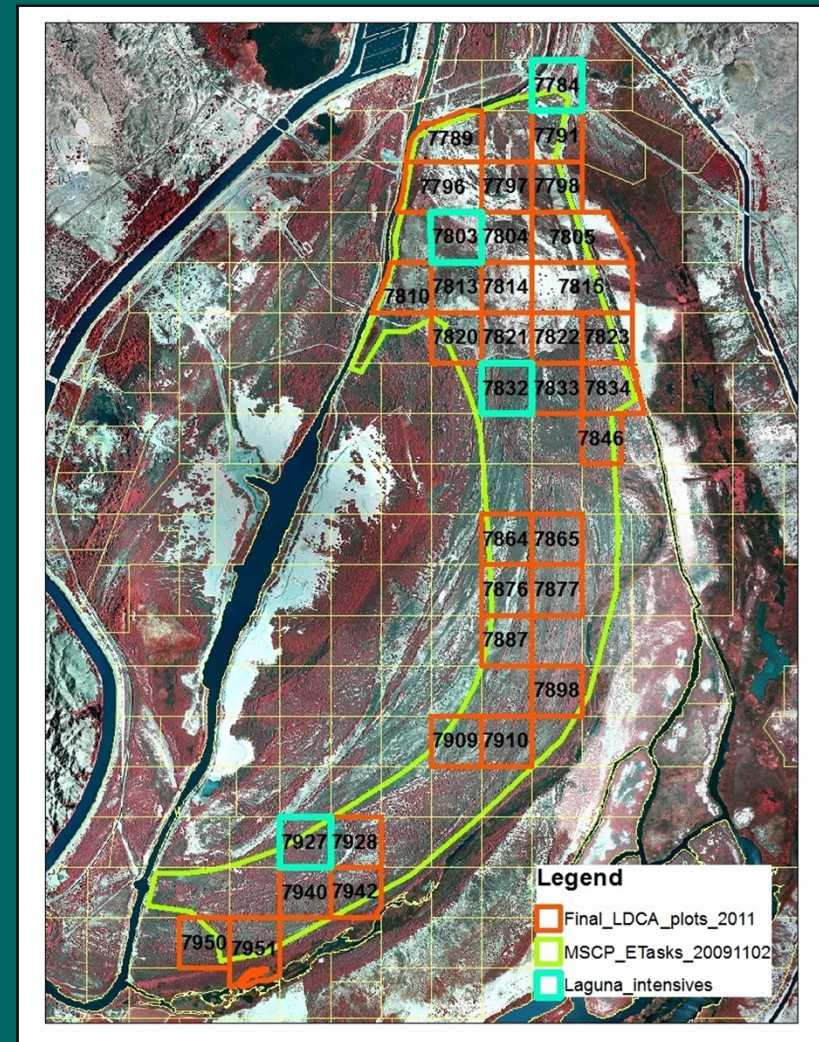
Component 3: Testing the Assumptions of the Double Sampling Method

Do intensive area searches provide unbiased estimates of bird numbers

Factors that could bias the estimates:

- Secretive species
- Density of vegetation
- Density of birds

Extra Intensive **(Amy will discuss in detail)**

- 8 randomly selected plots
- Each plot surveyed 16 times

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Component 4: Habitat Surveys

Perform detailed habitat assessment for four LCR MSCP covered species to derive recommendations for habitat creation

- Vegetation Surveys using new BOR protocol

- Hobo Data

The Vermilion Flycatcher and Gilded Flicker are not common enough to provide meaningful habitat analyses at this time

Area Search Survey Method

- Same method used by all 3 survey efforts

- Begin at sunrise and last several hours

- Plot systematically surveyed by passing within 50m of all points

- Surveyor identifies and tallies all birds

- Bird sightings, locations, and breeding evidence recorded

Sample of an intensive plot with territory mapping

Extra-Intensive Surveys:
A test of the double-sampling method

- Evaluate the assumption that intensive surveys provide unbiased estimates of bird numbers

- Estimate the error rate occurring during intensive surveys

- Determine if differences in error rate exist between species or habitats

- Suggest improvements to the intensive survey methods to achieve higher accuracy

Plot selection

– GIS layer of plots most likely to contain the most covered species

– That layer is the most challenging habitat to survey on the river

– Extra Intensive plots are not random or representative of the entire study area.

Extra-Intensive Survey Methods

– A subset of plots are surveyed using all three survey efforts

– Plots are surveyed by 3 independent observer

– The triple sampling effort would be increasing what we think to be the biggest limiting factor of the intensive survey method: **Time.**

More time on extra intensive surveys will provide:

- More time for challenging species

- More time for edge and partial territories

- More visits allow the surveyor additional opportunities to observe breeding behavior:
  1. birds reaction to nest failures,
  2. re-nesting and multiple-clutches
  3. post-fledging period

Intensive: EI Detection Ratio

25-50%
—Least Bittern
—Marsh Wren
—Pied-billed Grebe
—Crissal Thrasher
—Summer Tanager
—Lawrence's Goldfinch

50-75%
—Lesser Goldfinch
—Black Rail
—Lesser Nighthawk
—Verdin
—Lucy's Warbler
—Abert's Towhee

75-100%
—**Common Yellowthroat**
—**Ladder-backed Woodpecker**
—**Gila Woodpecker**
—**Yellow-breasted Chat**
—**Yellow Warbler**
—**American Coot**
—**Bell's Vireo**
—**Black-chinned Hummingbird**
—**Black-tailed Gnatcatcher**
—**Bullock's Oriole**
—**Song Sparrow**
—**Black Phoebe**
—**Great Horned Owl**
—**Virginia Rail**

100-125%
—Western Kingbird
—Blue Grosbeak
—Canyon Wren
—Bewick's Wren

125-175%
—Brown-crested Flycatcher
—Anna's Hummingbird
—Phainopepla
—Ash-throated Flycatcher
—Vermilion Flycatcher

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Variation Between the Results of the Triple-Sampling survey efforts?

- Many avian species with varying natural histories

- Logistic difficulty of plots
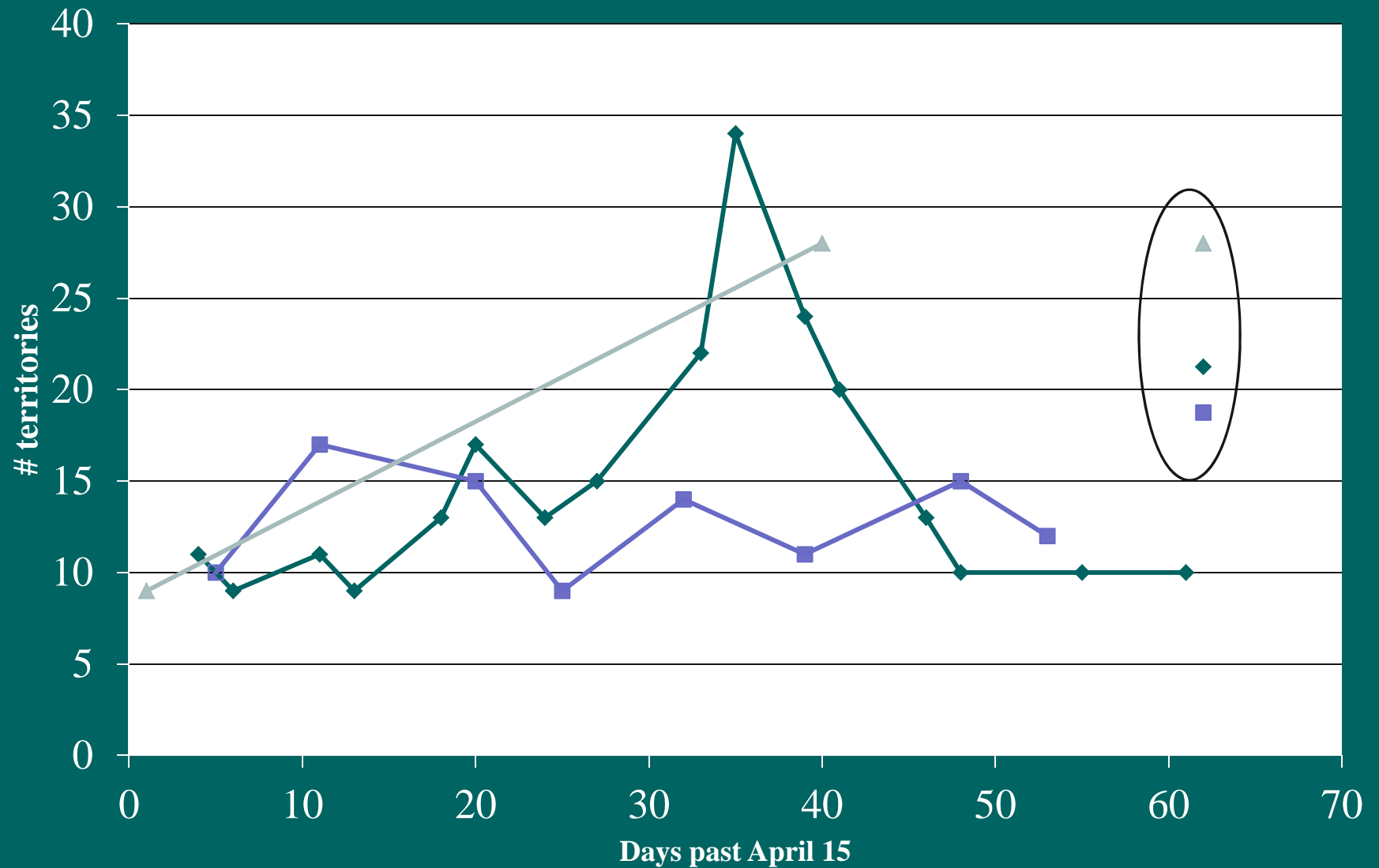
- Timing

- Partial Territories

- Observer Bias

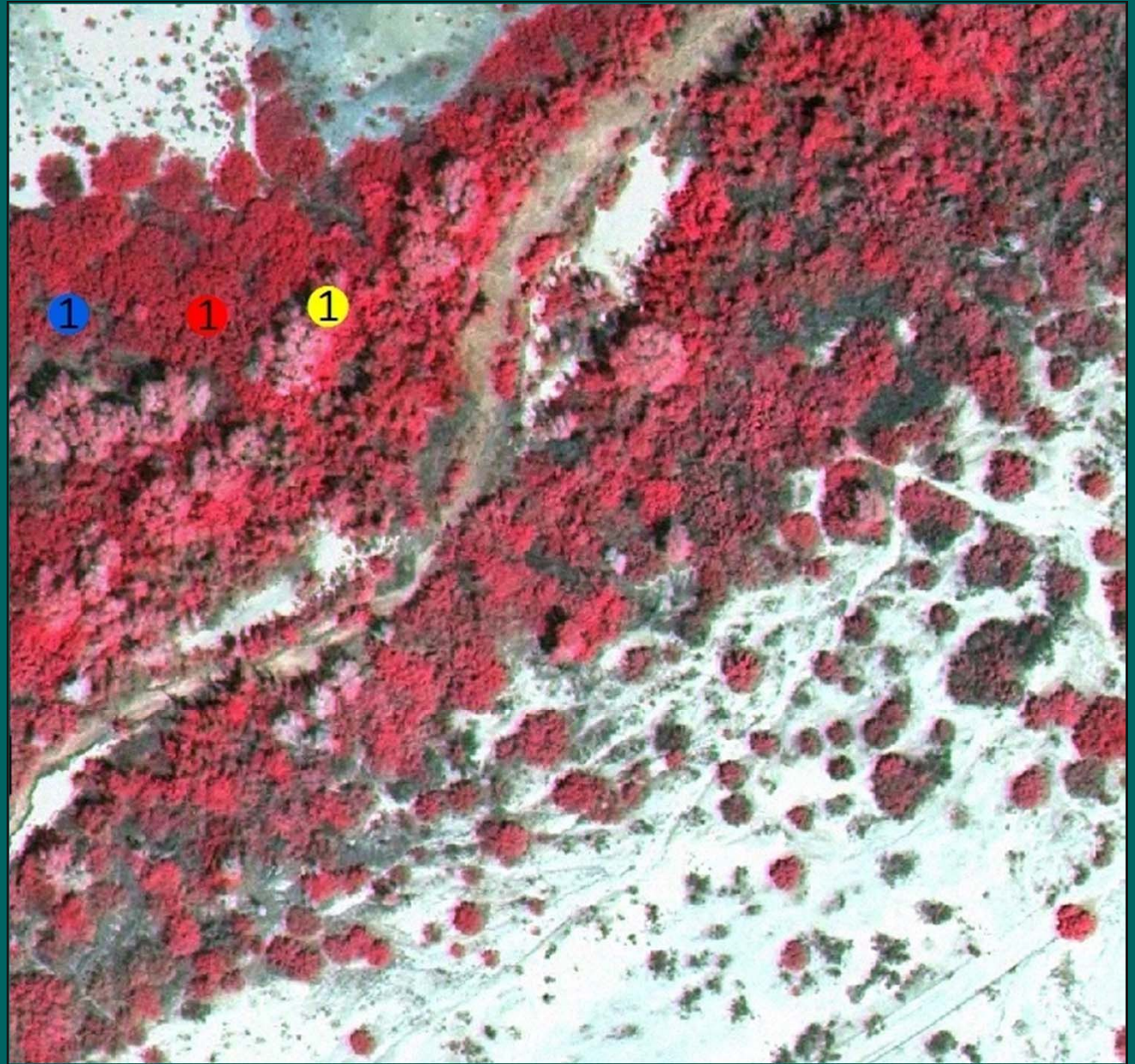BEVI Territories on Plot 2878 over the 2011 season
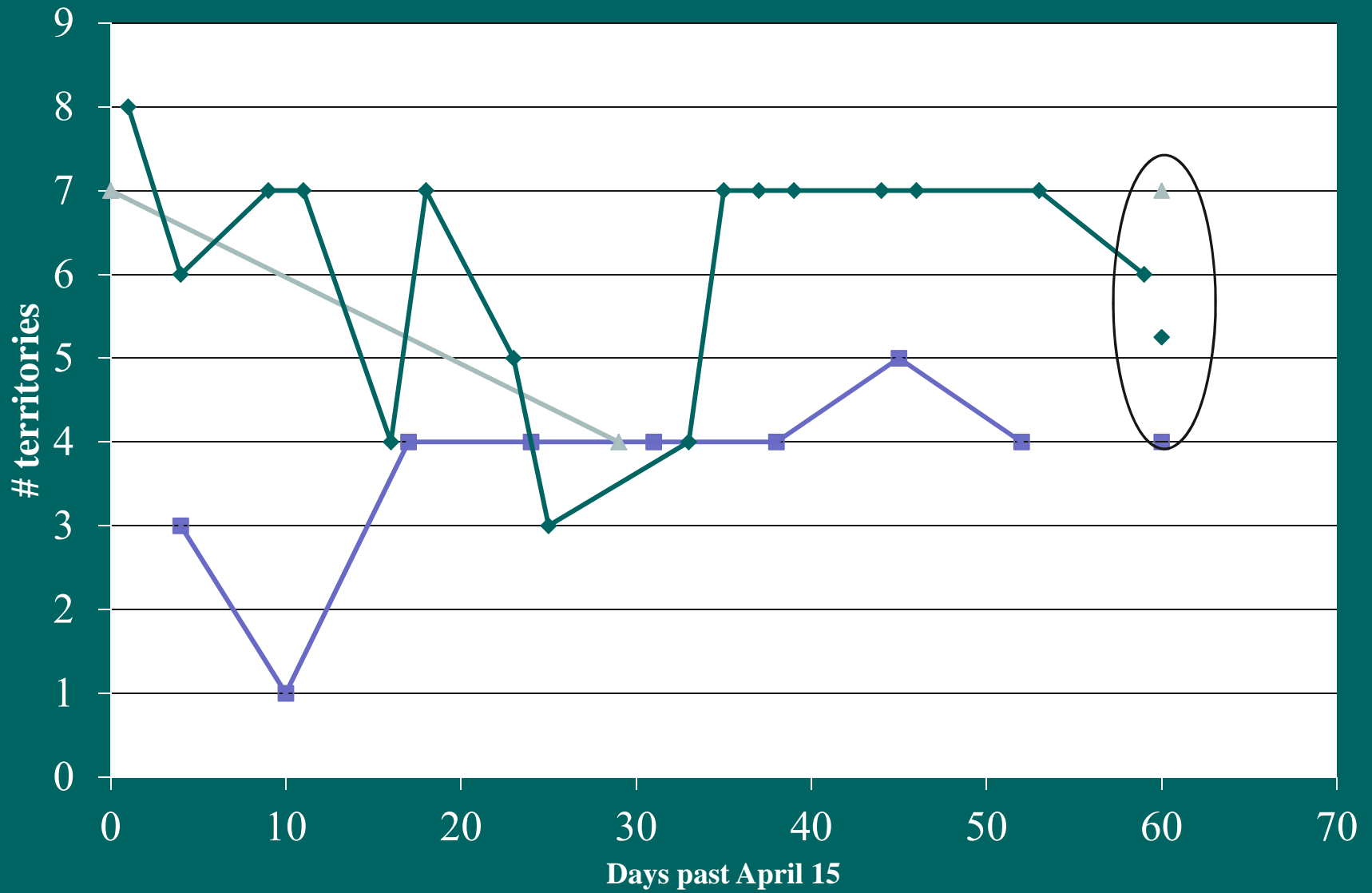
SOSP Territories on Plot 8223 over the 2011 season

Bell's Vireo Territories by Visit

— BEVI1 = ● (yellow)

— BEVI2 = ● (blue)

— BEVI3 = ● (red)

*Colors denotes an individual territory and #'s show on which visit the bird was observed
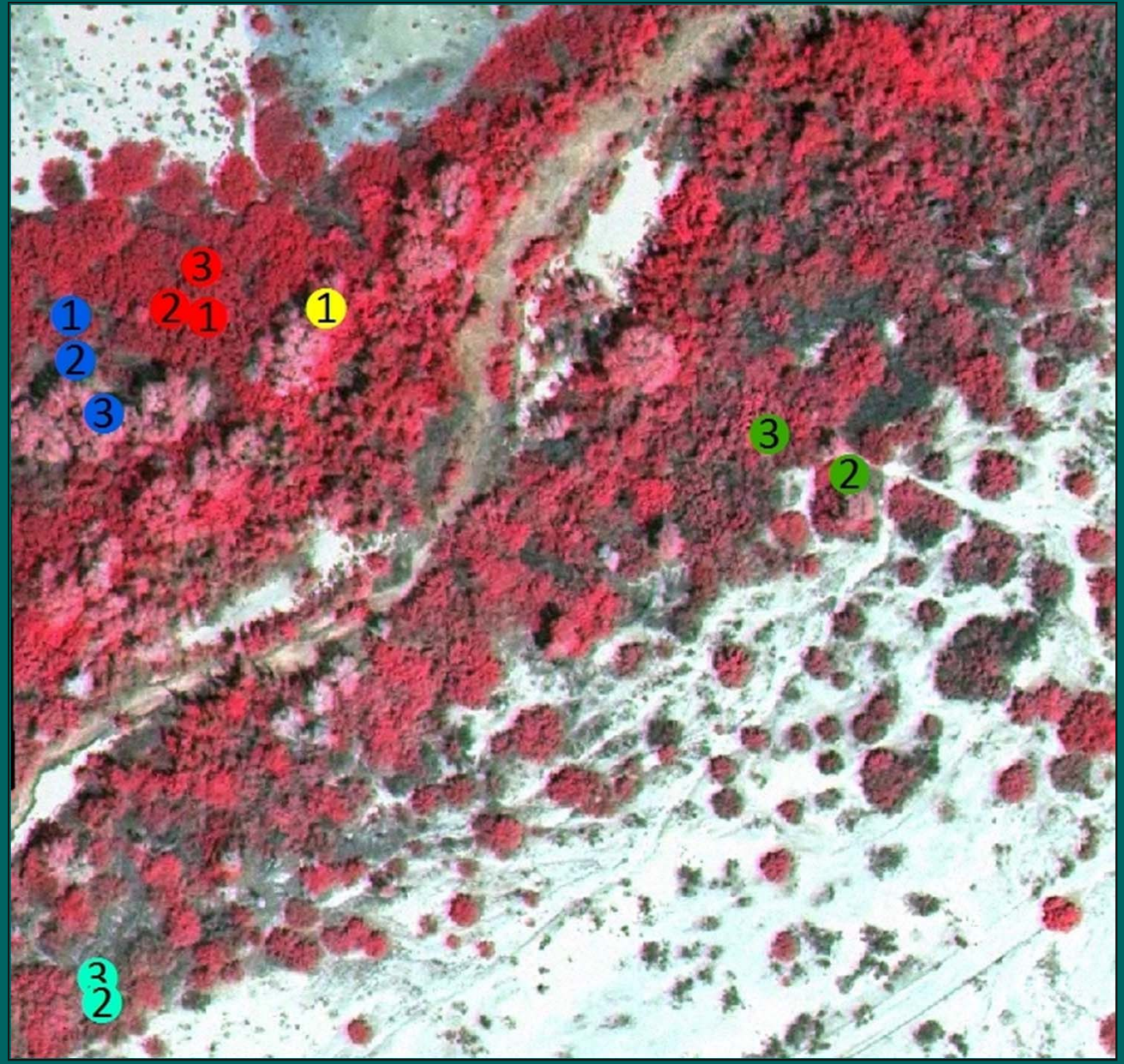
Bell's Vireo Territories by Visit

— BEVI1 = 🟡

— BEVI2 = 🔵

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—BEVI4 = 🟢

—BEVI5 = 🩵

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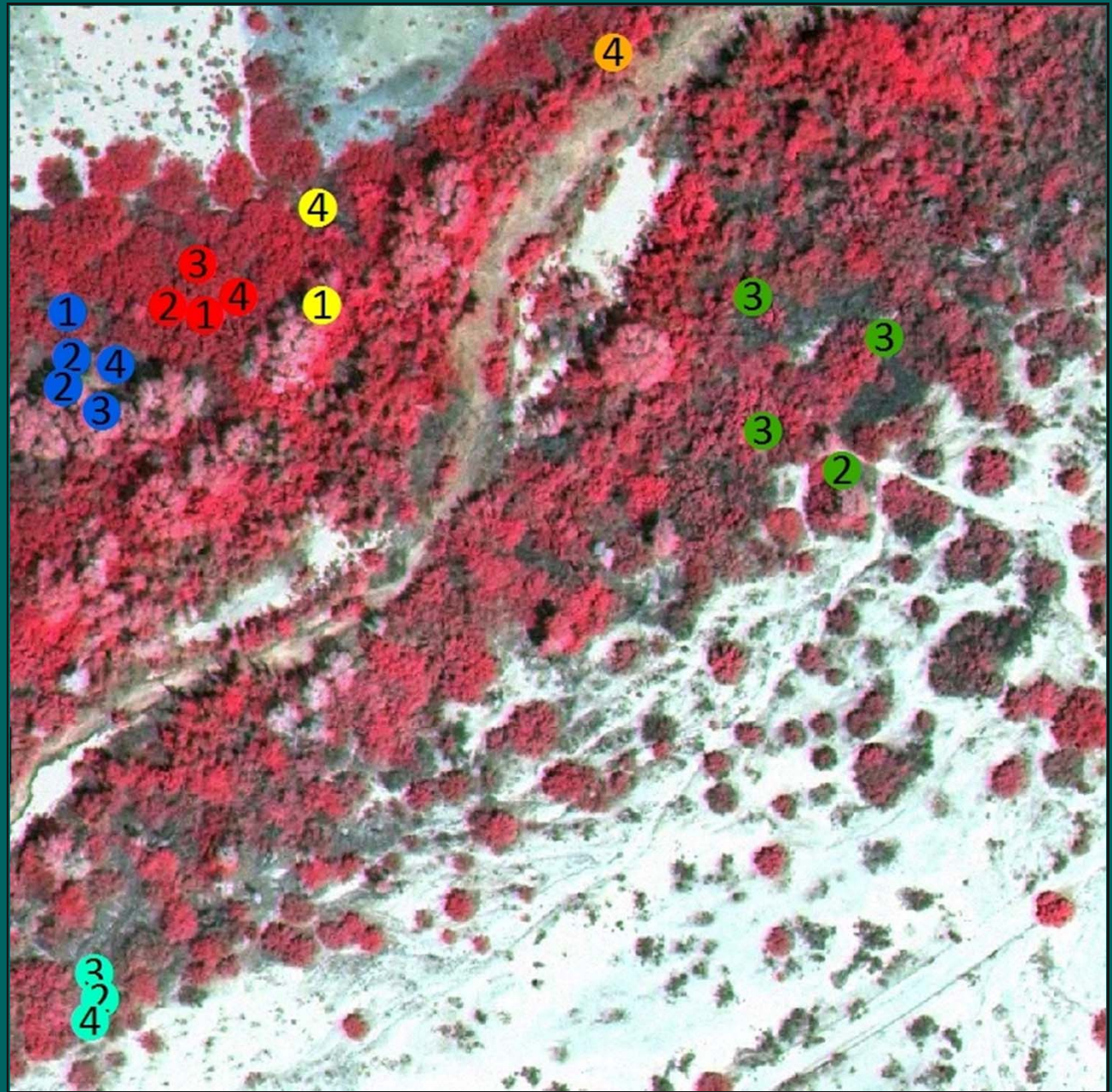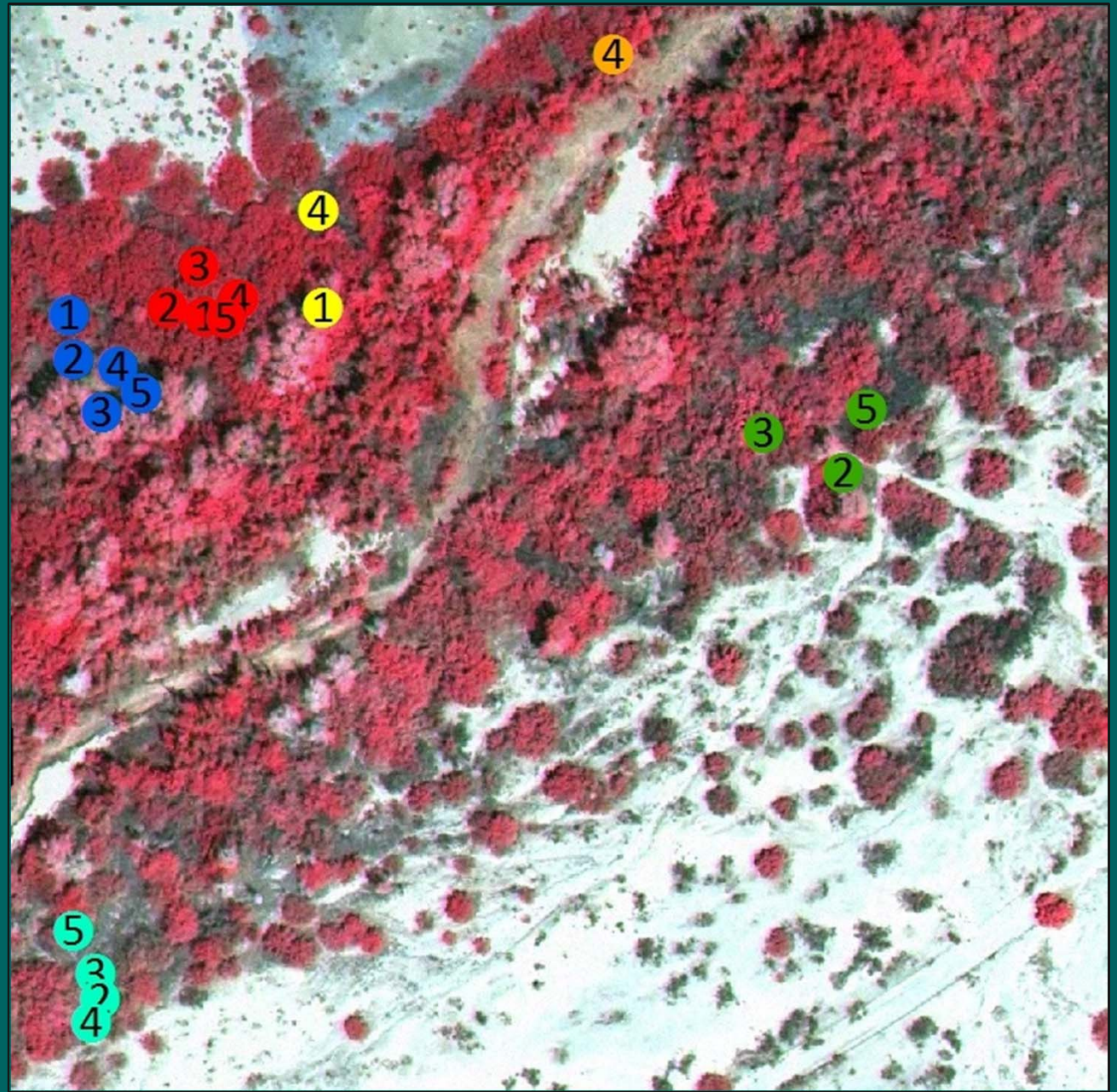
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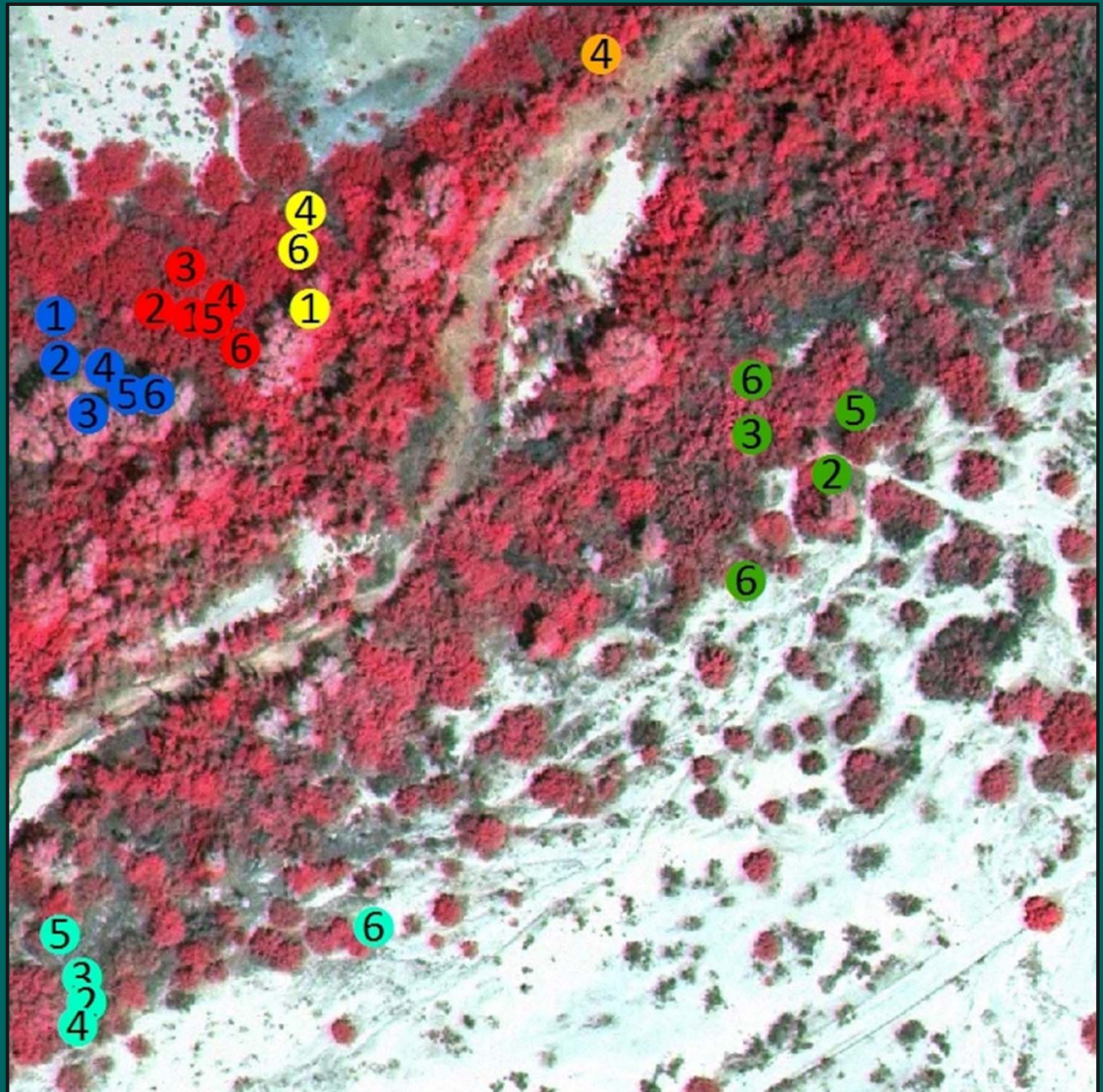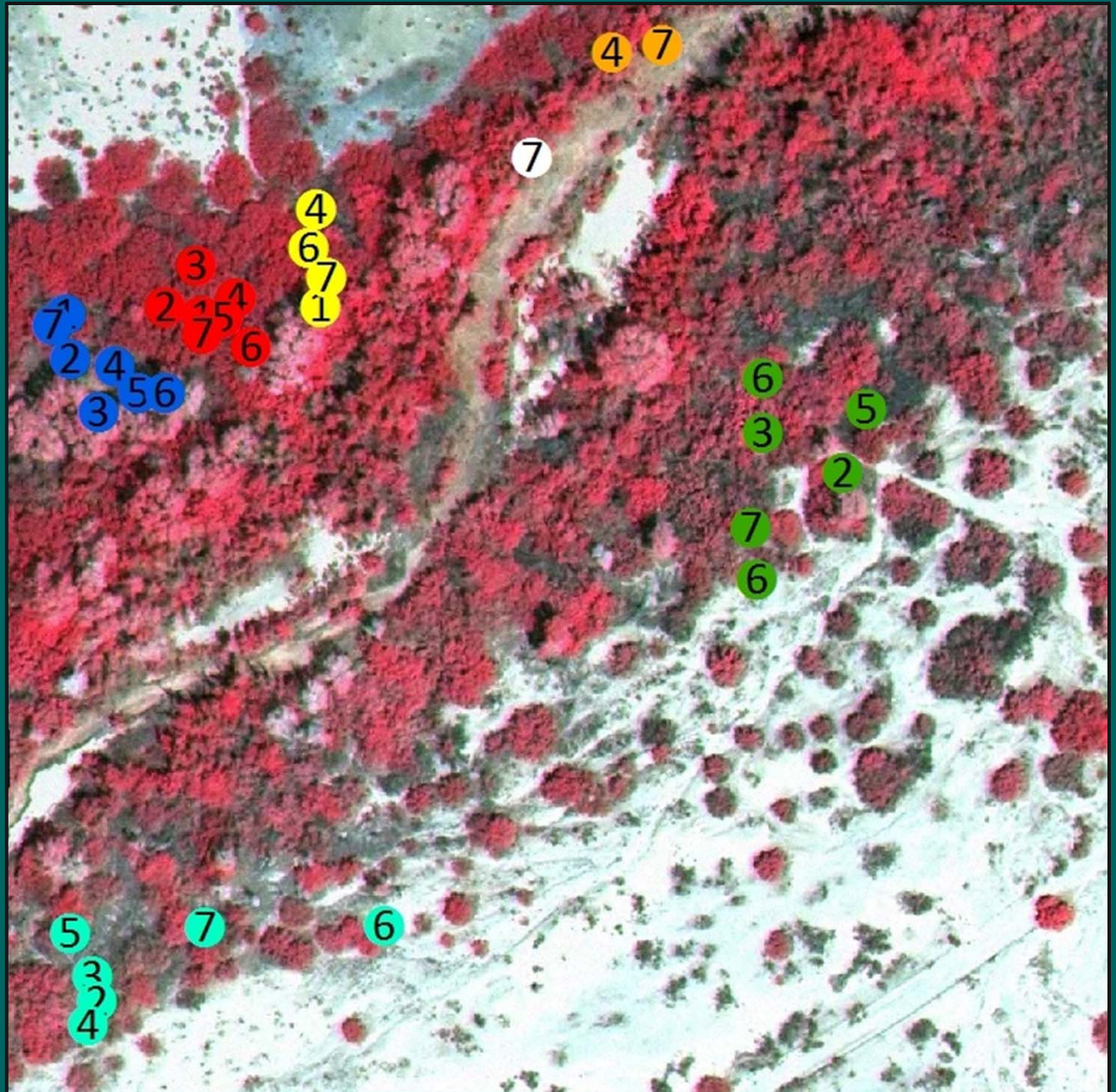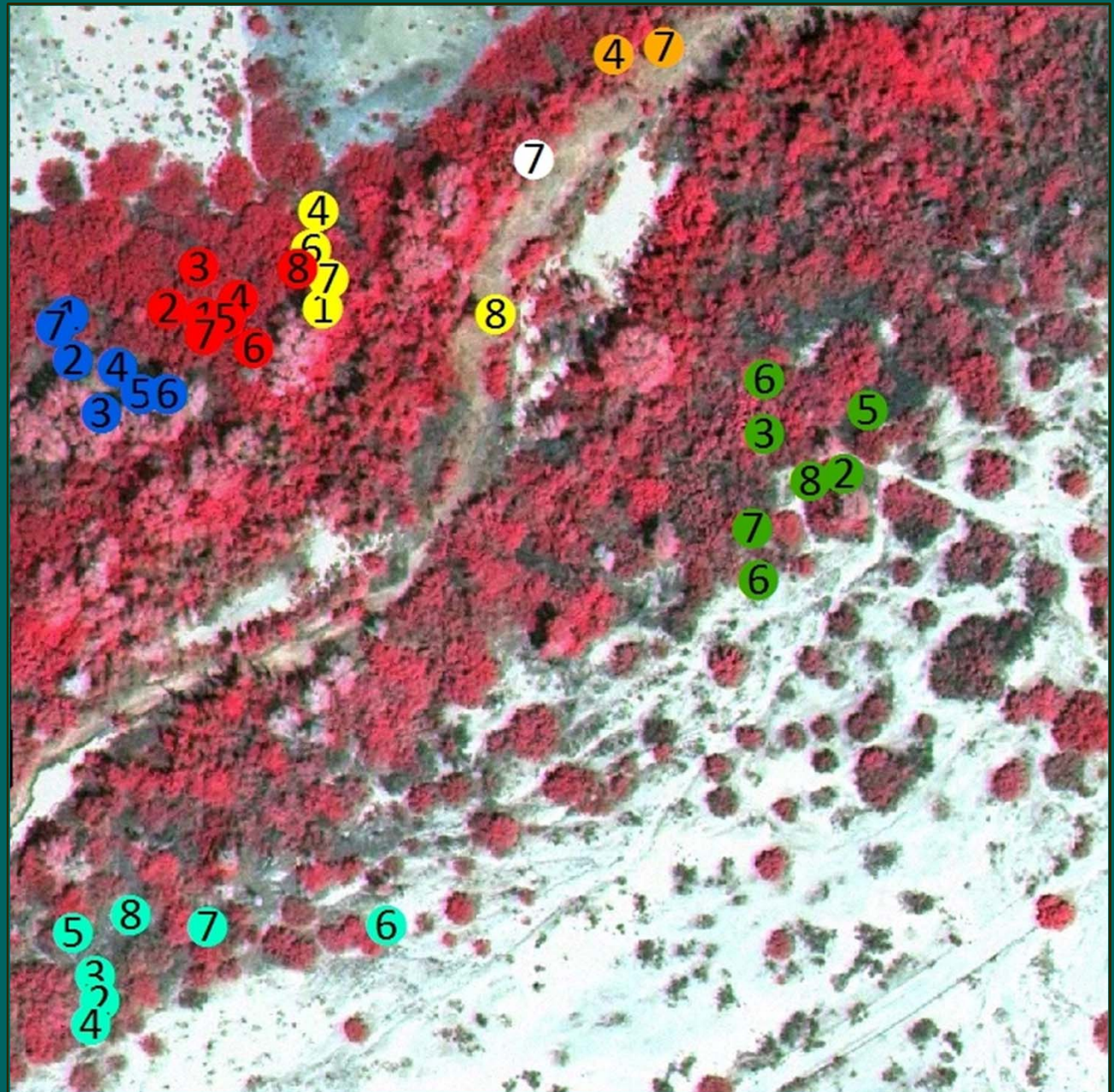
Bell's Vireo Territories by Visit

— BEVI1 = (yellow)

— BEVI2 = (blue)

— BEVI3 = (red)

— BEVI4 = (green)

— BEVI5 = (cyan)

— BEVI8 = (orange)

*Colors denotes an individual territory and #'s show on which visit the bird was observed

Bell's Vireo Territories by Visit

- BEVI1 =
- BEVI2 =
- BEVI3 =
- BEVI4 =
- BEVI5 =
- BEVI8 =
- BEVI10 =

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Challenges on difficult plots

EI plots represent the most challenging plots surveyed and are not representative of the entire study area, therefore we hypothesize that this is affecting the results.

- Vegetation density

- Bird density and diversity

- Access to plot edges

- Ability to see birds

Total # of Territories on Extra-Intensive Plots in 2011

Plot	# territories
6529	44
8682	44.75
8226	91.25
CRIT Plot C	92.75
8223	99.75
2878	127.75
8252	153.75

Discussion

We will use the knowledge gained from this season to :

      Improve training to focus on more challenging species

      Further adapt protocols and data collection

      Assess threshold of plot "hardness" when the Intensive survey is working…

Acknowledgements

- US Bureau of Reclamation Wildlife Group

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- GBBO Staff

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