Design of landbird surveys

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Management Issues

- Fulfill the requirement to "monitor riparian obligate bird species covered under the LCR MSCP to document long--term trend and habitat use."

Defining strata: habitat, region

1. Habitats based on Anderson-Ohmart, literature review, comments by species experts

2. Used communities-structural types; additional "near to water" modifier

1=good, 2=fair, blank=poor

Spe-cies	Cottonwood-willow				Honey mesquite	
	1	2	3	4	2	3
GIWO	**1**	**1**	**1**	2	2	2
GIFL	**1**	**1**	**1**	2	2	2
SUTA	**1**	**1**	2	2	2	2
VEFL	2^1	^{1}	**1**	**1**	2	2^1

Habitat Groups

| HabGrp	Name	Description
1	Good (tall)	tall CW, mixed CW near to water
2	Good (low)	Mixed CW; tall HM, SH, SM; mixed HM, SC, SH, SM near to water
3	Fair	Tall or mixed SC; mixed HM, SC, SH, SM; low CW, HM, SC, SH, SM near to water; AG, ATW, AW, NC, UD near water
4	Poor	Low CW, HM, SC, SH, SM
5	Marsh	all marshes
6	Water	all aquatic areas (used for display purposes)
0	Unsuitable	Other than above

Plots (n=15,028)
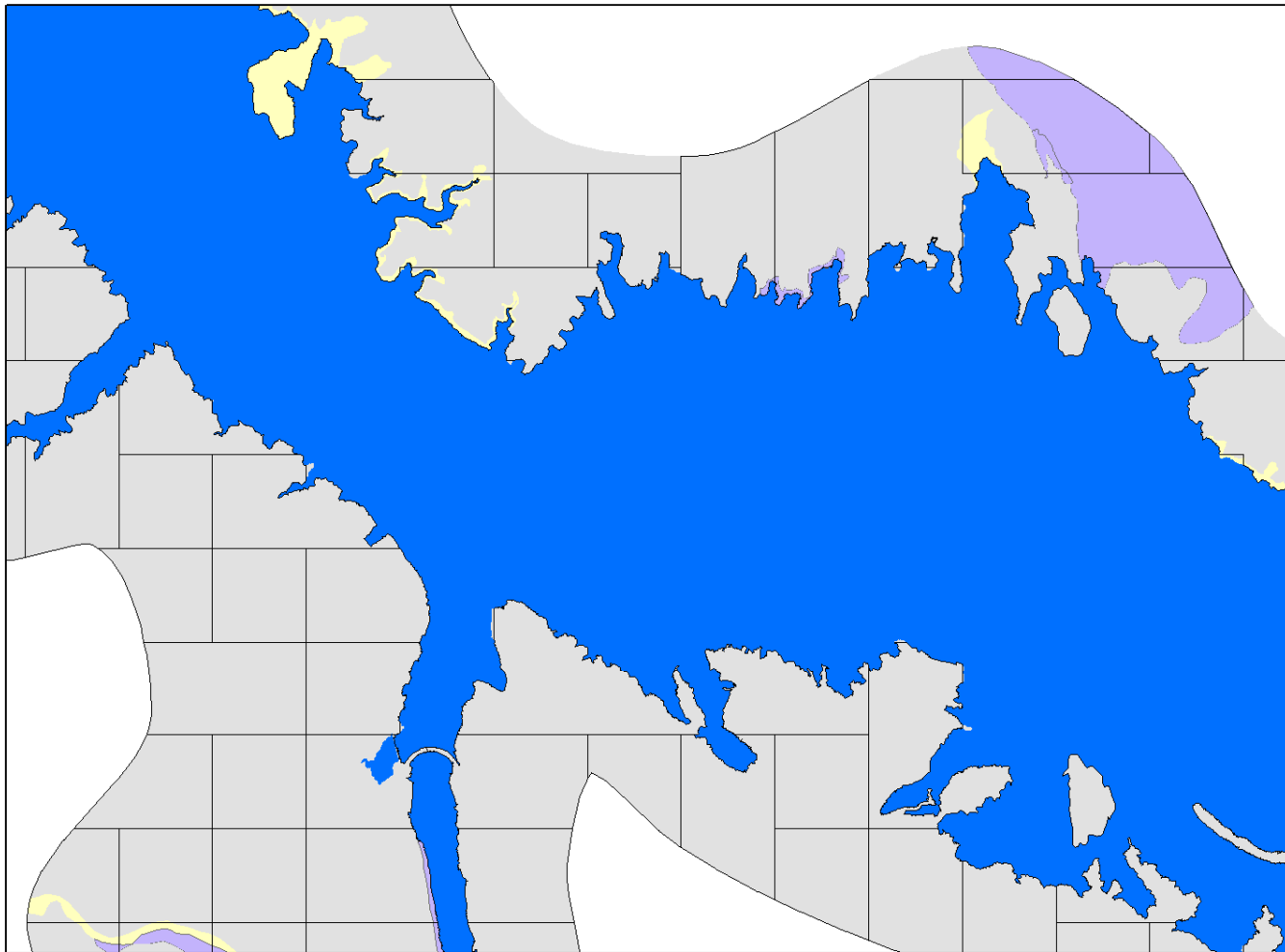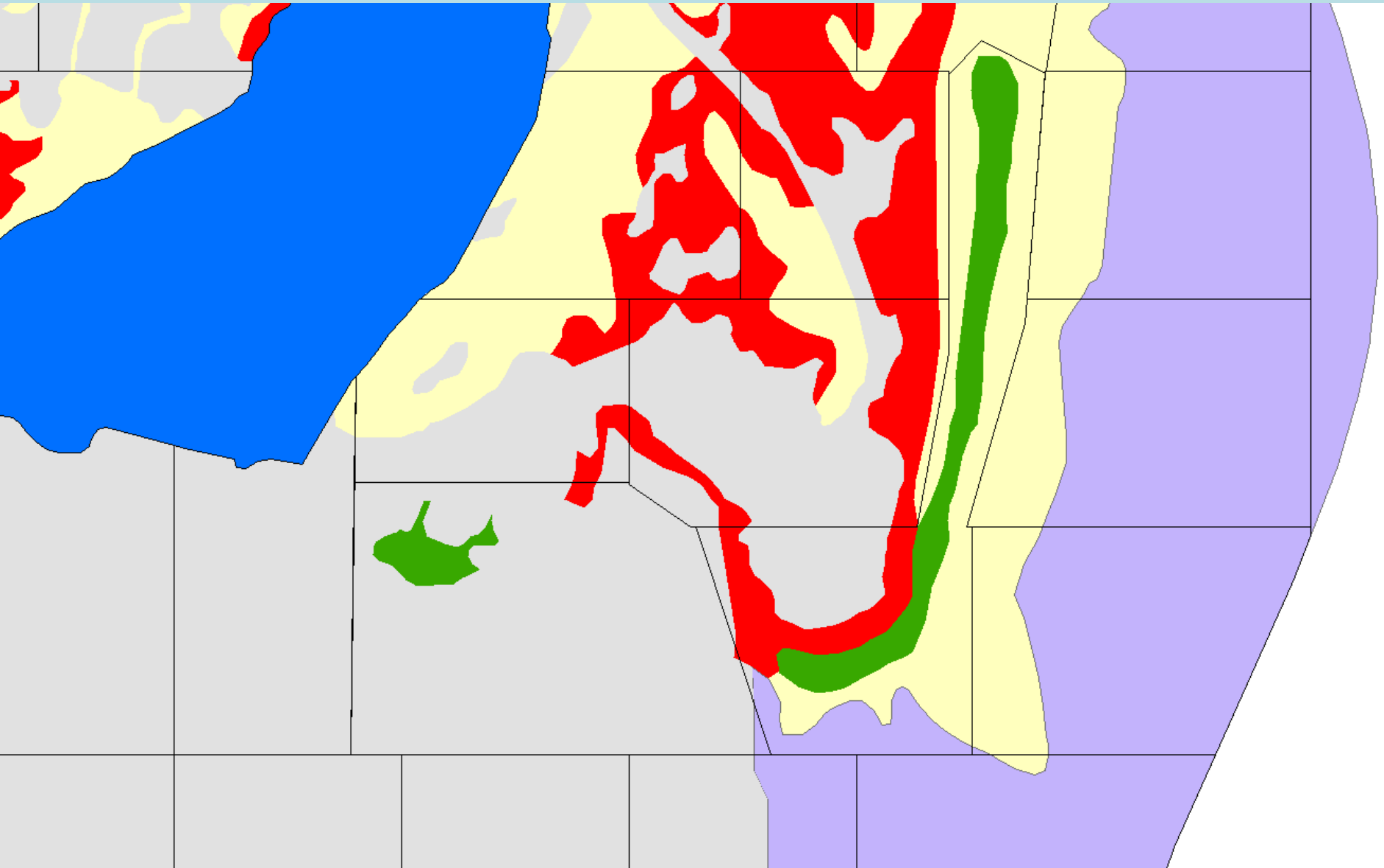
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HABGRP
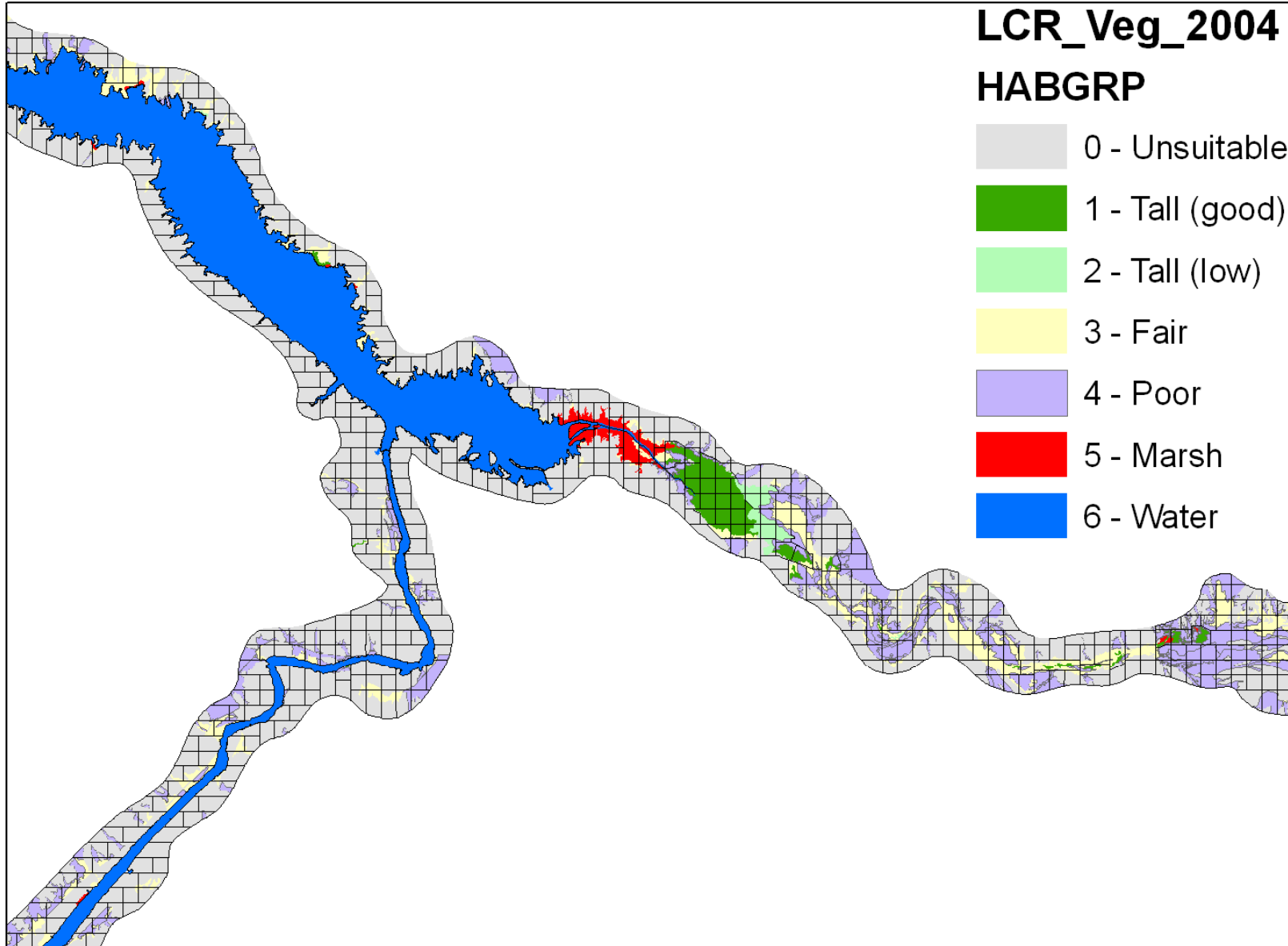
- 0 - Unsuitable
- 1 - Tall (good)
- 2 - Tall (low)
- 3 - Fair
- 4 - Poor
- 5 - Marsh
- 6 - Water
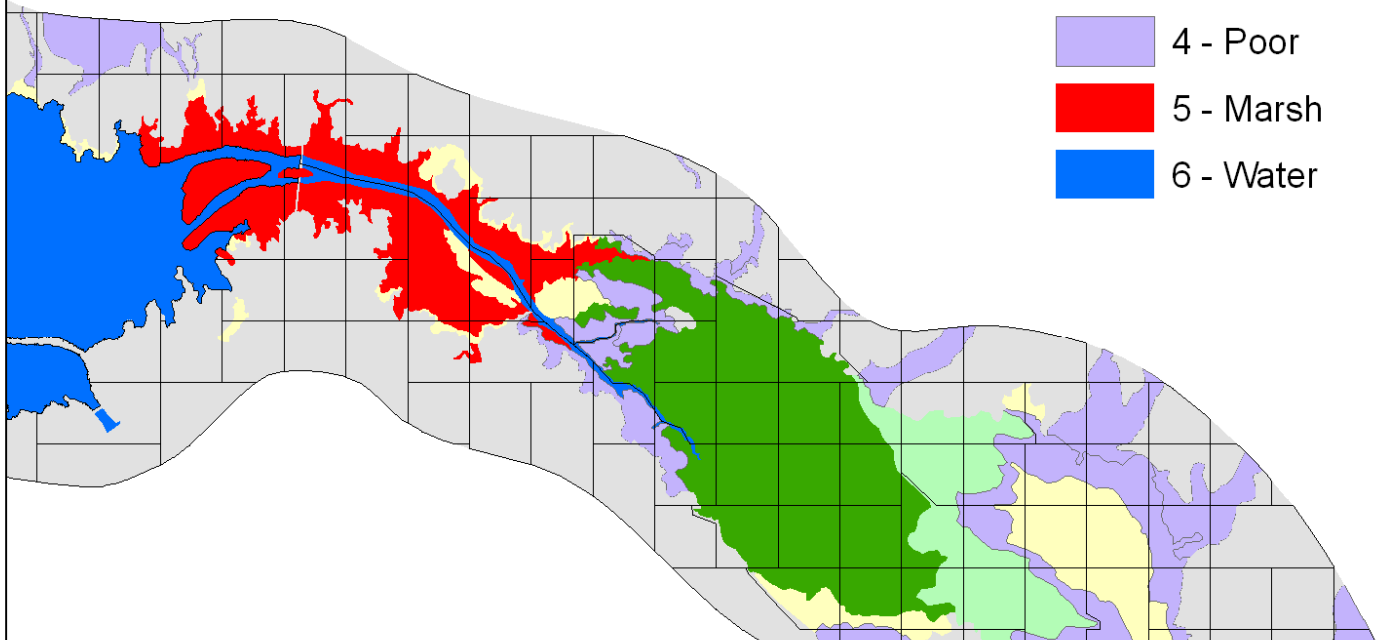
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HABGRP

	0 - Unsuitable
	1 - Tall (good)
	2 - Tall (low)
	3 - Fair
	4 - Poor
	5 - Marsh
	6 - Water

Assignment of plots to types

- If >20% good-tall, plot=good-tall
- If >20%, good-low, plot=good-low
- Largest proportion

13 Regions

1. Separation Canyon to Lake Mead
2. Virgin River
3. Lake Mead
4. Hoover Dam to Davis Dam
5. Davis Dam to Bill Williams (excluding Havasu NWR)
6. Havasu NWR (excluding Bill Wms unit)
7. Bill Williams unit of the Havasu NWR
8. Bill Wms to Cibola excluding the Colorado Reservation
9. Colorado River Indian Reservation Preserve.
10. Cibola NWR
11. Imperial NWR
12. Colorado River from the Imperial NWR to Yuma
13. Yuma to the southern border of the study area

Strata = region-habitat

N plots per stratum

Region	0	1-Good (tall)	2-Good (low)	3- Fair
1. Separation Canyon to Lake Mead	395	123	356	45
2. Virgin River	347	31	5	539
3. Lake Mead	1488	0	0	51
4. Hoover Dam to Davis Dam	314	9	0	140

N plots selected per stratum

Region	0	1	2	3
1. Separation Canyon to Lake Mead	1	2	1	1
2. Virgin River	0	0	0	0
3. Lake Mead	2	0	0	1
4. Hoover Dam to Davis Dam	1	7	0	2

Bird surveys

- One survey on each plot (rapids)
- Repeated surveys on 15 plots (intensives)

Field method for rapid surveys

Summary form for rapid surveys

Species	Nests	Prob. nests	Pairs	Singing bird	Males	Fe-males	Unk. sex	Groups	Inci-dentals
SOSP				I					I
BCFL									I
YBCH			I	I					II
COYE				I					
LUWA				I					
BEWR				I					
WWDO									II
PEFA									I
SNEG									II
BHCO						I			
BCHU				I					
CANW				I					
BEVI		I							
GAQU								8	
ATFL			I						
LBWO	I								
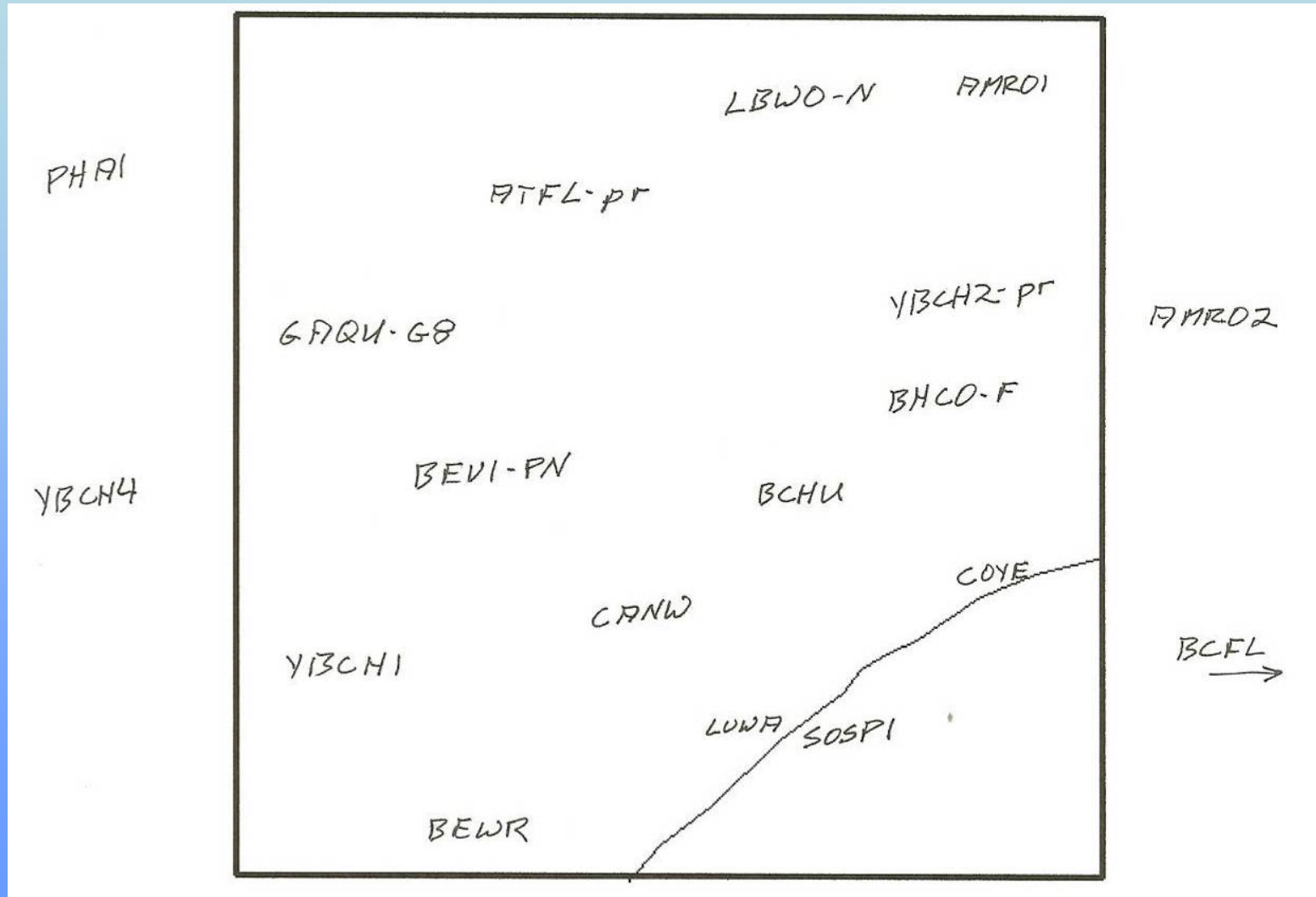
Rapid surveys (n=88)

Species	YWAR	BEVI	VEFL	GIWO	SUTA
N birds	236	218	2	85	42
N plots	34	26	1	25	16

Intensive surveys (n=15)

Species	YWAR	BEVI	VEFL	GIWO	SUTA
N birds	13	23	1	17	7
N plots	5	4	1	4	3

Detection ratios

Species	Detection ratio	Actual
GIWO	0.88	17
VEFL	0.00	1
BEVI	1.17	23
YWAR	1.00	13
SUTA	0.43	7
All	1.03	697

Estimation

Density

$$d = \frac{\hat{\bar{X}}}{\hat{R}} \qquad \hat{V}(d) = d^2 \left(\frac{\hat{V}(\hat{\bar{X}})}{\hat{\bar{X}}^2} + \frac{\hat{V}(\hat{R})}{\hat{R}^2} \right)$$

Pop. size

$$\hat{Y} = Ad \qquad \hat{V}(\hat{Y}) = A^2 \hat{V}(d).$$

Estimated Population Totals

Species	Pop. size	SE	CV
GIWO	1080	256	0.24
BEVI	654	124	0.19
YWAR	2006	213	0.11
SUTA	104	19	0.18

Habitat

- Grid of points on intensive plots
- 1-m vertical column imagined at each
- Sub-divided into vertical zones
  - 0 (substrate): sand
  - <1: dense grass-forbs
  - 1-4: medium salt cedar

Analysis

- Vertical profile constructed for each point

- Points within the home ranges of each focal species identified

- Proportions for several variables calculated for each species

Bell's vireos

	Water level (m)					
>1.0	0.51-1.0	0.10-0.50	<0.10	Satur-ated	Moist	Dry
0	0	0	0	0.11	0.11	0.78

Density of vegetation

Ht(m)	Canopy cover			
	0	1-25%	26-75%	>75%
0-1	0.01	0.44	0.39	0.16
1-2	0.03	0.42	0.4	0.15
2-3	0.06	0.41	0.38	0.15
3-4	0.1	0.28	0.46	0.16
4-5	0.17	0.25	0.48	0.1

Species composition

Ht (m)	Willow	Cotton-wood	Mesq. P.verde	Salt cedar
Sub.	0	0	0	0.01
0-1	0.22	0.08	0.12	0.45
1-2	0.27	0.08	0.12	0.49
2-3	0.34	0.1	0.11	0.5
3-4	0.47	0.12	0.12	0.4
4-5	0.52	0.1	0.12	0.33

Measures of variability still needed.

Specifications for habitat production

	0-0.1	Sat'd	Moist	Dry
Water level	0.1	0.2	0.3	0.4
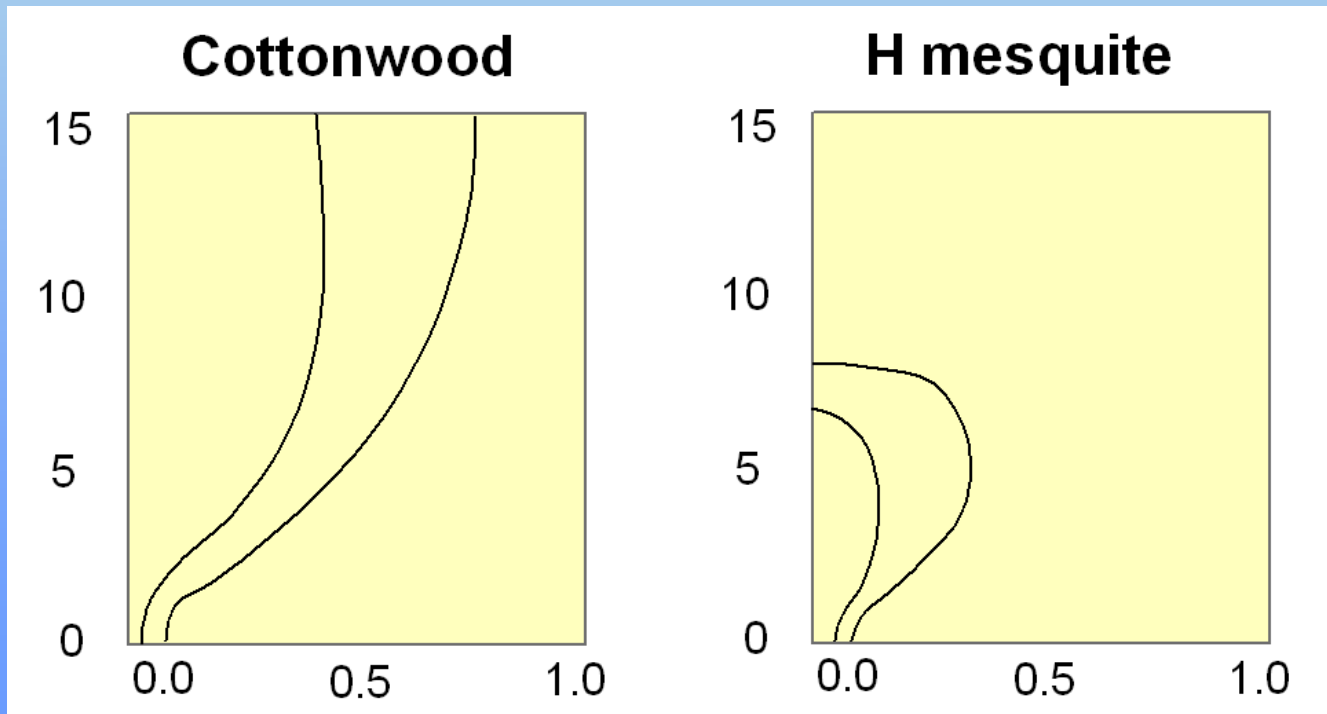
Conclusions

- Sampling plan well developed
- Survey method working
- CVs look good
- Habitat methods still need work
- Sampling plan for restoration sites designed but needs verification