

Habitat Use by Bats along the Lower Colorado River

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Lower Colorado River Multi-Species Conservation Program Objectives

- **Conduct research to identify focal species habitat requirements.**
- **Conduct surveys to determine distribution of focal species**
- **Monitor and adaptively manage created habitat**



MSCP Species



Cave Roosting Species



Tree Roosting Species

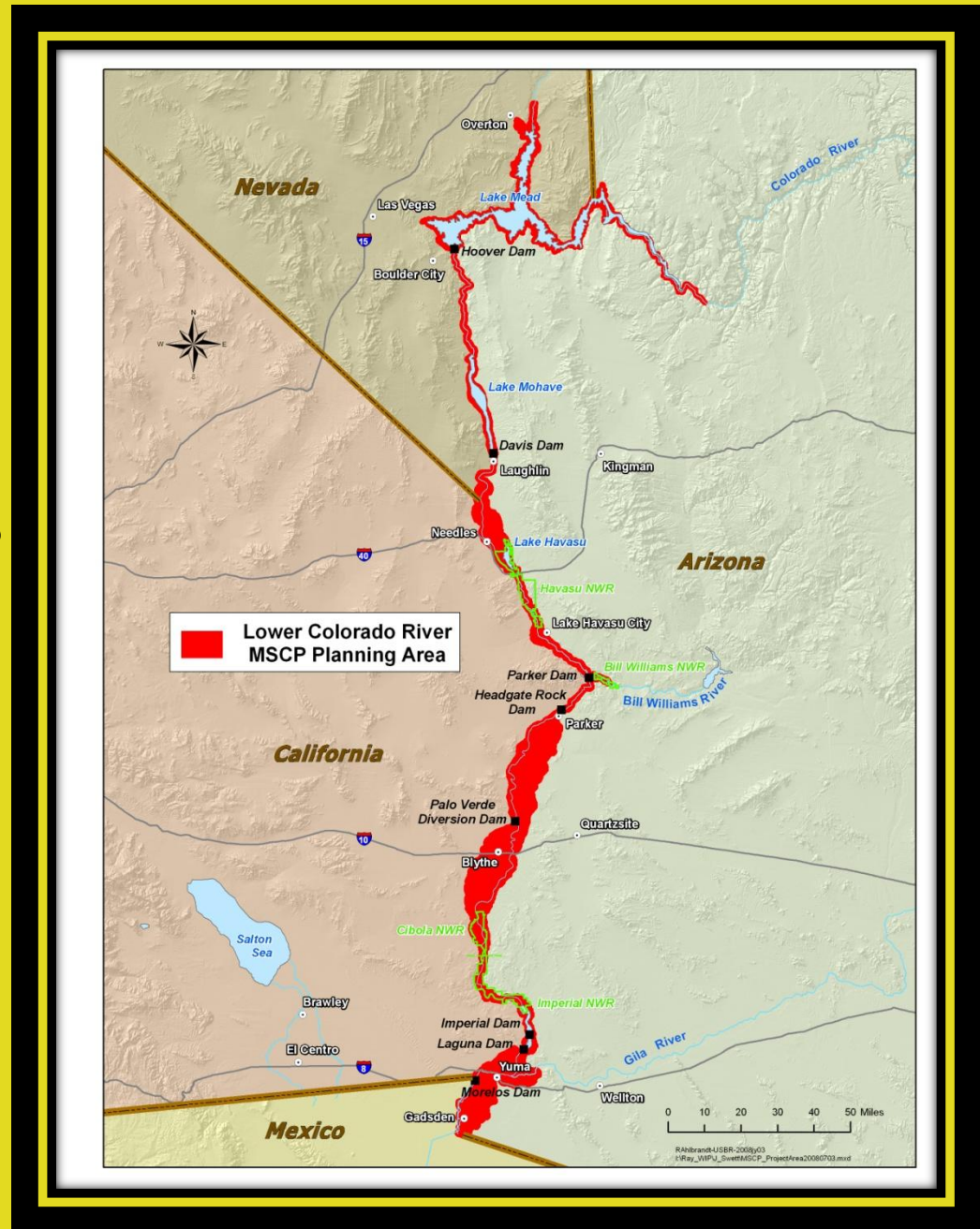


Study Objectives

- 1) To determine habitat use
- 2) Predict distribution of the four focal species within the study area.
- 3) Make recommendations for habitat restoration.

Study Area and Methods

72 sites X 2yrs
X 4 vegetation types
over 386km
for 2 consecutive
nights per site each
of four seasons.



Vegetation Types



Salt cedar 40.4%



Marsh 8.5%

Vegetation Types



Cottonwood 3.2%



Mesquite 26.5%

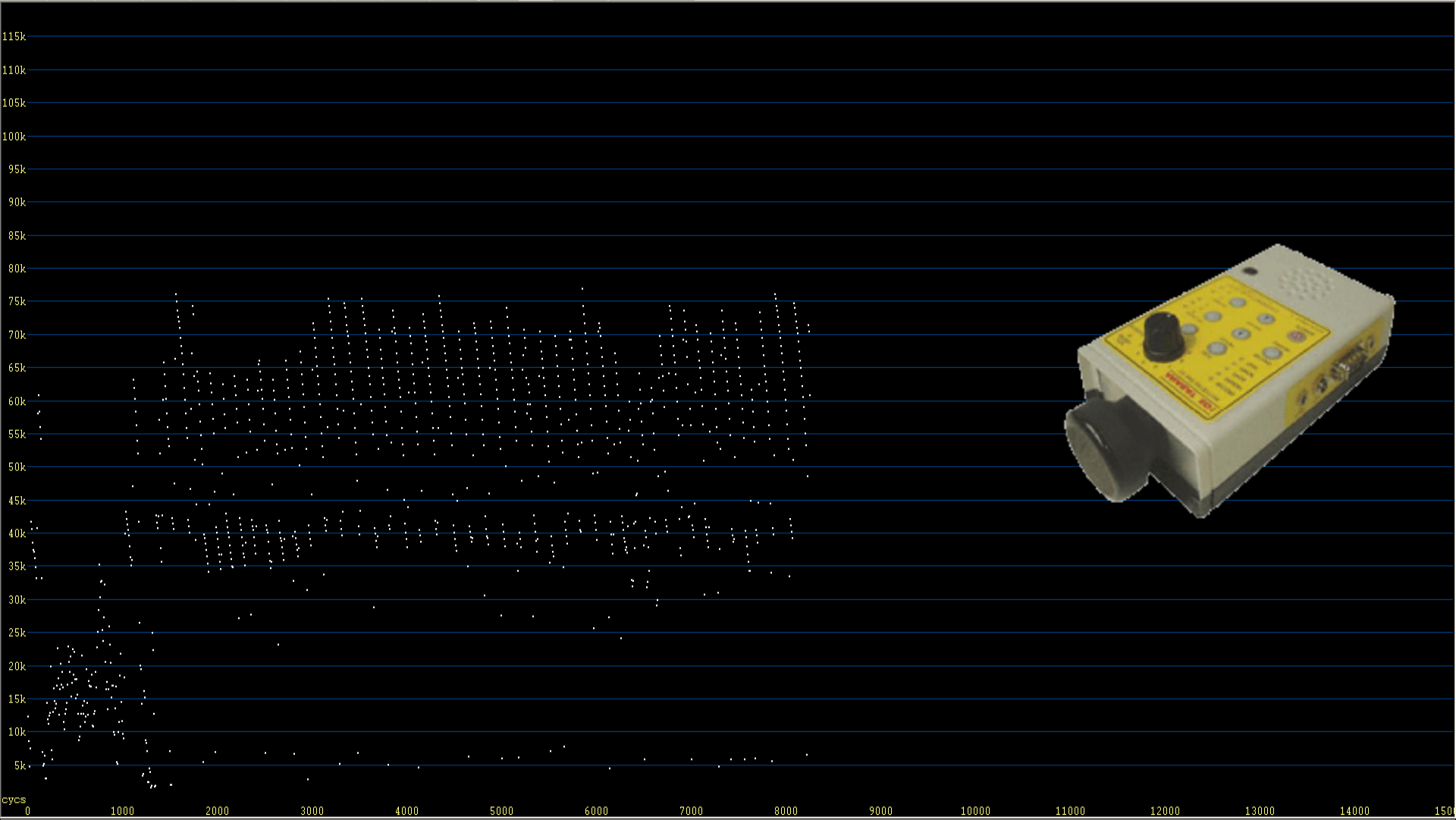
Analog - [C:\Documents and Settings\acalvert\My Documents\Anabat data\Reference calls\COTO\06222151.51#]

File Edit View Filter Tools Record Window Help

F1 F2 F3 F4 F5 F6 F7 F8 F9 10 All

EUPE	EPFU	MYU	50K	LABL	Replace	Undo	Save	Buf1+	LCR bats
	TABR	MYCA	40K	LAXA	Edit		Save	Buf2+	
	NYMA	MYOC	20-25K	MACA	Load	Clear	Save	Buf3+	
	NYFE	ANPA	JUNK	COTO	Save As		Save	Buf4+	

Acoustic Sampling



Tape	CF0001	Date	20030622	Loc	Budweiser Spring, Mojave Ntnl Preserve,	Datum	MG284	
Species	rCOTO	Spec		Lat	0.00000 N	Lon	0.00000 E	
Notes							Alt	0 m

Div: 16 Filetime: 20030622 2151 51 N points displayed: 1032

Occupancy Modeling

- Uses presence/absence of a species
- Needs a large sample size (>100)
- Predicts the probability of detection and occurrence of a species
- Models created *a-priory* based on expert opinion and literature research.

Detection Covariates

Average Temperature

*Minimum Temperature

Maximum Temperature

Daily Precipitation

Average Wind speed

Maximum Wind speed

Moon Phase

Year

*2 Seasons (warm vs. cold)

*4 Seasons

Individual Survey event

Occupancy Covariates

Distance to:

- Dams
- Bridges
- Mines
- Known mine and cave roosts
- Potential roosts
- River

Percent area of:

- Salt-cedar
- Marsh
- Cottonwood/willow
- Mesquite
- Native plants
- Water sources

Human population
density

Results

- Greater occupancy in cottonwood and willow stands
- Greater occupancy near river

ψ : Probability of occupancy p : Probability of detection	AIC _C	Δ AIC _C	W _i
1. ψ Cottonwood/willow p (minimum temperature + 4Seasons)	323.25	0.00	0.70
2. ψ Cottonwood/willow + proximity to river p (minimum temperature + 4Seasons)	324.91	1.66	0.30



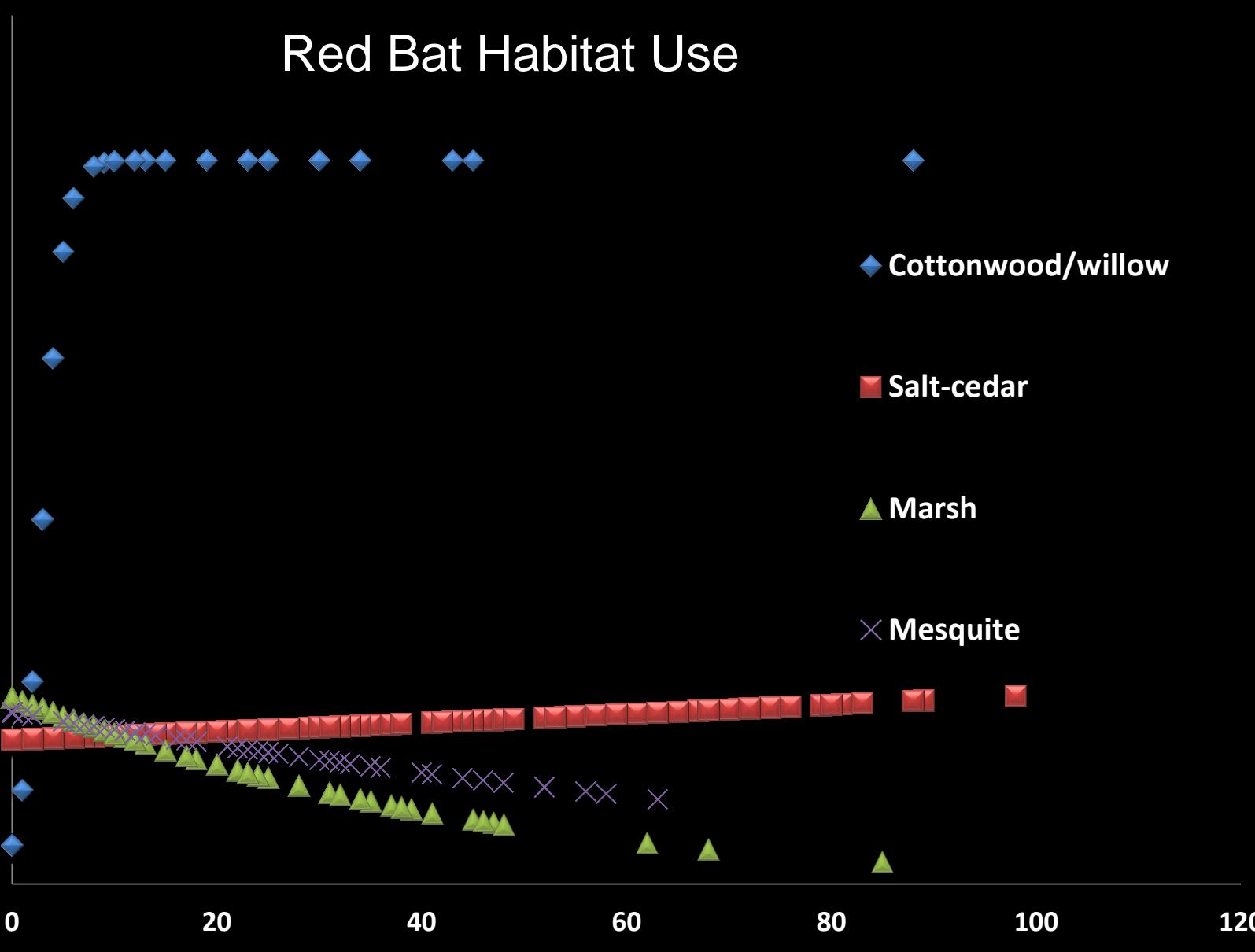
Western Red Bat

- All models performed better than the global and null

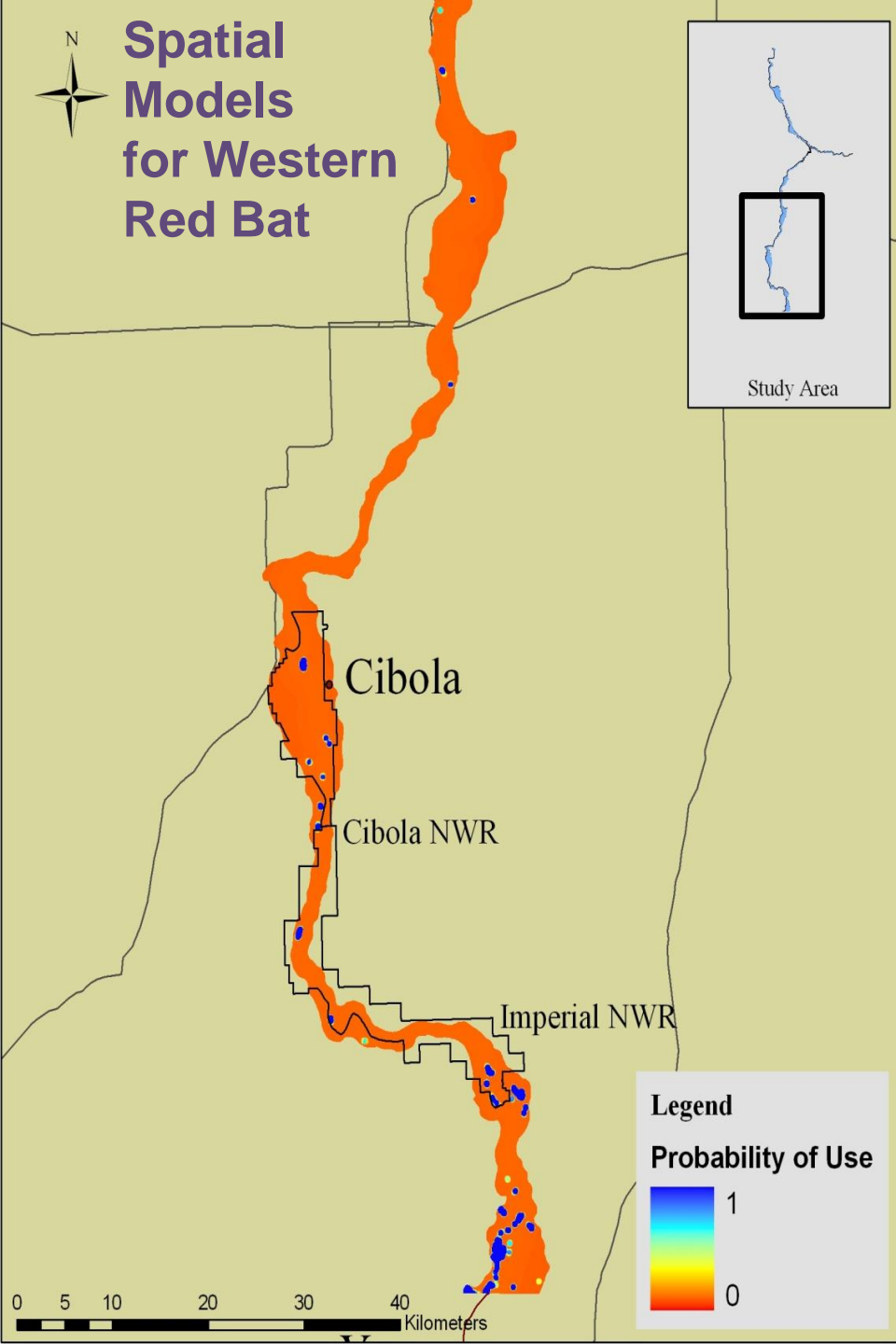
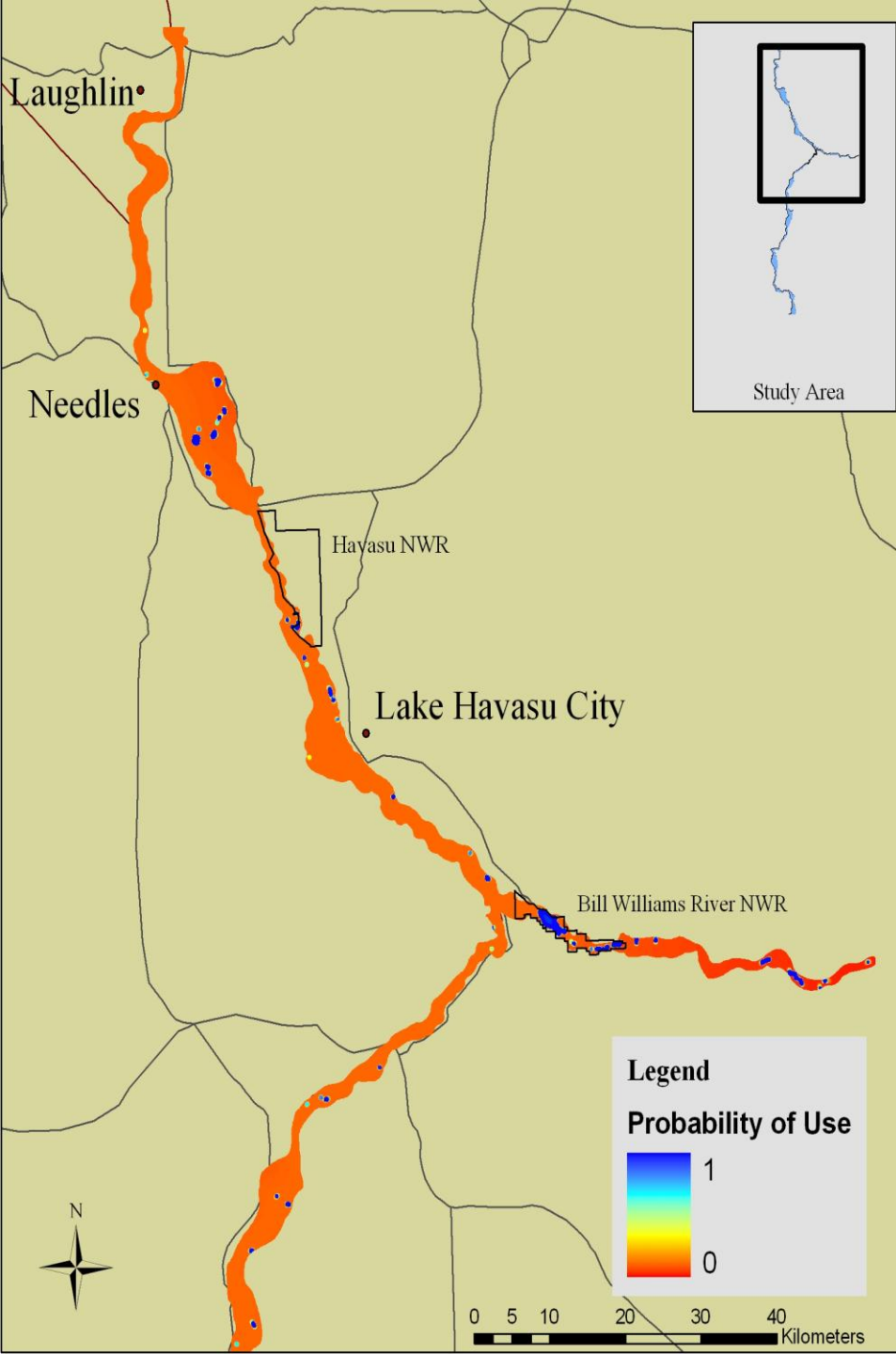
Red Bat Habitat Use

Probability of western red bat occupancy

1.2
1.0
0.8
0.6
0.4
0.2
0



% area of vegetation type within a 300m



Results

- Greater occupancy in cottonwood and willow stands
- Greater occupancy in native vegetation
- Less occupancy in salt-cedar vegetation

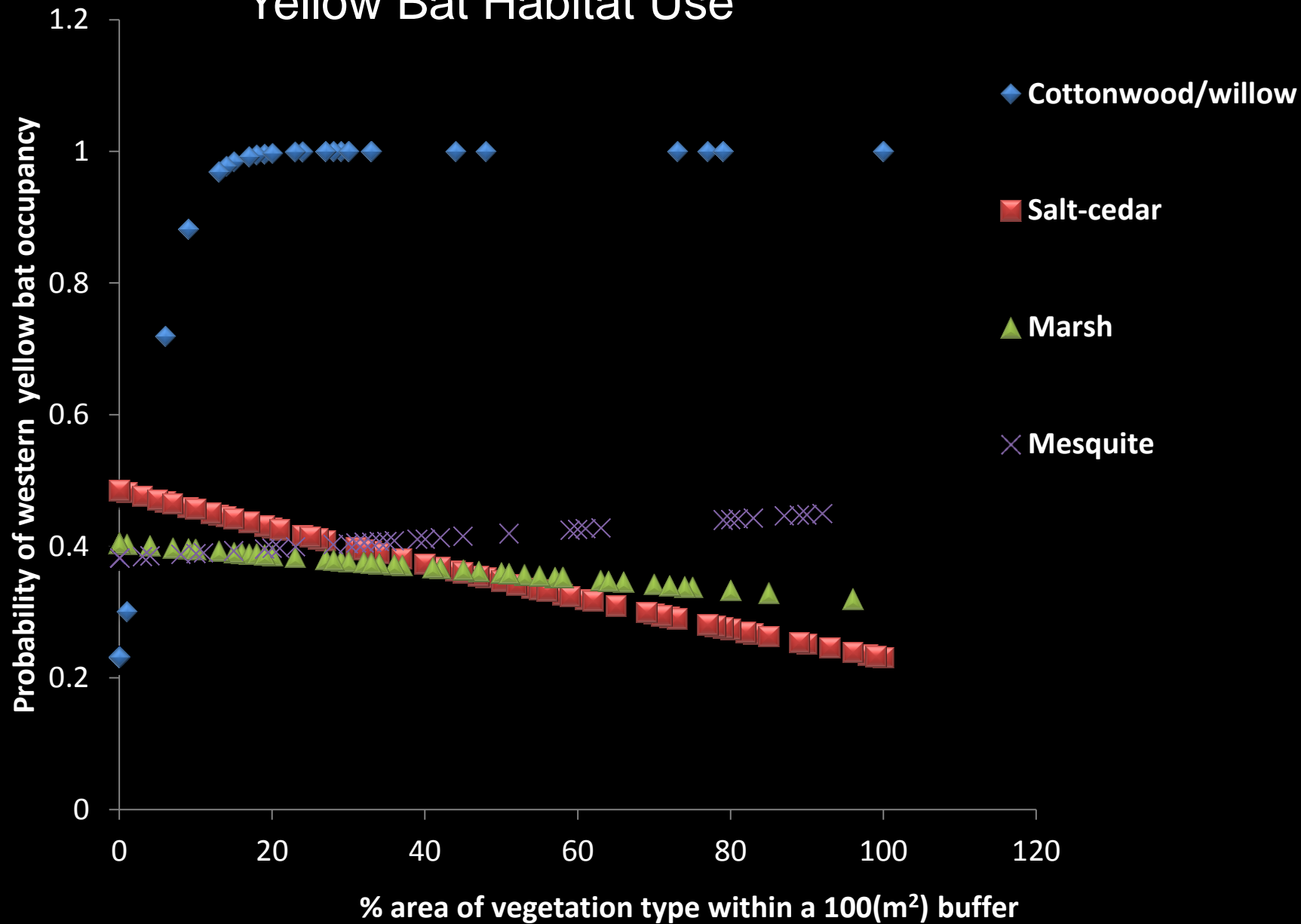
ψ : Probability of occupancy p : Probability of detection	AIC _C	Δ AIC _C	W _i
1. ψ Cottonwood/willow + Native p (minimum temperature + 2Seasons)	467.68	0.00	0.67
2. ψ Cottonwood/willow + Salt-cedar(-) p (minimum temperature + 2Seasons)	469.56	1.88	0.26

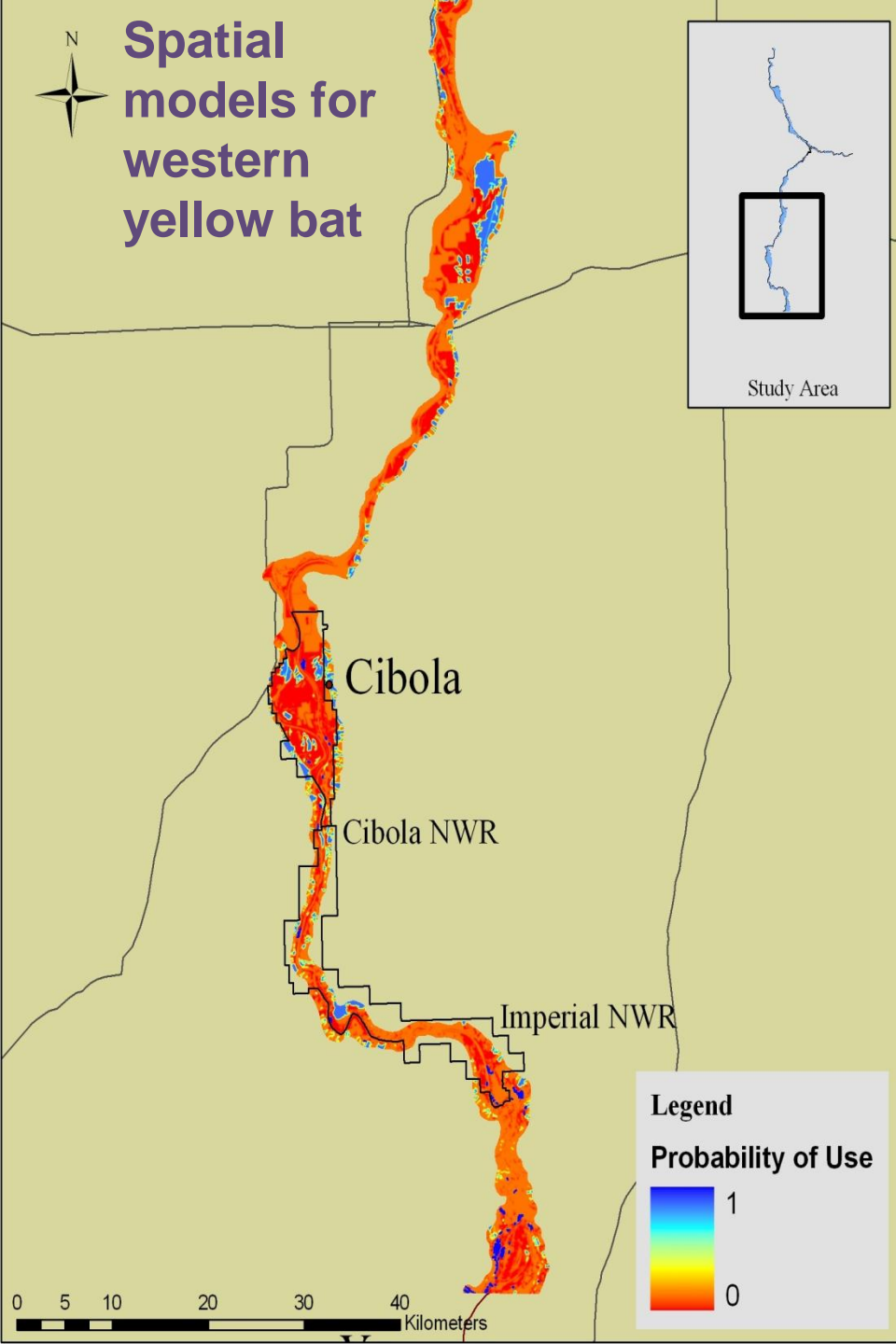
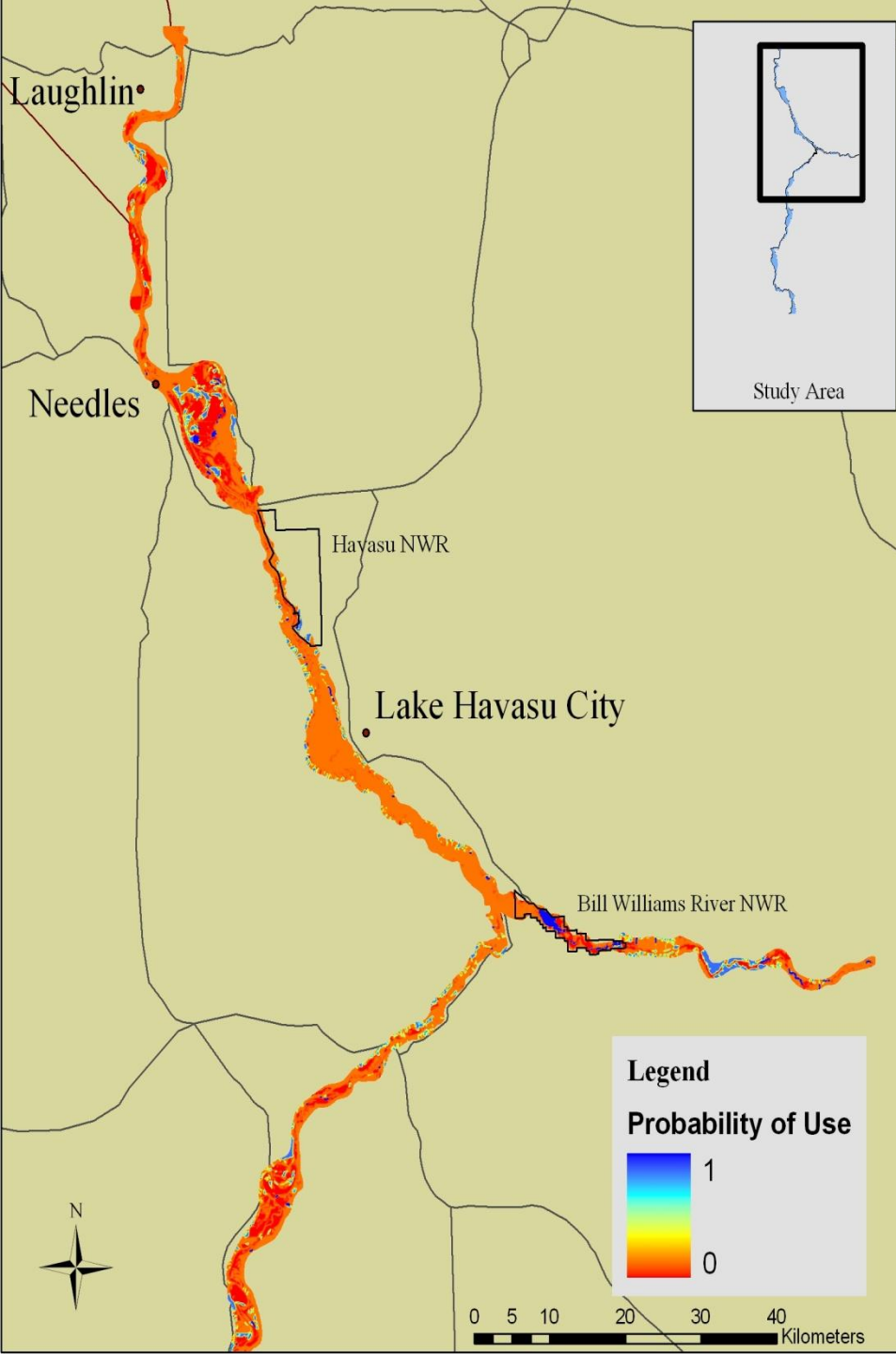


Western Yellow Bat

- All models performed better than the global and null

Yellow Bat Habitat Use





Results

- Greater occupancy near river
- Greater occupancy near roost

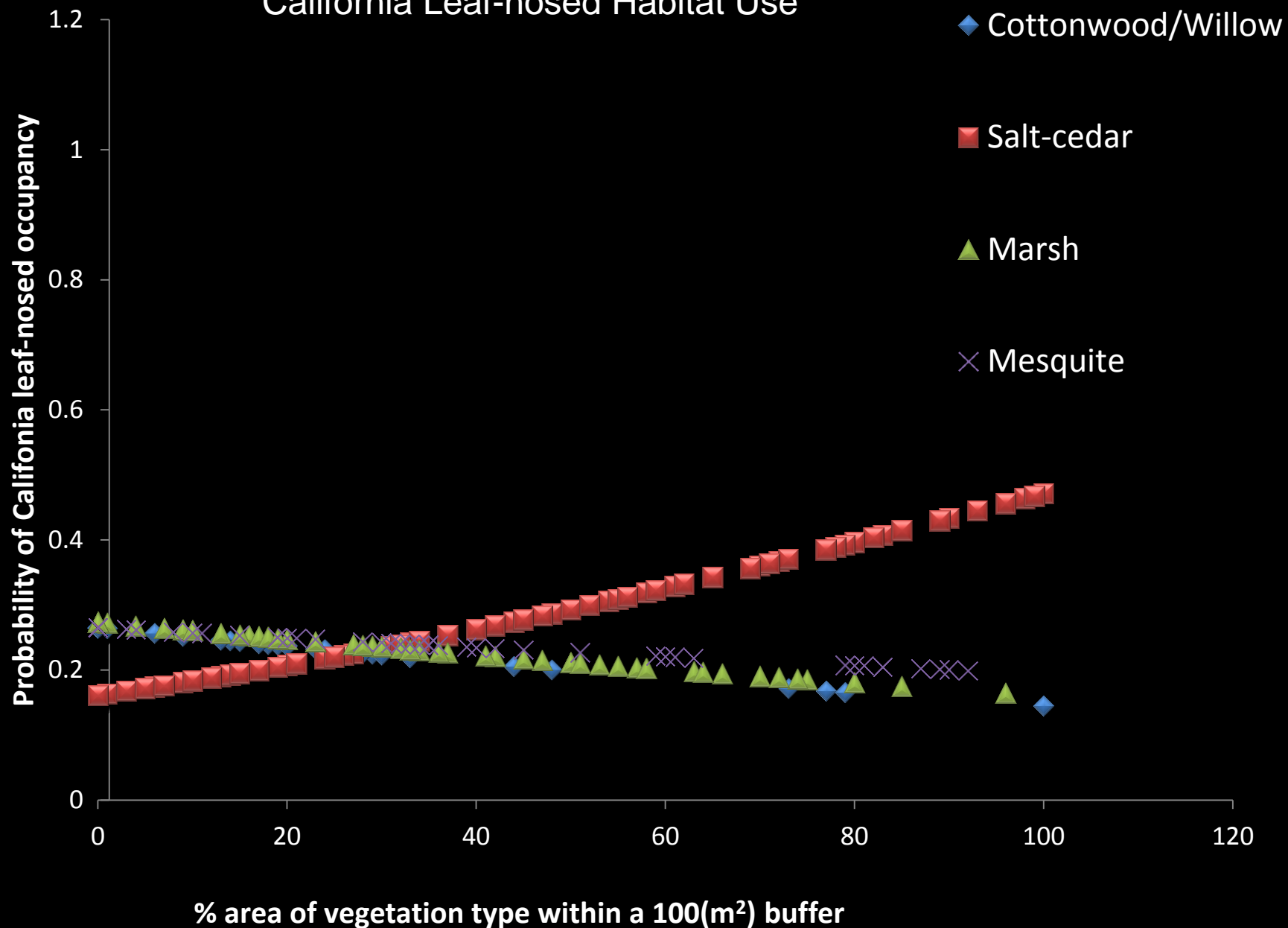
ψ : Probability of occupancy p : Probability of detection	AIC _C	Δ AIC _C	W_i
1. ψ Proximity to River + Proximity to roost p (minimum temperature + 4Seasons)	355.68	0.00	0.88

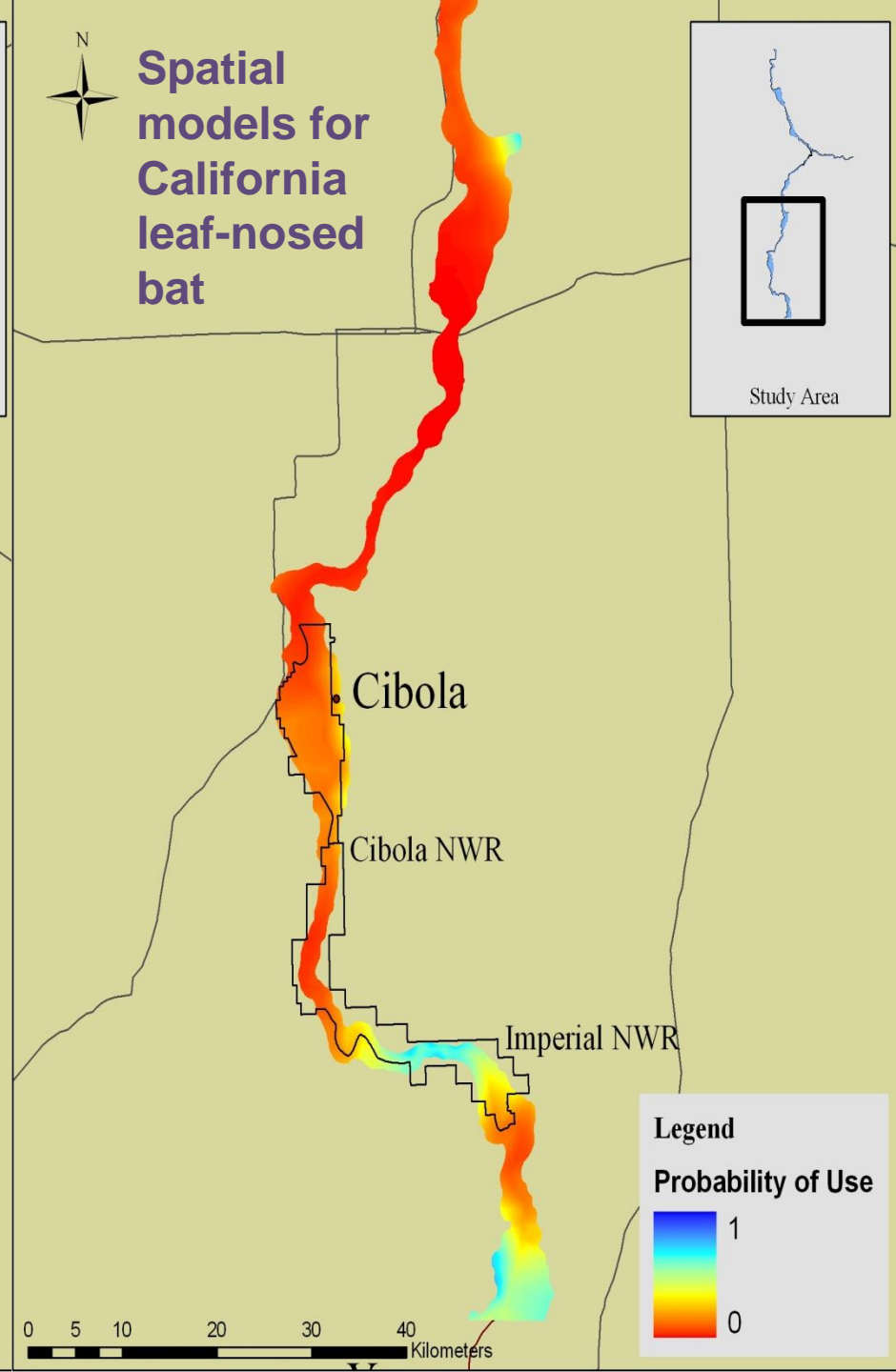
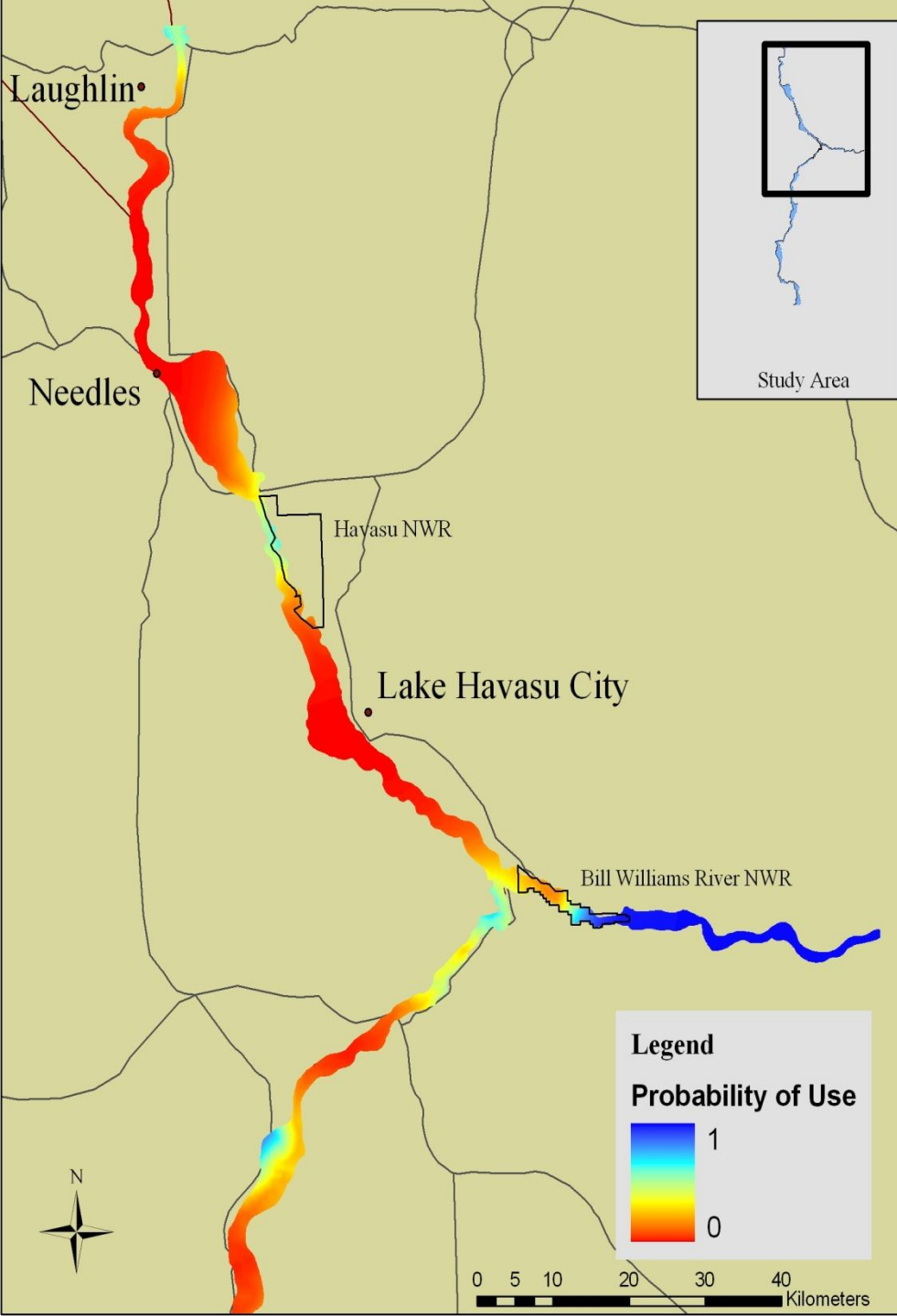
- All models performed better than the global and null



California Leaf-nosed Bat

California Leaf-nosed Habitat Use





Results

- Greater occupancy in salt-cedar
- Greater occupancy near mines
- Less occupancy with higher population density

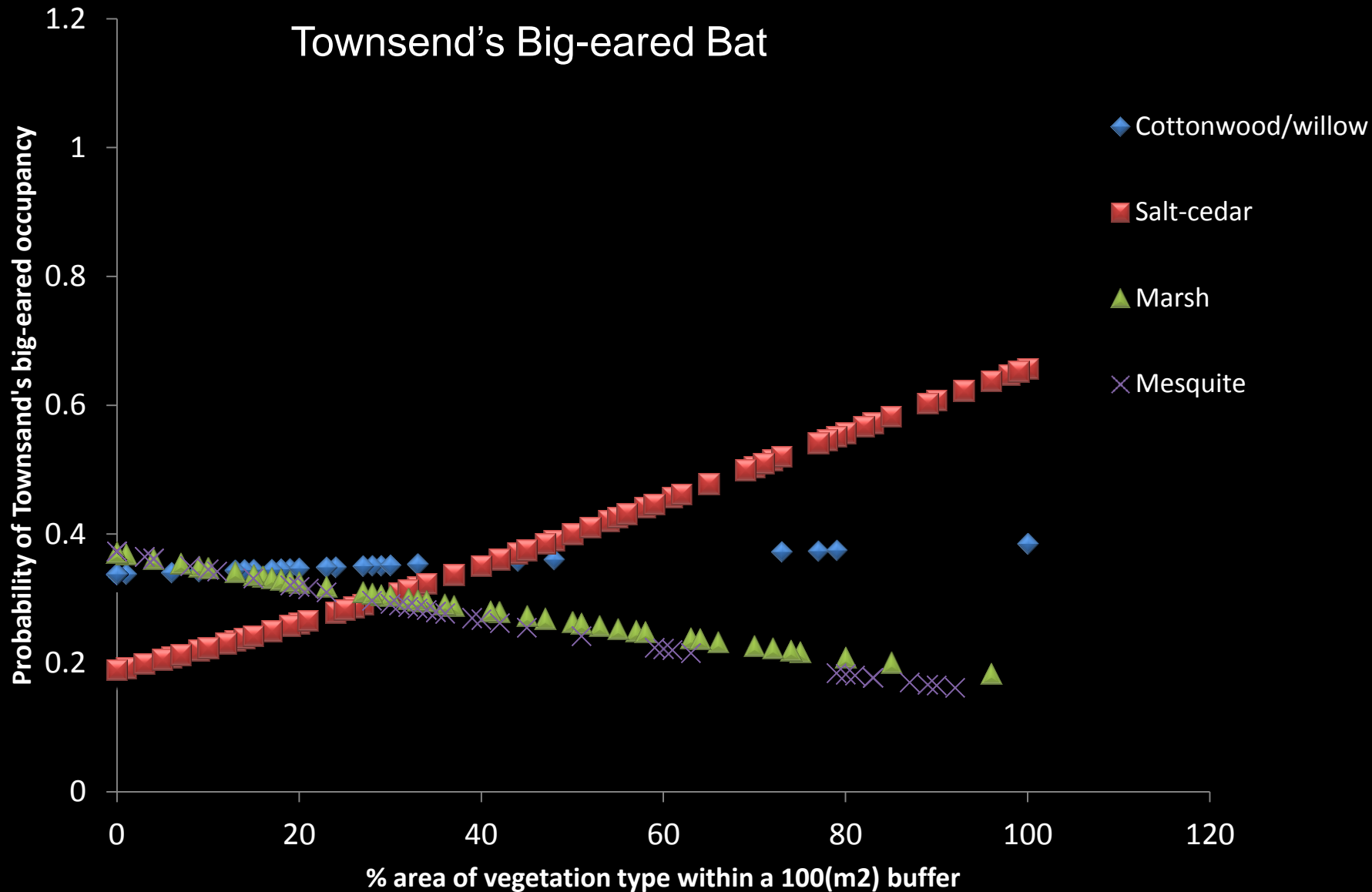
ψ : Probability of occupancy p : Probability of detection	AICC	Δ AICC	W_i
1. ψ Salt-cedar + Proximity to mines p (minimum temperature + 2Seasons)	303.38	0.00	0.57
2. ψ Salt-cedar + Human population density(-) p (minimum temperature + 2Seasons)	305.74	2.36	0.17

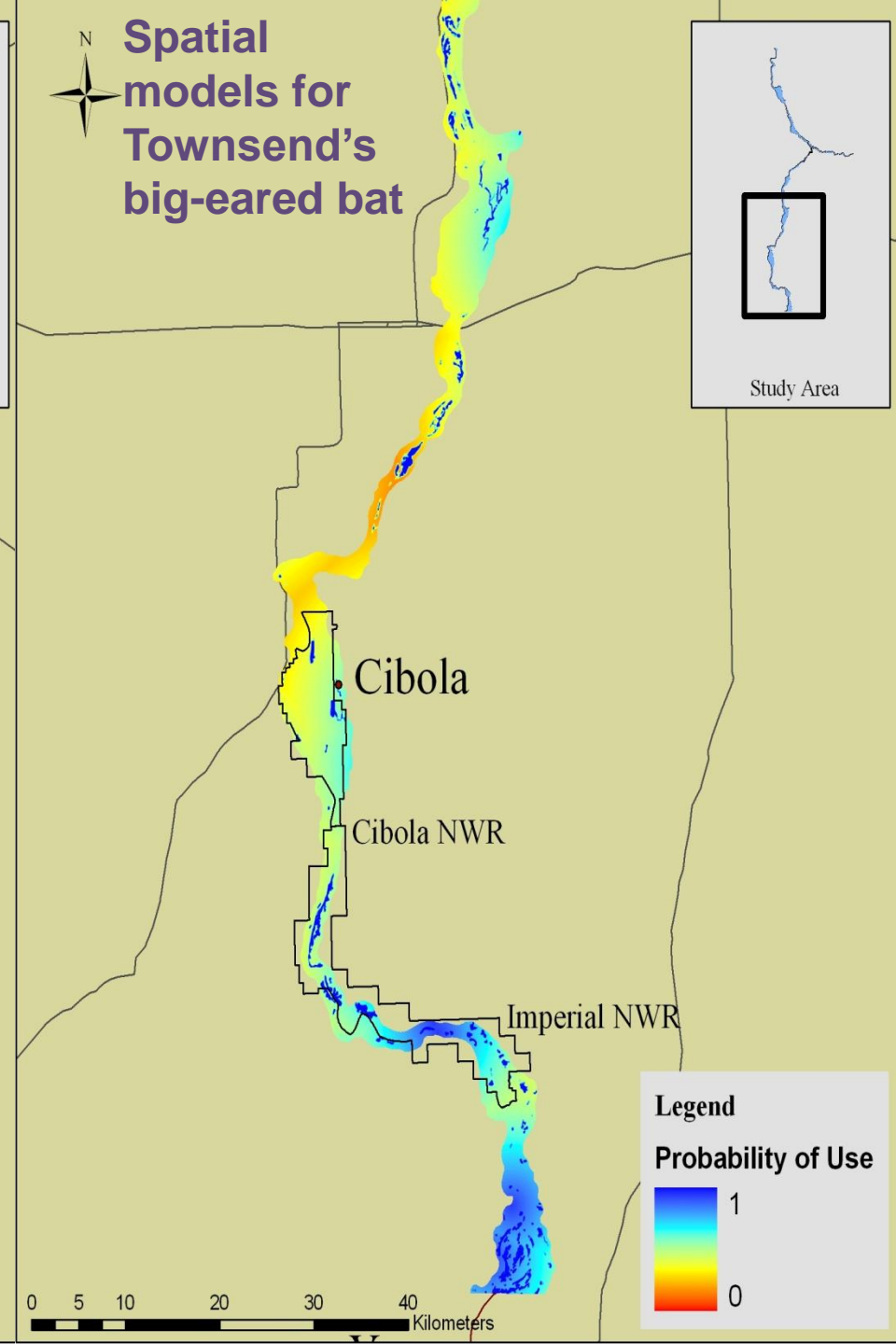
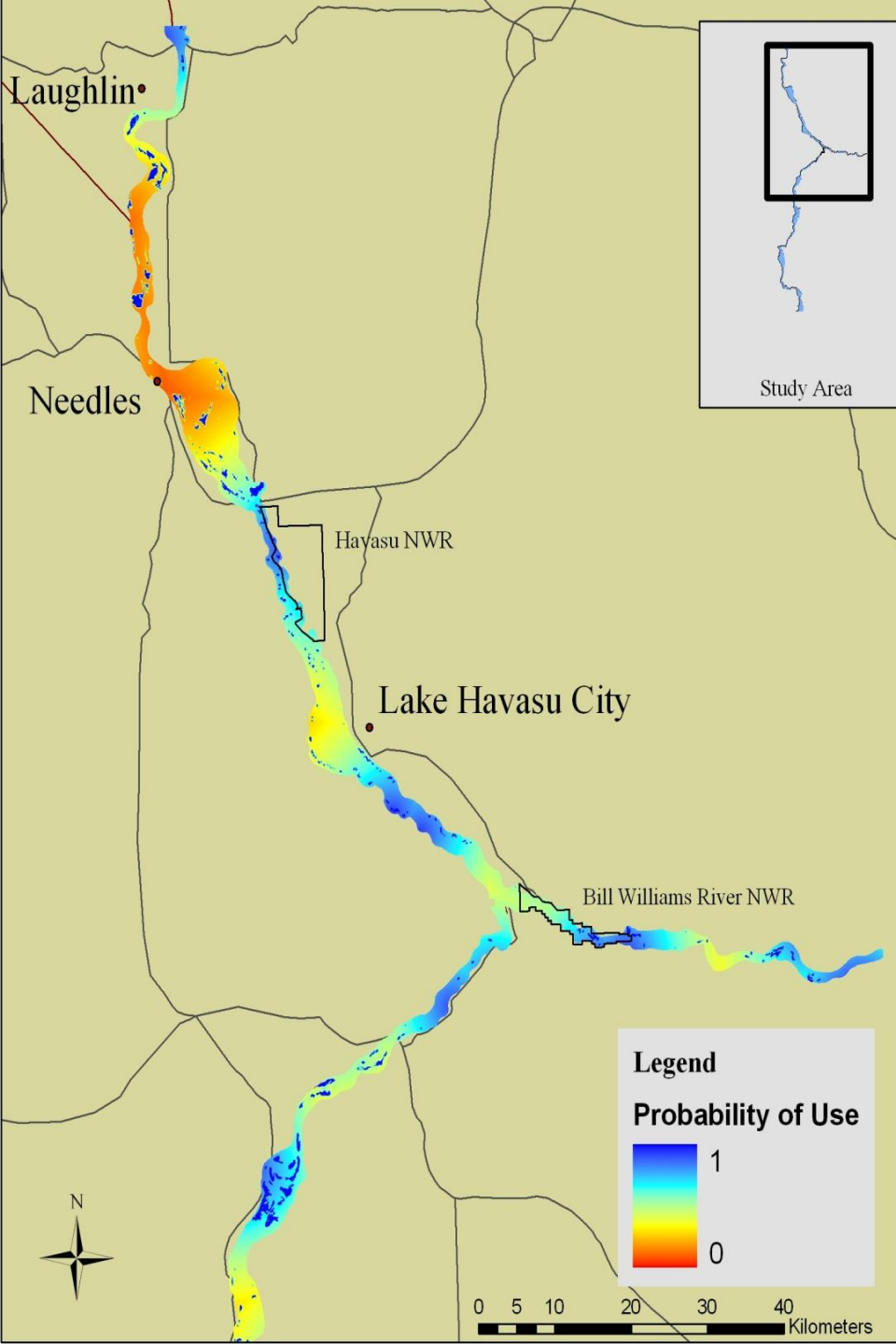


Townsend's Big-eared Bat

- All models performed better than the global and null

Townsend's Big-eared Bat





Management Recommendations for Tree Roosting Bats

- Establishment of cottonwood and willow habitat and to a lesser extent mesquite.
- Removal of saltcedar should take place only if it is replaced by native vegetation.

Management Recommendations for Cave Roosting Bats

- Continue monitoring of California leaf-nosed bat roosts
- Evaluation of mines within the LCR MSCP project area should continue in order to identify any unknown Townsend's big-eared bat roosts.
- Roosts accessible to the public should be gated.
- All known roosts for any of these species should be protected.

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