Distribution and Roost Site Habitat Requirements of Western Yellow (*Lasiurus xanthinus*) and Western Red (*Lasiurus blossevillii*) Bats

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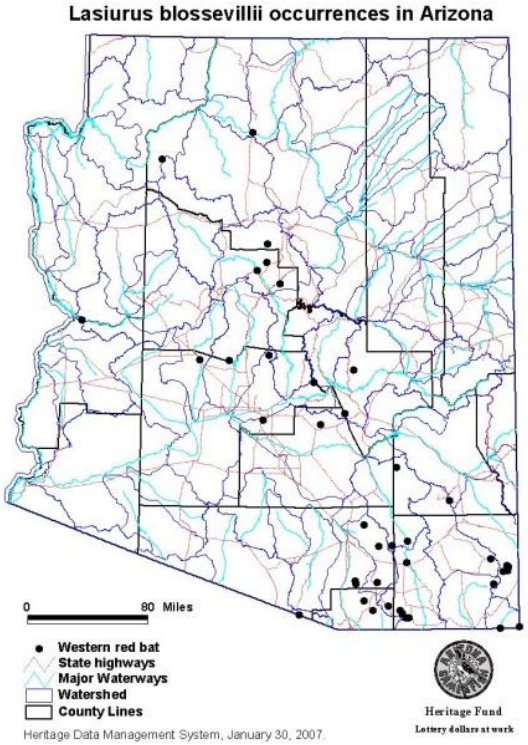
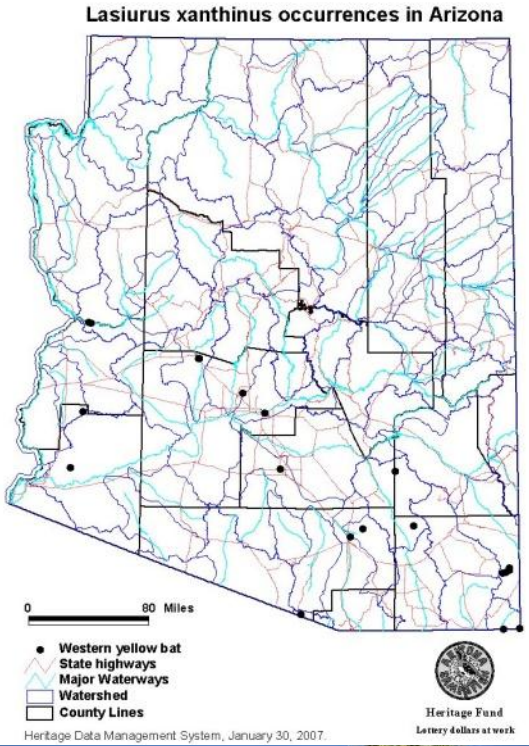
Western Red Bat Ecology

- Riparian
  - Cottonwood, oak and sycamore communities
- Foraging
  - Lepidoptera
  - Canopy and understory
- Roosting
  - Foliage
- Distribution
- Migratory
  - Warm season
  - Resident?



Western Yellow Bat Ecology

- Riparian
  - Palm trees
- Foraging
  - Beetles
- Roosting
  - Foliage (dead leaves)
- Distribution
- Migratory
  - Warm season



Research Objectives

1. Locate roost
2. Describe roost
3. Estimate distribution
4. Management guidelines

Methods: Study Area (Treatment)

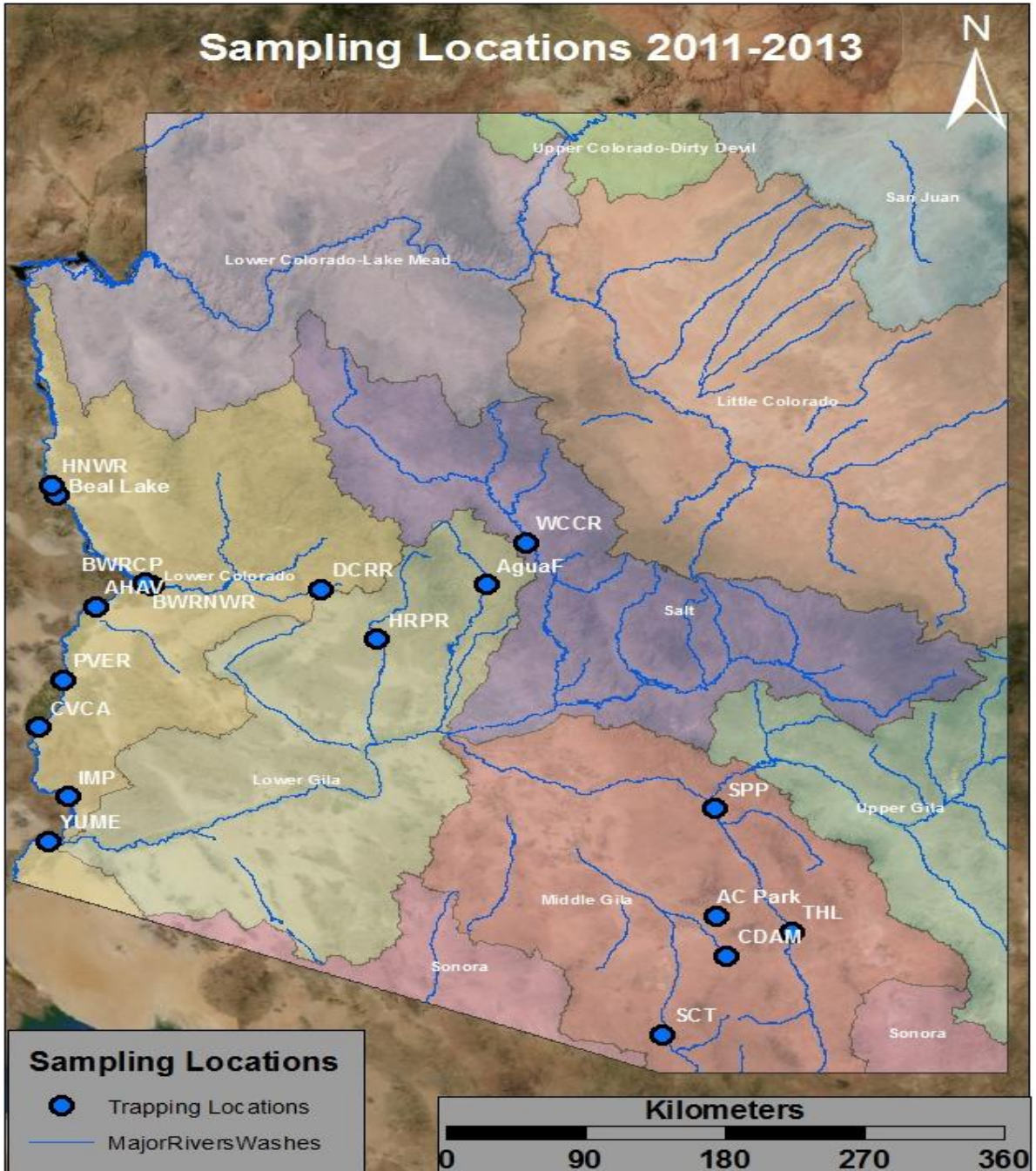
6 Treatment plots

- Riparian habitat
  - Cottonwood canopy
  - Even-aged stand
  - Little or no understory

Methods: Study Area (Control)

10 Control plots

- Riparian habitat
  - Cottonwood canopy
  - Mixed understory
    - Native
    - Invasive


Sampling Locations 2011-2013
N
Upper Colorado-Dirty Devil
San Juan
Lower Colorado-Lake Mead
Little Colorado
HNWR
Beal Lake
WCCR
BWRCP
AHAV
Lower Colorado
BWRNWR
DCRR
AguaF
HRPR
Salt
PVER
CVCA
IMP
YUME
Lower Gila
SPP
Upper Gila
Middle Gila
AC Park
THL
CDAM
Sonora
SCT
Sonora
Sampling Locations
Trapping Locations
MajorRiversWashes
Kilometers
0
90
180
270
360

Methods: Locate Roosts

Western red bat

- 3 seasons
- Sampling period
  - Cold season
  - Warm season
- Telemetry
  - 5/20 individuals
- Sampling methods
  - 39m by 7.5m

Western yellow bat

- 3 seasons
- Sampling period
  - Warm season
- Telemetry
  - 20 individuals
- Sampling methods
  - 39m by 7.5m

Methods: Describe Roost

Variables

- tree heights
- DBH
- canopy cover
- canopy height
- slope
- aspect
- tree roost species
- number of live branches
- dead crown ratio
- foliage condition
- bat roost height
- distance from trunk

Methods: Describe Roost

Variables

- tree heights
- DBH
- canopy cover
- canopy height
- slope
- aspect
- tree roost species
- number of live branches
- dead crown ratio
- foliage condition
- bat roost height
- distance from trunk

Results: Objective 1: Locate roosts

Western Red Bat

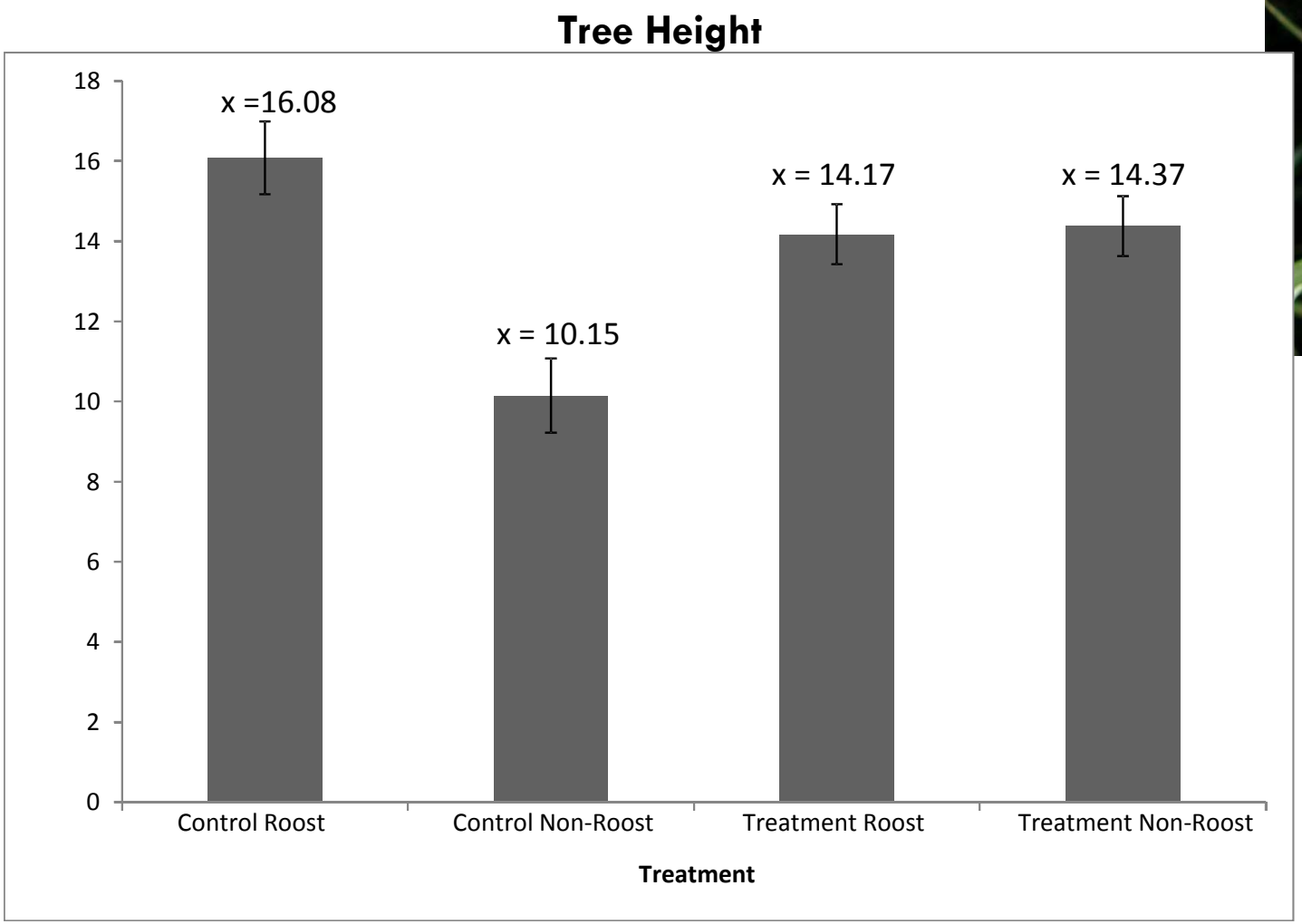
- 55 Captures
- 30 Transmitters
- 52 Roost Locations

Results: Objective 1: Locate roosts

Western yellow bat

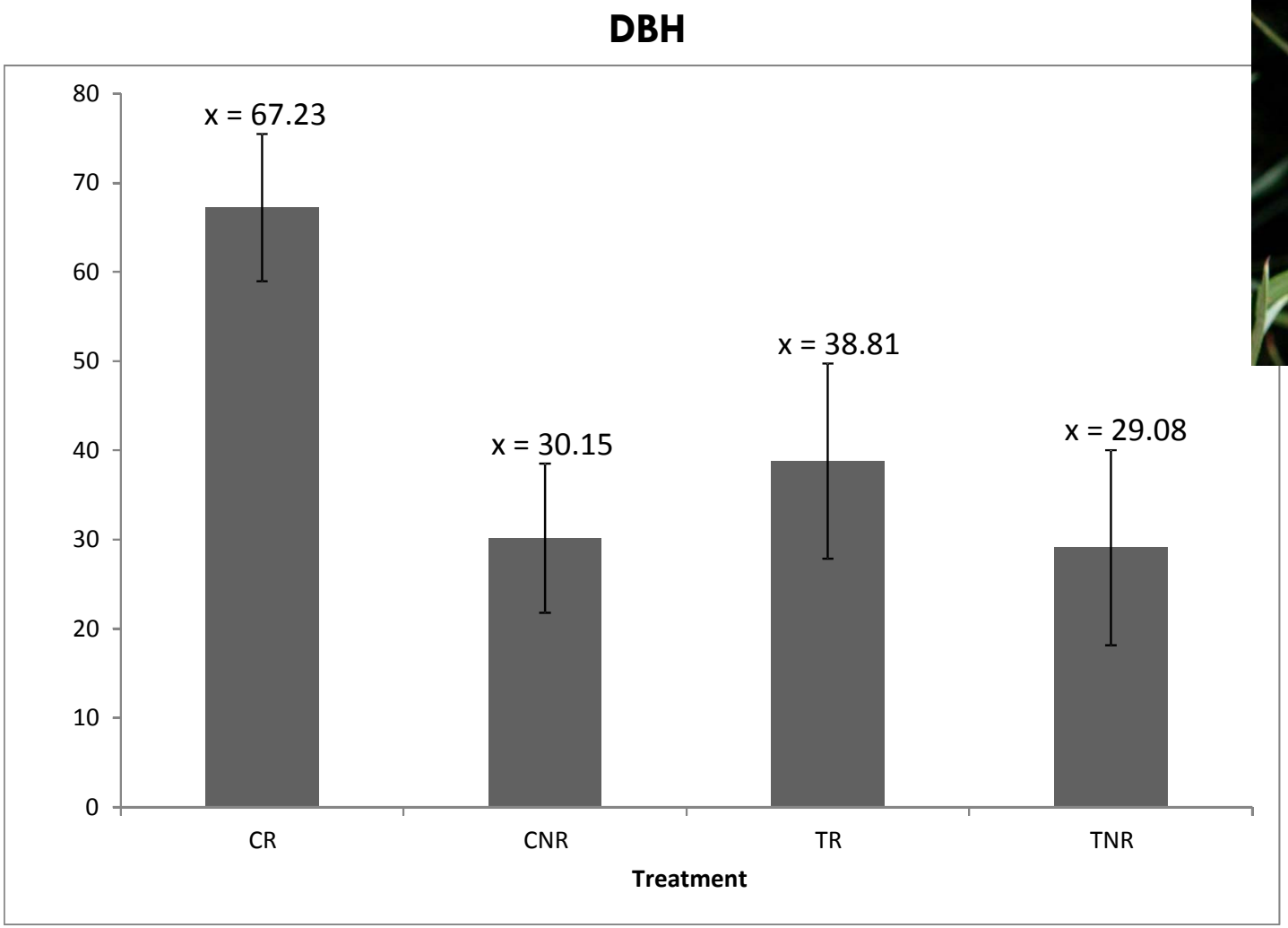
- 54 Captures
- 32 Transmittered
- 31 Roost Locations

Results: Objective 2: Describe roosts



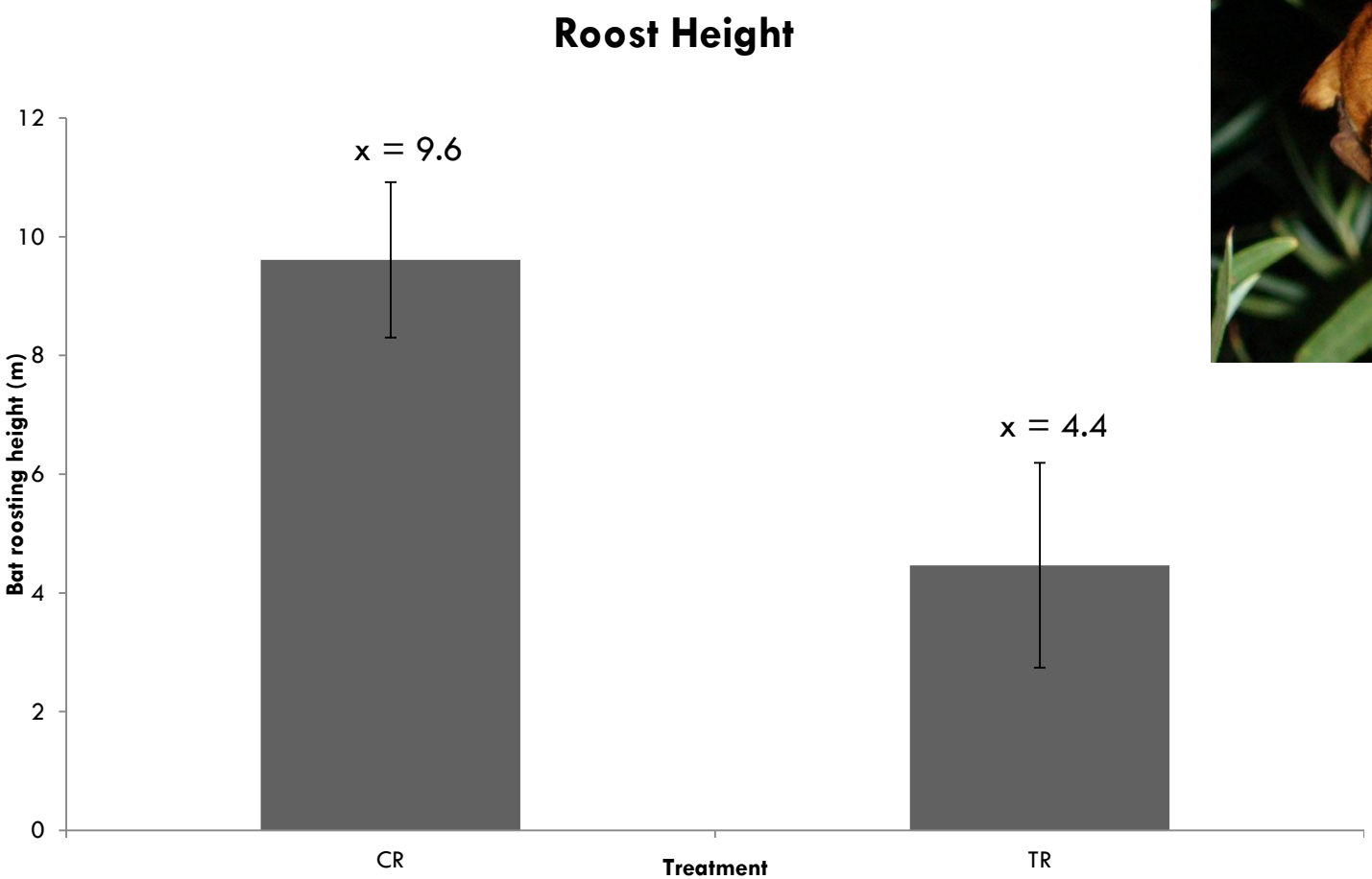
(F=7.51; p=0.0136)

Results: Objective 2: Describe roosts

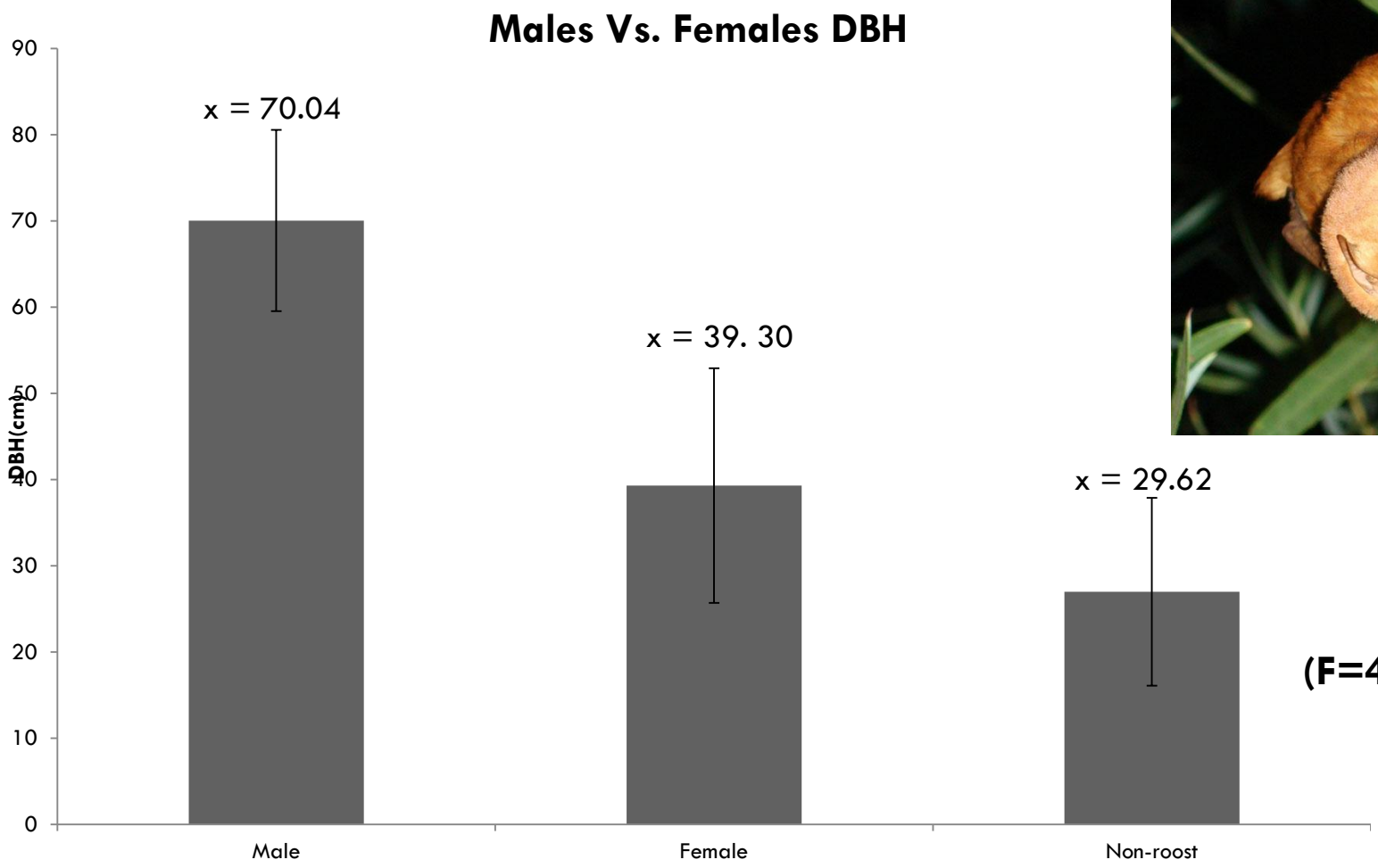


(F=5.04; p=0.0307)

Results: Objective 2: Describe roosts

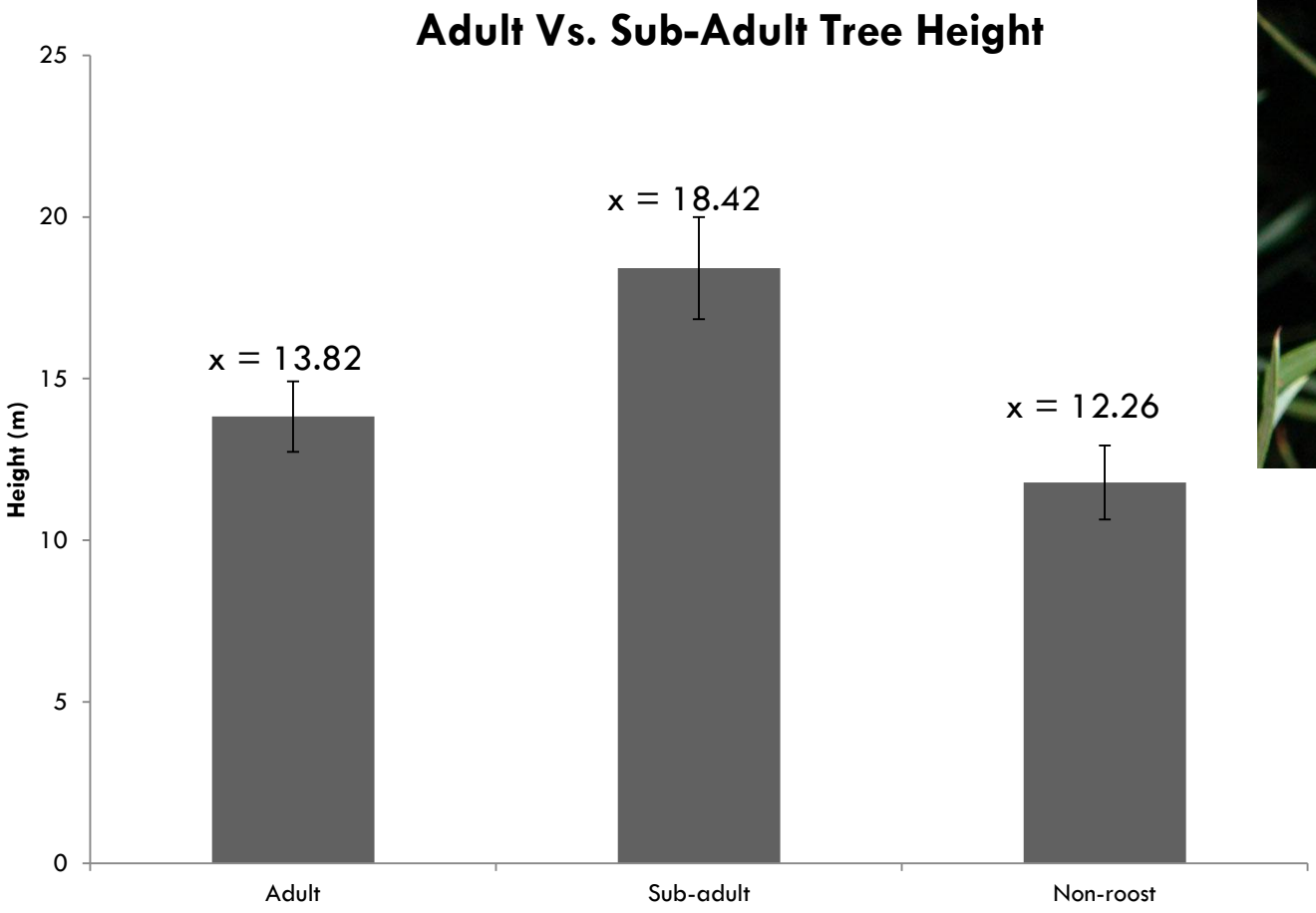


Results: Objective 2: Describe roosts



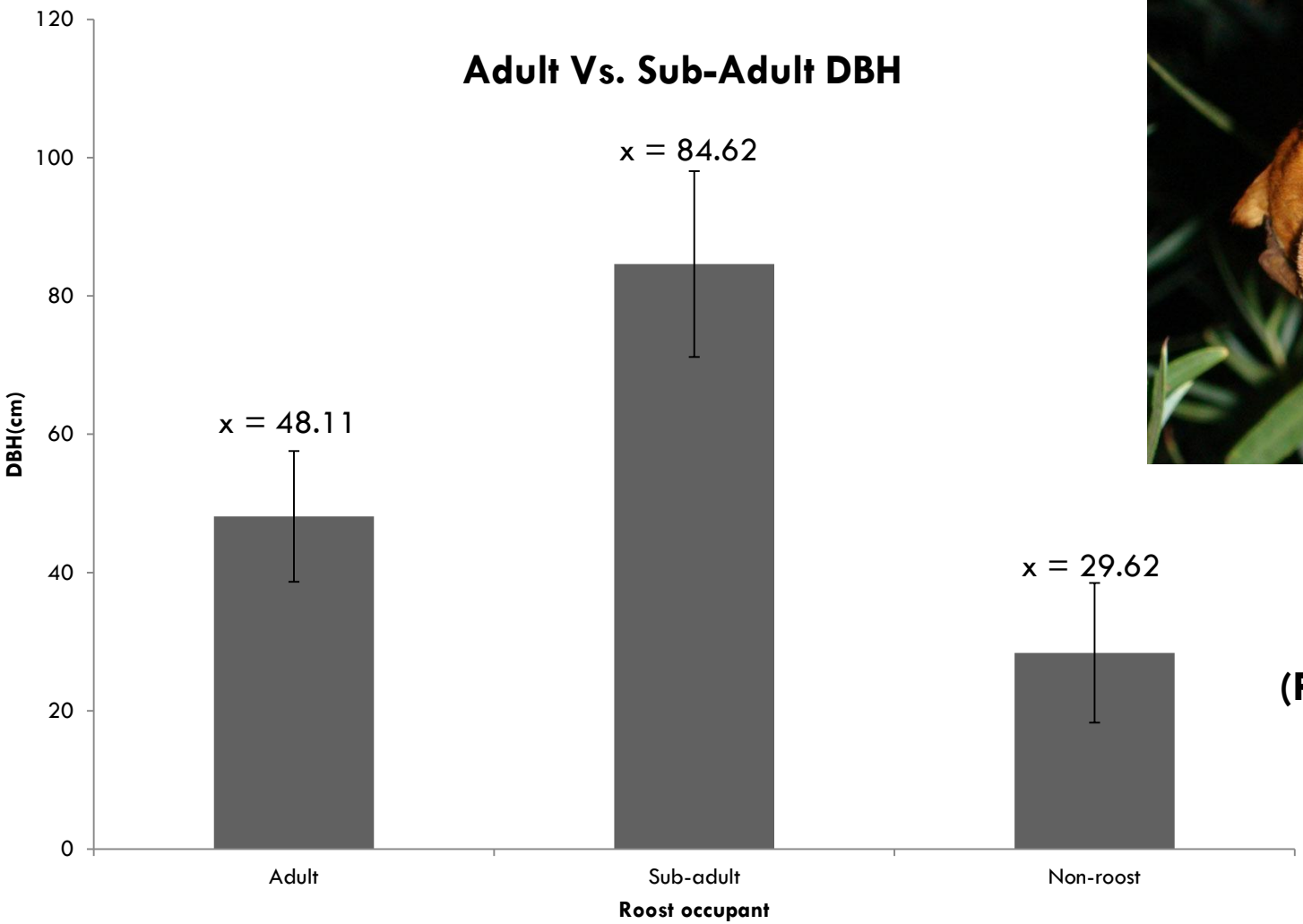
(F=4.83; p=0.0376)

Results: Objective 2: Describe roosts



(F=5.79; p=0.0242)

Results: Objective 2: Describe roosts



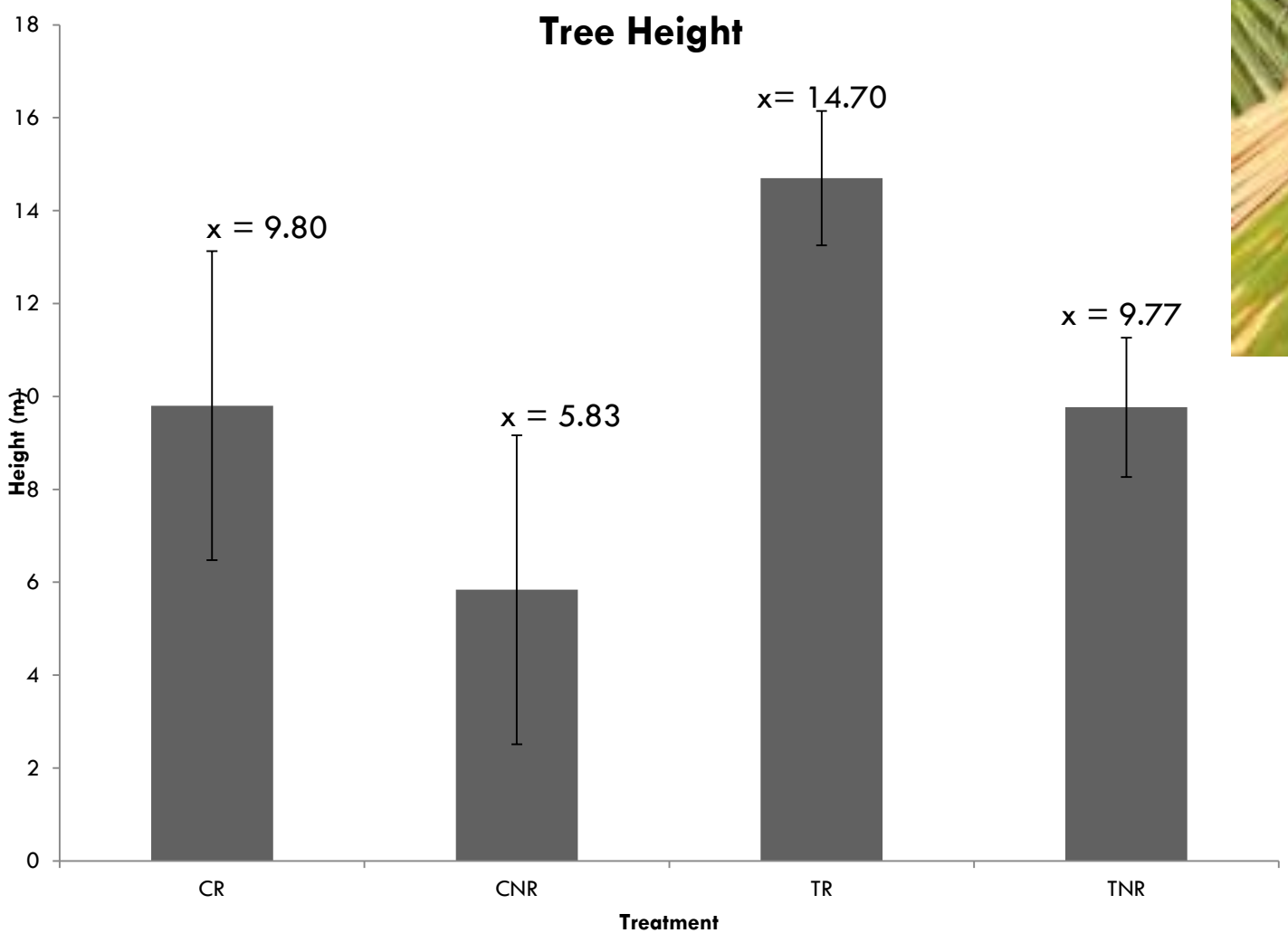
(F=6.74; p=0.0162)

Results: Objective 2: Describe roosts

93% in Mexican Fan Palms (n= 29)

2 roosts in Date Palms

Results: Objective 2: Describe roosts



(F=3.49; p=0.0499)

Distribution Estimates

Meso –Scale (Roosting Patch)

- **Red Bat Occupancy:**

Treatment > Control

Distribution Estimates

Meso –Scale (Roosting Patch)

Control Occupancy:

Shape Index ↓

Occupancy ↑

Model	AIC	Delta AIC	AIC wgt	Model Like	Trend
SI	88.48	0	0.2074	1	O=+; SI=-
LowHT	88.55	0.07	0.2003	0.9656	O=+; LowHT=-
HighHT	88.55	0.07	0.2003	0.9656	O=-; HighHT=+
LW	89.35	0.87	0.1343	0.6473	O=-; LW=+
Null	90.23	1.75	0.0865	0.4169	N/A

Distribution Estimates

Meso –Scale (Roosting Patch)

Treatment Occupancy:

Tree Height ↑

Occupancy ↑

Model	AIC	Delta AIC	AIC wgt	Model Like	Trend
LowHT	76.47	0	0.8883	1	O=+; LowHT=-
HighHT	82.73	6.26	0.0388	0.0437	O=+; HighHT=-

Distribution Estimates

Meso –Scale (Roosting Patch)

Treatment Occupancy:

Residential Development ↑

Occupancy ↑

Model	AIC	Delta AIC	AIC wgt	Model Like	Trend
DEV	102.11	0	0.276	1	O=-; DEV=+
HW	102.11	0	0.276	1	O=-; HW=+
Null	103.02	0.91	0.1751	0.6344	N/A
HighHT	104.21	2.1	0.0966	0.3499	O=+; HighHT=+

Distribution Estimates

Macro-Scale (Landscape)

- **Red Bat Occupancy:**

  Treatment > Control

Distribution Estimates

Macro-Scale (Landscape)

Occupancy Treatment and Control

Understory

Model	AIC	Delta AIC	AIC wgt	Model Like	Trend
DEV	102.11	0	0.276	1	O=-; DEV=+
HW	102.11	0	0.276	1	O=-; HW=+
Null	103.02	0.91	0.1751	0.6344	N/A
HighHT	104.21	2.1	0.0966	0.3499	O=+; HighHT=+

Occupancy

Model	AIC	Delta AIC	AIC wgt	Model Like	Trend
LW	88.5	0	0.303	1	O=-; LW=+
DEV	88.58	0.08	0.2912	0.9608	O=-; DEV=+
HW	88.98	0.48	0.2384	0.7866	O=+; HW=-
Null	90.23	1.73	0.1276	0.4211	

Distribution Estimates

Macro-Scale (Landscape)

Treatment Occupancy:

Residential Development ↑

Occupancy ↑

Treatment Yellow

Model	AIC	Delta AIC	AIC wgt	Model Like	Trend
DEV	100.95	0	0.6273	1	O=-; DEV=+
Null	103.02	2.07	0.2228	0.3552	-

Implications

Western Red Bat Roosts:

- Roosts in Phase I or Nursery Plantings

- Roosts in 4ft inline spacings

Implications

Western Yellow Bat Roosts

•Roosts Exclusively in Planted Palms

Acknowledgements:
Allen Calvert (BOR)
Jenny Smith (BOR)
Jeff Hill (BOR)
Nate Foley (AZGFD)
Robby Don (AZGFD)