Mesquite Revegetation on the Bill Williams River National Wildlife Refuge

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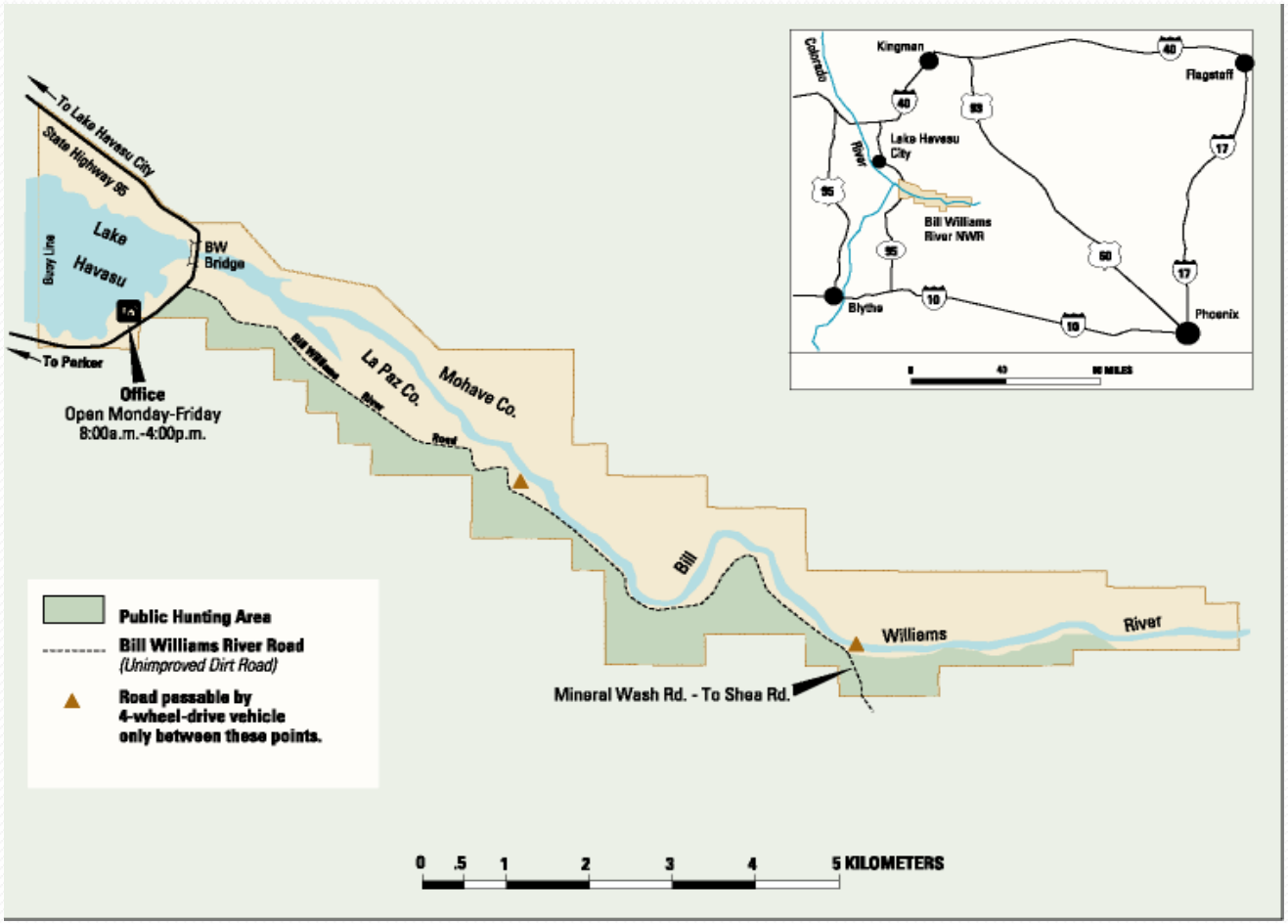
Welcome back to your annual trip to the Bill Williams River NWR….sigh..quiet moment…

Onwards…

- In December, 2000 a tanker truck overturned on the Bill Williams River bridge and spilled approximately 6,000 gallons of diesel fuel damaging soil, vegetation and wildlife on the refuge. (PS – the clapper rails LOVED the orange booms)
- $115,000 damages was provided from that event for habitat restoration on the BWRNWR.
- Goal was to increase mesquite bosque habitats on the BWRNWR particularly to enhance terrace avian community.
- 20 acres of abandoned agricultural fields on the old Kohen Ranch, near the middle of the refuge, were planted with approximately 1030 mesquites, 200 palo verde, 200 catclaw, 50 ironwoods to enhance native woody density.

Bill Williams River National Wildlife Refuge



July 2008

- Kohen was last farmed (for Bermuda hay) in 1983 and has been slowly returning to mesquite terrace so we know age of existing trees which we wished to preserve.
- Old ag. well is present and about 42 feet to water at R (NW) side of photo. Approx 20 feet to water on L (SE) dropping toward river. Water table highly variable seasonally.
- Bermuda grass becomes denser the further down field toward the river until lower 10-15 acres of fields nearly impenetrable.
- Upper 20 acres, near well, a sparser mix of existing mesquite, native and exotic shrubs, annuals, herbaceous veg.

Infrastructure

2 pumps in well run by 2 solar set-ups. 10 panel = 50 gal/min, 8 = 25. Ended up not needing both except as backup.

One was manual, one had a timer (ps..beware of thrashers…they like red buttons).

So we had water…with only a few leaks.

We used an unusual system to deliver the water to the trees…

- 4 inch pipes from wells lead to various step-down header pipes until ¼ " spiderline was finally led to each tree's drip system …but a bit different system.
- I went to a workshop by David Bainbridge hosted by the Park Service at Lake Meade on arid land restoration and we decided to try one of the unusual methods he recommended on Kohen.
- It looks like this……
- Spiderline runs into bottle, bottle creates soaker hose that puts water deeper beneath roots and leads them down rather than remaining wettest on surface as most irrigation does.

Planting set up

- Hole augured with bobcat wherever veg was sparse. 20-25 foot centers.
- Seedlings were grown from BWR trees in deep citrus pots until about 3 months old.
- Hole pre-soaked with B1 rooting solution.
- Rope put deep but bottle top left where spider line could fill.

Like this…

Included biodegradable protective sleeves that worked well for Mesquite, poorly for Palo Verde.

July 2011

Summer 2013…..

Winter 2013….

Some thought we piped in the water for THEM, however.

Vegetation results on Kohen fields as of 2013.

- Those in rows 1-4 – mostly Palo Verde, Catclaw and Ironwood planted
  - 53 of 450 Palo Verde and Catclaw are alive (13.25%)
  - Most PV and Catclaw were eaten down by herbivores (rabbits)
  - Most of the 50 Ironwoods 2-4 feet tall and looking good.
- Those in rows 5-40 were mostly Honey Mesquite and 916 of 1030 alive (88.9%)
  - Mesquite in rows 5-32 are 4 - 20 feet tall; canopies touching in larger ones. Many basal diameter over 4-6 inches.
  - Mesquite in rows 33-40 mostly less than 5 feet tall, canopies less than 3 feet, diameters less than 3". Closer to water table, further from pump, but lots more Bermuda.
  - Also about 150 wild seedlings have come in, mostly where there were leaks.

Avian communities on Kohen Re-veg as of 2014.

(based on standardized transect data = 3 consecutive days of a strip 400 m x 20m with 20 stops in 20x20 plots; 3-4 min per stop per season each year).

- July (2010-2013)
- Species =23
- Average N/hr = 36.32
- Shannon Div (H') =.9097
- 10 most common species
  - Gamble's Quail – 14.19/hr
  - Verdin – 3.67/hr
  - Black-tailed Gnatcatcher – 2.38/hr
  - Bell's Vireo – 2.32/hr
  - Northern Rough-winged Swallow – 1.61/hr
  - Gila Woodpecker – 1.03/hr
  - Abert's Towhee - .90/hr
  - Mourning Dove - .83/hr
  - Loggerhead Shrike - .77/hr
  - Blue Grosbeak - .64/hr

- January (2010-2014)
- Species= 24
- Average N/hr = 9.67
- Shannon Div (H') =.7201
- 10 most common species
  - White-crowed Sparrow – 9.53/hr
  - Phainopepla – 3.25/hr
  - Black-tailed Gnatcatcher – .93/hr
  - Flicker (Northern/Gilded) – .46/hr
  - Say's Phoebe -.37/hr
  - Abert's Towhee & Verdin– .32/hr
  - Crissal Thrasher & Gamble's Quail – .23/hr
  - Gray Flycatcher, Northern Mockingbird, Gila Woodpecker - .18/hr

Comparison of avian communities 2010-2011 between Kohen re-veg and Esquerra.

- Kohen Re-veg
- Summer

  Total species =23

  Total N/hr = 36.32

  H'= .8458

  Resident - 13 species

  Abert's Towhee - .90/hr

  Gamble's Quail – 14.19/hr

  Seasonal – 10 species

  Bell's Vireo = 2.32/hr

  Blue Grosbeak = .77/hr
- Winter

  Total species = 24

  Total N/hr = 9.67

  H' = .8731

  Resident – 16 species

  Abert's Towhee = .90

  Gamble's Quail = 0/hr

  Black-tailed Gnatcatcher = .64/hr

  Seasonal – 8 species

  Phainopepla = 3.25/hr

  White-crowed Sparrow =2.07

- Esquerra
- Summer

  Total species -21

  Total N/hr = 43.26

  H'=.8461

  Resident – 14 species

  Abert's towhee = 0

  Gamble's Quail = 29.93/hr

  Seasonal -7 species

  Bells' Vireo = 1.98/hr

  Blue Grosbeak = 0
- Winter

  Total species = 22

  Total N/hr = 26.77

  H' = .8300

  Resident – 14 species

  Abert's Towhee = 1.58

  Gamble's Quail = 2.93/hr

  Black-tailed Gnatcatcher = .24/hr

  Seasonal - 8 species

  Phainopepla = 7.21/hr

  White-crowned Sparrow = 2.09

Kohen Reveg compared to Esquerra 2010-2011

Summer avian communities

% similarity = 83.71
Morisita's Index .9964
Major differences:

Abert's Towhees using KRV but not Esquerra (0/hr; .9/hr)

Bells' Vireo's using KRV almost 3X more than Esquerra, (.98/hr ; .32/hr)

Black-tailed Gnatcatchers are using KRV about twice as much as Esquerra (2.61/hr; 1.35/hr)

KRV is developing dense stands of canopy mesquite but not many old enough for good mistletoe production unlike Esquerra and has dense understory of Sweetbush, Saltbush, and Purple Nightshade at W end; Bermuda grass at E end.

Kohen Reveg compared to Esquerra 2010-2014

Winter avian communities

% similarity = 83.71
Morisita's Index .9964
Major differences:

Overall birds per hour on Kohen 9.6; on Esquerra is 23.85.

Esquerra has more than 3X the use by Phainopepla than KRV (27.48/hr; 8.55/hr).

Esquerra has triple the use by Gamble's Quail than KRV (3.22/ hr; .61/hr).

Esquerra has high winter use by Abert's towhees but not KRV (1.5/hr; .90/hr).

KRV has almost 10 times the use by White-crowned sparrows than Esquerra (24.81;2.59)

Esquerra has virtually no understory. Native annuals when it rains.

Inspector General Oriole

On refuges, these things don’t happen without our volunteers so our grateful thanks go out to them

References

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- Photo credits – John West and USFWS personnel.