

Efficacy of Mechanical Removal of Green Sunfish from Bonita and Aravaipa Creeks: Closed Systems

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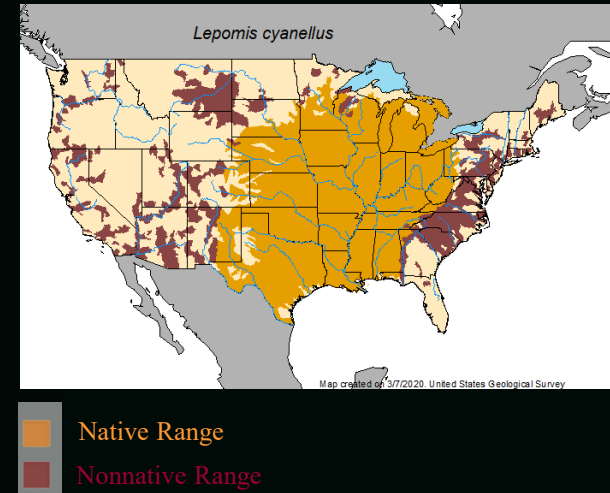
Jeff Conn, Saguaro
National Park



Bonita and Aravaipa Creeks



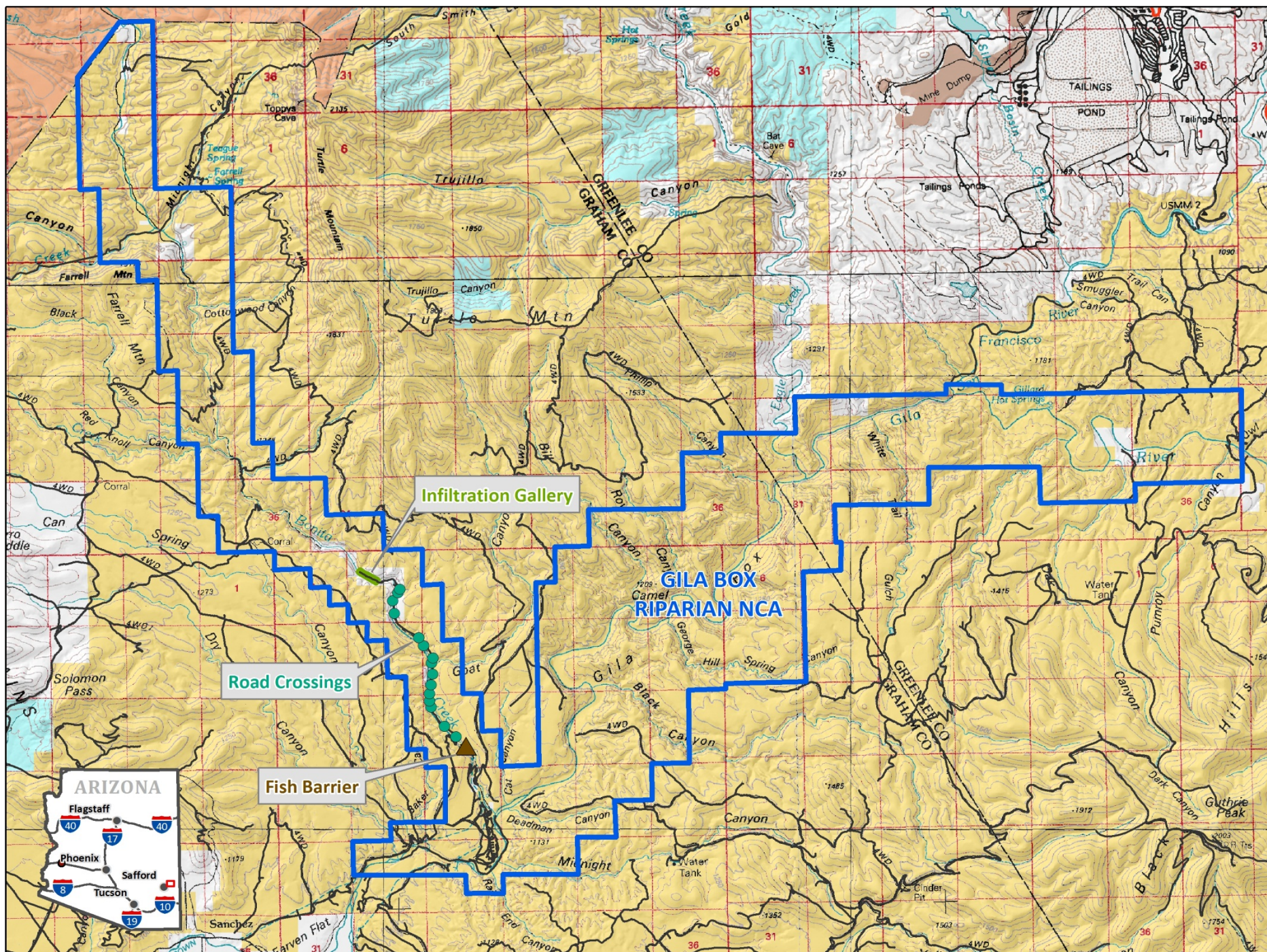
Green Sunfish





Case Study: Mechanical Removal of Green Sunfish (*Lepomis cyanellus*)
from Bonita Creek







Bonita Creek Native Fish



Gila Chub

Gila intermedia

Federally Endangered



Longfin Dace

Agosia chrysogaster

BLM Sensitive



Speckled Dace

Rhinichthys osculus

BLM Sensitive



Desert Sucker

Pantosteus clarkii

BLM Sensitive



Sonora Sucker

Catostomus insignis

BLM Sensitive



Gila Topminnow

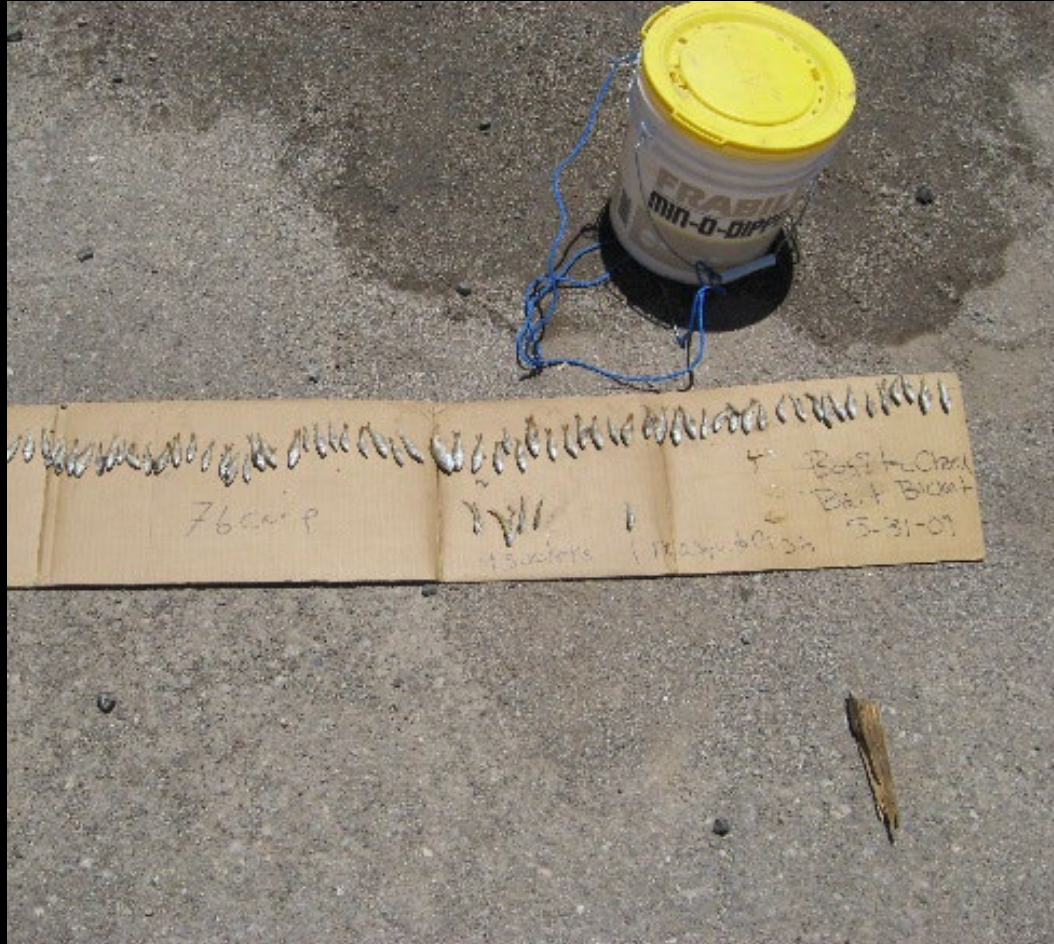
Poeciliopsis occidentalis

Federally Endangered

Bonita Creek Timeline

Month	2008	2009	2010	2011	2013
January				Closed to fishing	
March		Mosquitofish			
April			Fathead Minnow	Yellow Bullhead	
May		Bait bucket			
June		Mosquitofish and Green Sunfish			
August		Mechanical removal			
September	Barrier completed				
October	Chemical renovation				
December					Virile Crayfish

Nonnatives?



Plausible Explanations

- Fathead Minnow wash down during flooding events.
- Green Sunfish and Yellow Bullhead stocked by people or some survived the chemical treatment.
- Mosquitofish were a bait bucket introduction, or they survived the renovation.

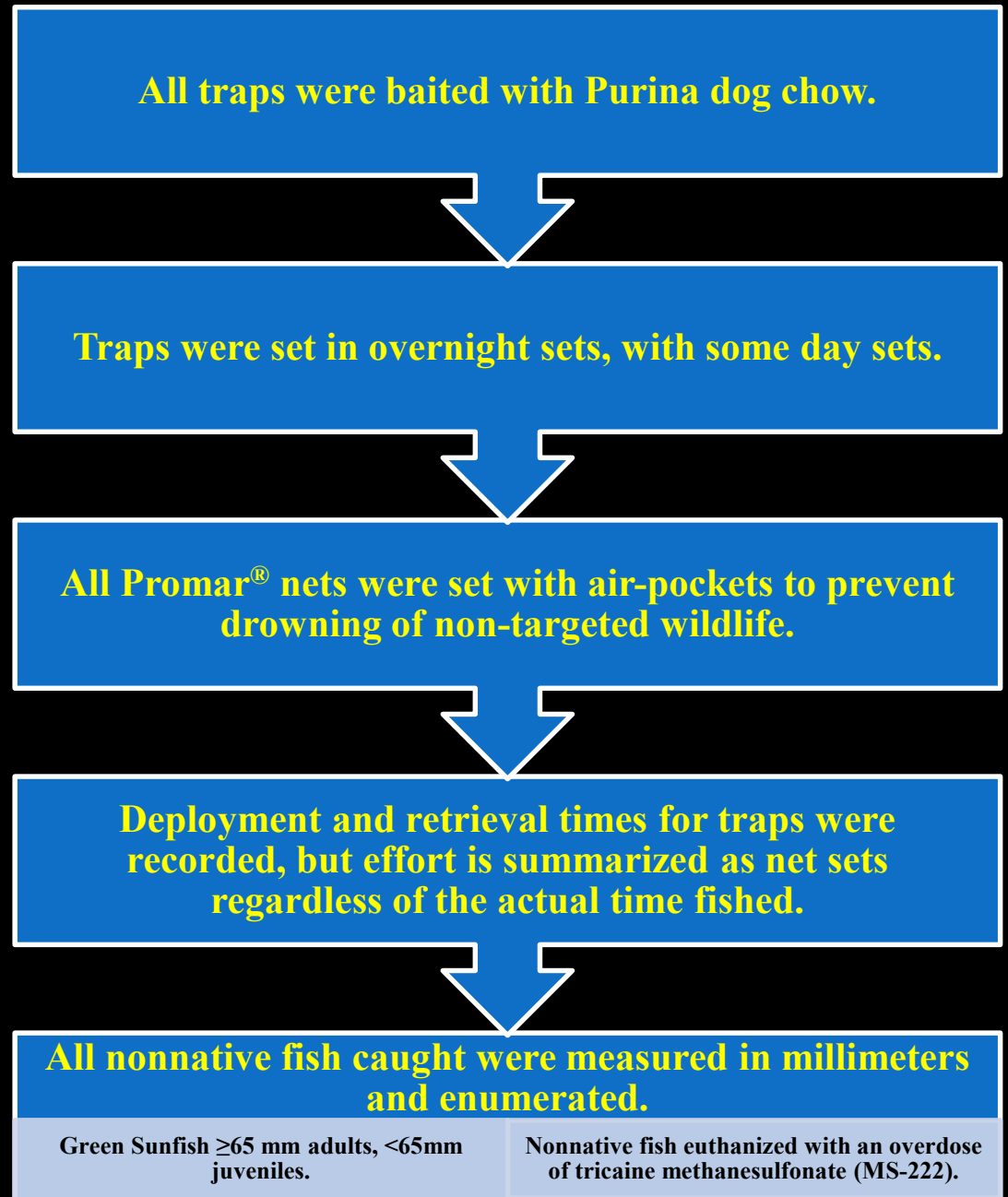
Methods

- Gear used to make collections
 - Gee metal minnow traps
 - Collapsible Promar[®] nets
 - Collapsible red Promar[®] nets
 - Hoop nets
 - Custom and crab traps
 - Dipnets
 - Backpack electrofisher
 - Tote barge shocker
 - Seine



Modified perch trap

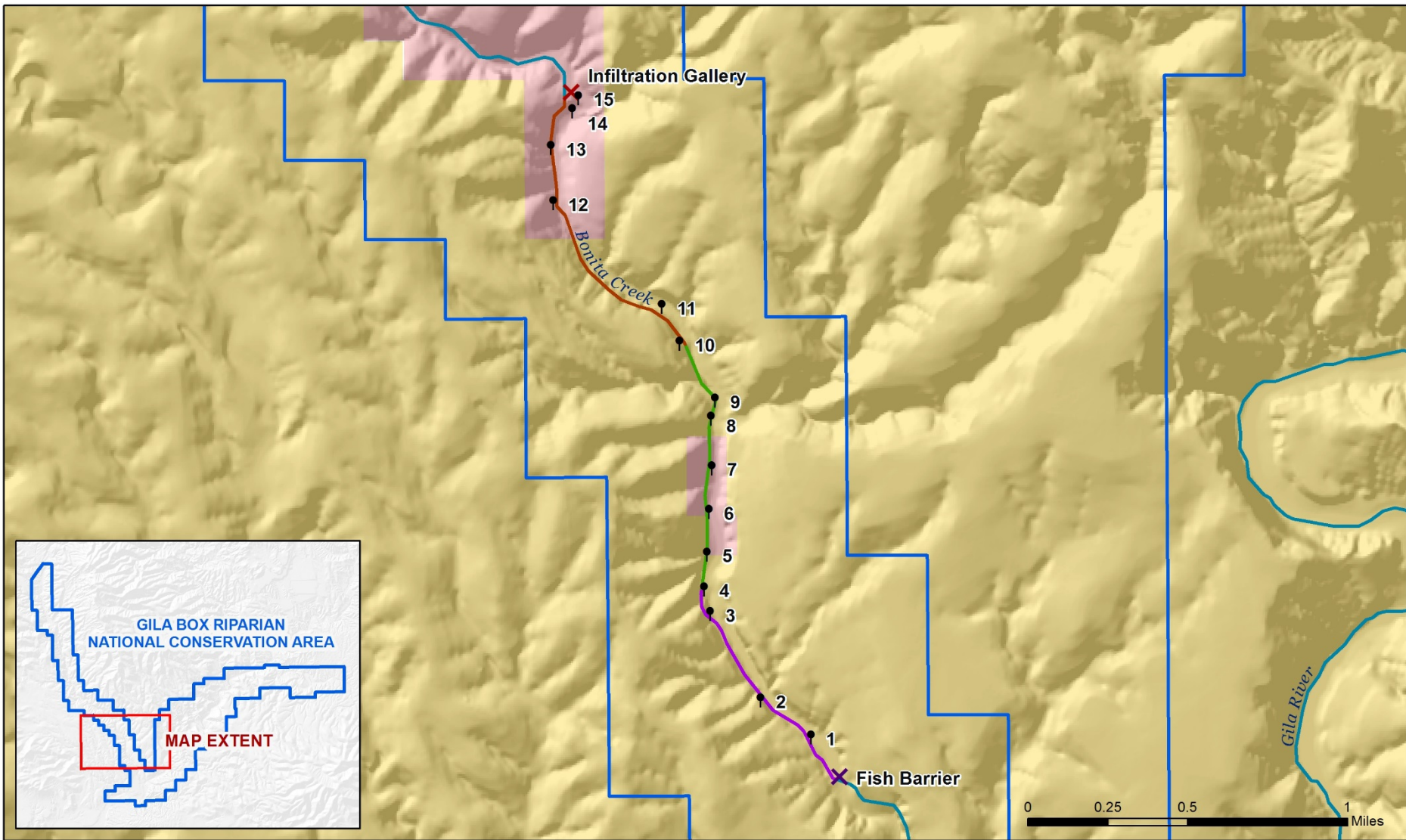
Methods





Hardware Cloth





Bonita Creek Road Crossings



- | | | |
|------------------------|----------------|-----------------------------|
| ● Road Crossing | — Upper Reach | □ Gila Box Riparian NCA |
| ✕ Infiltration Gallery | — Middle Reach | □ Bureau of Land Management |
| ✕ Fish Barrier | — Lower Reach | □ City of Safford |

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Challenges



Beaver Dam Across Bonita Creek

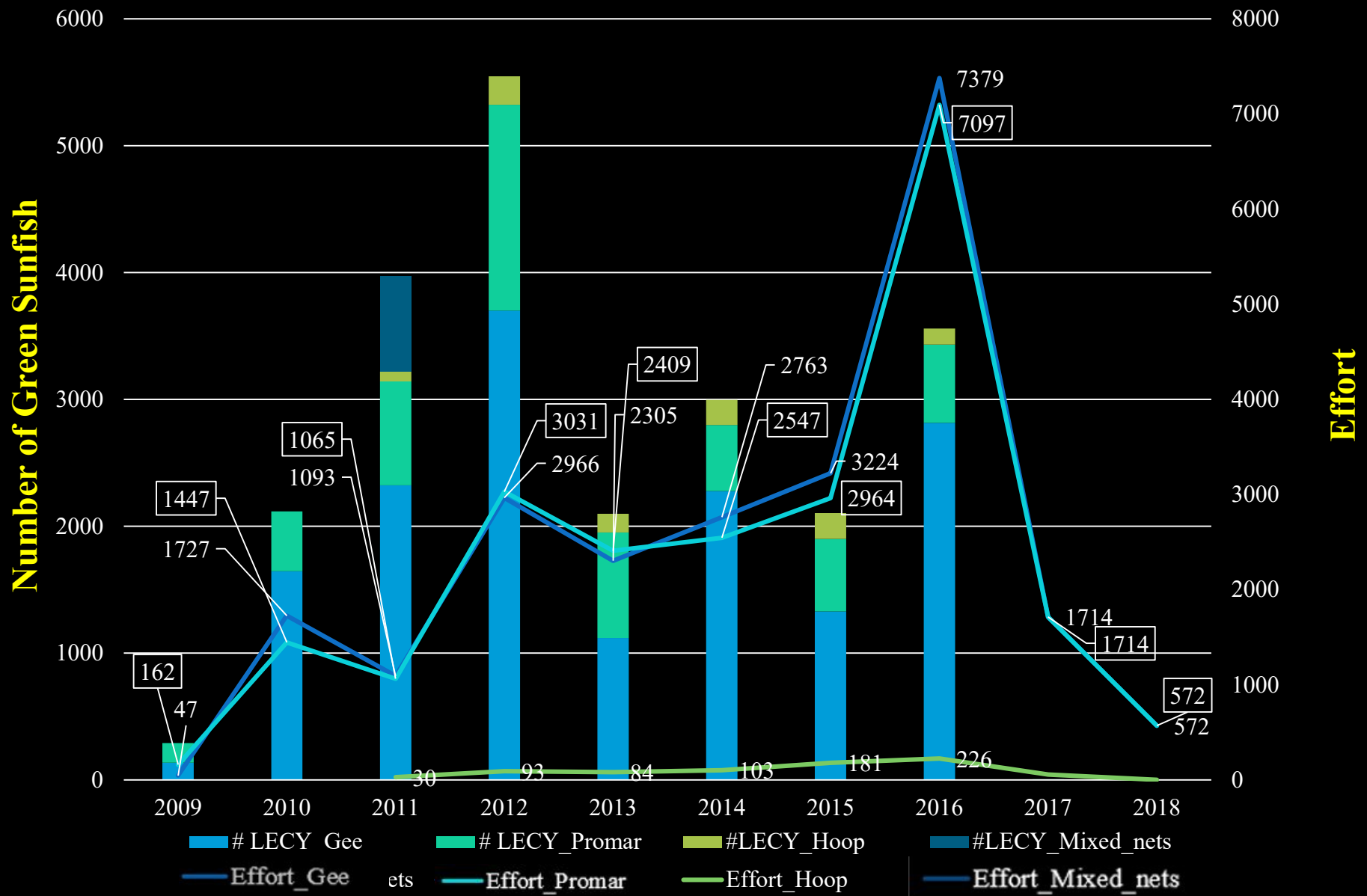
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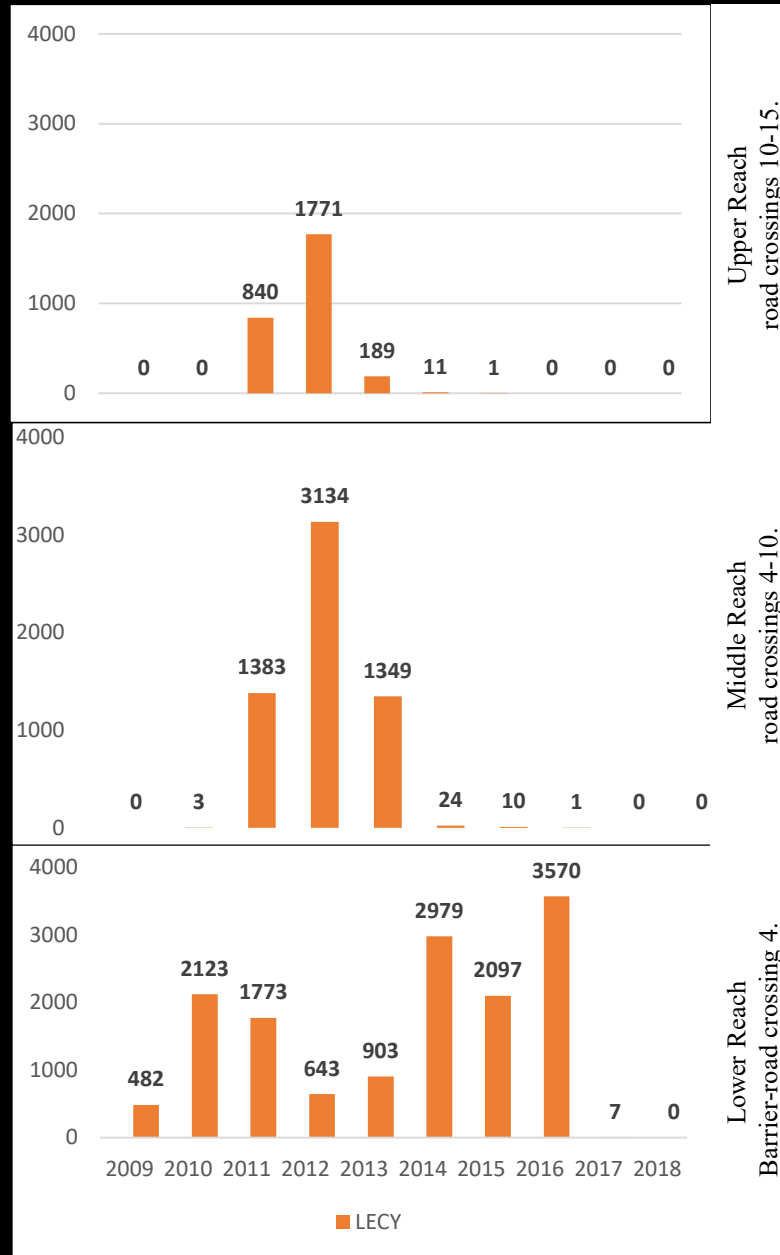
Gear Type and Number of Green Sunfish Removed from Bonita Creek, 2009-2020

Gear Type	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Gee Minnow Trap	137	1,647	2,323	3,701	1,152	2,278	1,329	2,815	2				15,384
Promar Net	155	471	820	1,623	857	521	574	576	5				5,602
Hoop Net			76	224	148	198	204	126					976
Gee and Promar - Combined			756										756
Seine	173				186			12					371
Dip Net					93								93
Red Promar	7				4			42					53
Backpack Electrofisher	10	8	10			2							30
Tote Barge Shocker						7							7
Custom Trap						8	1						9
Crab Trap					1								1
Total	482	2,126	3,985	5,548	2,441	3,014	2,108	3,571	7	0	0	0	23,282

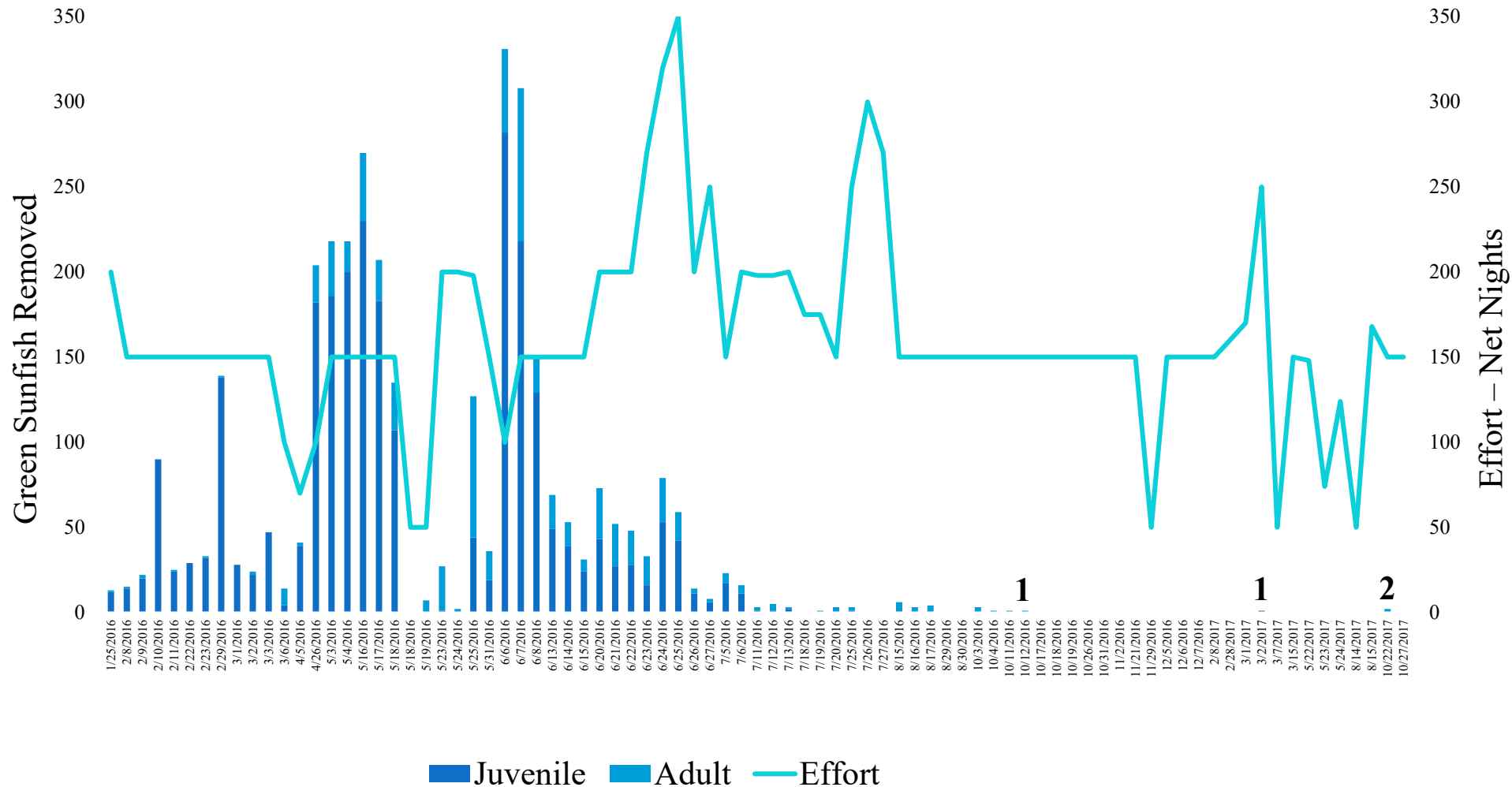
Green Sunfish Removed, Gear Type, and Effort



Green Sunfish Removed by Reach



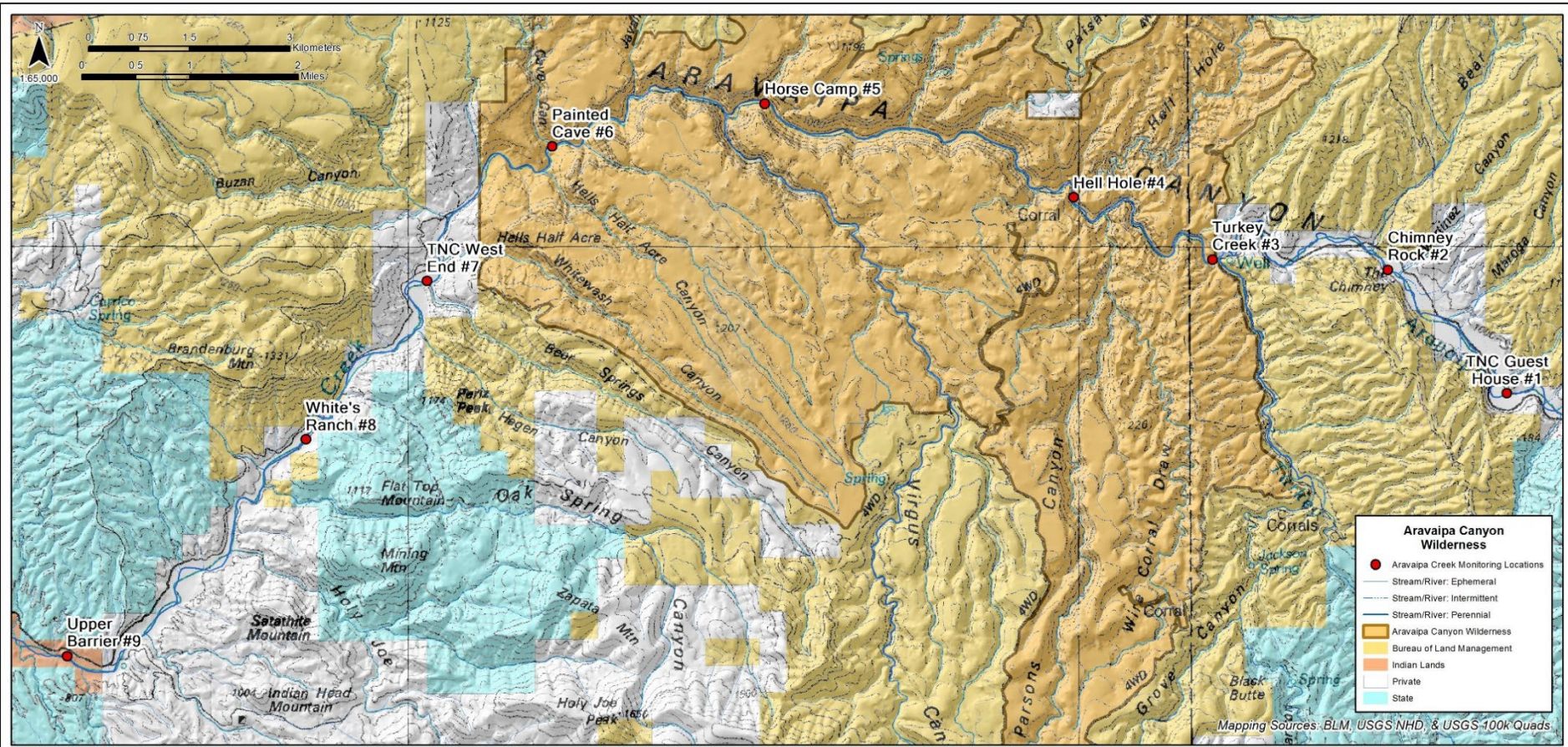
Number of Green Sunfish Removed and Effort from Road Crossings 2-3, 2016-2017





**Case Study: Mechanical Removal of Green Sunfish
(*Lepomis cyanellus*) from Horse Camp Canyon**





Aravaipa Canyon, Graham and Pinal Counties

Horse Camp Canyon



Native Fish in Aravaipa Creek



Loach Minnow

Tiaroga cobitis

Federally Endangered



Spikedace

Meda fulgida

Federally Endangered



Roundtail Chub

Gila robusta

BLM Sensitive



Speckled Dace

Rhinichthys osculus

BLM Sensitive



Longfin Dace

Agosia chrysogaster

BLM Sensitive



Desert Sucker

Pantosteus clarkii

BLM Sensitive



Sonora Sucker

Catostomus insignis

BLM Sensitive

Nonnative Fish in Aravaipa Creek

Green Sunfish - *Lepomis cyanellus*

First detected in 1963

- Horse Camp Canyon - only known source of Green Sunfish into Aravaipa Creek during runoff events
- Found from Booger Canyon downstream to fish barrier

Yellow Bullhead - *Ameiurus natalis*

First detected in 1963

- Found from Bear Canyon downstream to fish barrier

Red Shiner - *Cyprinella lutrensis*

First detected in 1990

- Found from Turkey Creek downstream to fish barrier





Methods

Gear type used:

- Gee metal minnow traps
- Collapsible Promar® nets
- Seine
- Backpack electrofisher
- + **Aquarium dip net**
- Tote barge shocker
- Hoop nets
- Custom and crab traps

Methods

- Seining and dip netting were performed in pools prior to nets being set
- All Promar[®] traps were set with air-pockets to prevent captured amphibians and reptiles from drowning
- Approximate times of deployment and retrieval for nets and minnow traps were recorded, but effort was summarized as overnight sets (if ≥ 12 -hours) regardless of the actual time fished
- All fish caught were measured in millimeters and enumerated*
 - Fish ≥ 65 mm adults, fish < 65 mm juveniles
 - Nonnative fish euthanized with an overdose of tricaine methanesulfonate (MS-222).

*Fish collected by crews in 2011 and 2012 were not measured or categorized by net type caught in.

Gear type used and number of Green Sunfish removed from Horse Camp Canyon, 2010-2015.

Gear Type	2010	2011	2012	2013	2014	2015	Total
Gee Minnow Trap	294		71	462	3		830
Promar Net	278		16	233	1	3	531
Red Promar Net			108	530			638
Gee and Promar Combined		582	94				676
Seine	229		3	893			1,125
Aquarium Dipnet	105						105
Backpack Electrofishing				5			5
Total	906	582	292	2,123	4	3	3,910



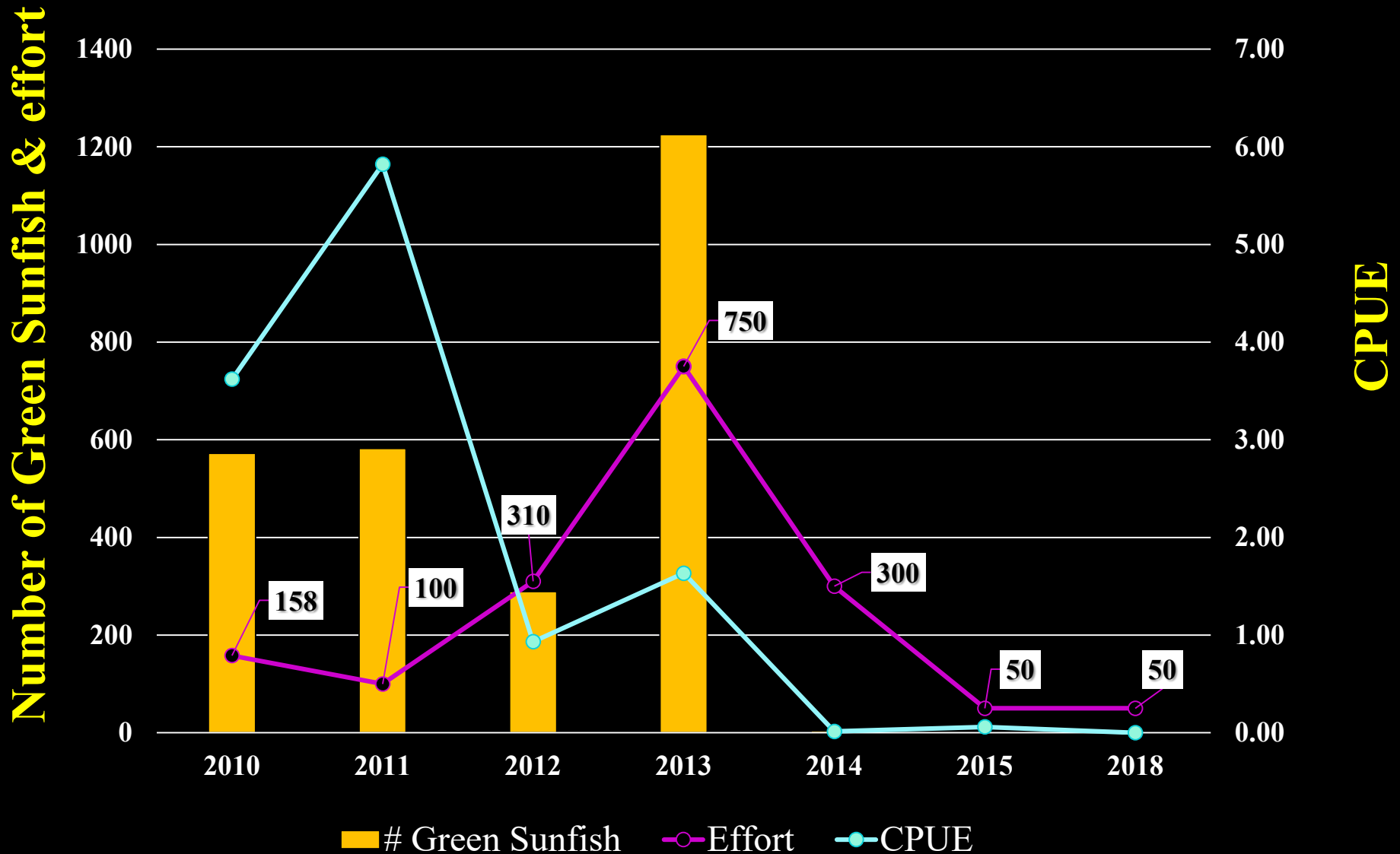
Visual surveys in 2016 and 2017

Horse Camp Canyon Monitoring, 2018

Species	Adult	Juvenile	Unknown
Roundtail Chub	1		
Sonora Sucker	5	1	
Longfin Dace	5		
Lowland Leopard Frog	4		1
Canyon Tree Frog		1	
Sonora Mud Turtle	1	2	
Green Sunfish	0	0	0



Number of Green Sunfish removed using Gee and Promar traps, effort, and CPUE, 2010-2015, and 2018.





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Lessons Learned

The importance of timing the removal effort to reduce the number of spawning adults is equally as important as the amount of effort expended. Underestimating the effort needed, funding constraints, and lack of personnel are the primary reasons it took nine years to eliminate Green Sunfish from Bonita Creek and five years from Horse Camp Canyon.

Conclusions

Nonnative Green Sunfish have been eliminated from Horse Camp Canyon and Bonita Creek.



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