

EAHCP REFUGIA PROGRAM OVERVIEW



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EAHCP CHIEF SCIENCE OFFICER



Edwards Aquifer Habitat Conservation Plan

Creating a Habitat Conservation Plan

- Edwards Aquifer Recovery and Implementation Process (EARIP): 2006-2012
- Collaborative stakeholder process, balancing endangered species & human aquifer water needs
- Produced framework & ground rules for the establishment of the Edwards Aquifer Habitat Conservation Plan (EAHCP)
- EAHCP approved in 2012

Incidental Take Permit

- ITP covering 7 endangered, 1 threatened, and 3 petitioned March 2013 - 2028.
- 5 entities on permit
 - San Antonio Water System, City of San Marcos, City of New Braunfels, Texas State University, and Edwards Aquifer Authority

EAHCP COVERED SPECIES



Fountain Darter



Comal Springs Riffle Beetle



San Marcos Gambusia*



Comal Springs Dryopid
Beetle



Peck's Cave
Amphipod



Texas Wild-rice*

*All photos except Gambusia and Wild-rice credit of **Abbott Nature Photography**.

EAHCP COVERED SPECIES



TX Troglobitic Water Slater



San Marcos Salamander



Edwards Aquifer Diving Beetle

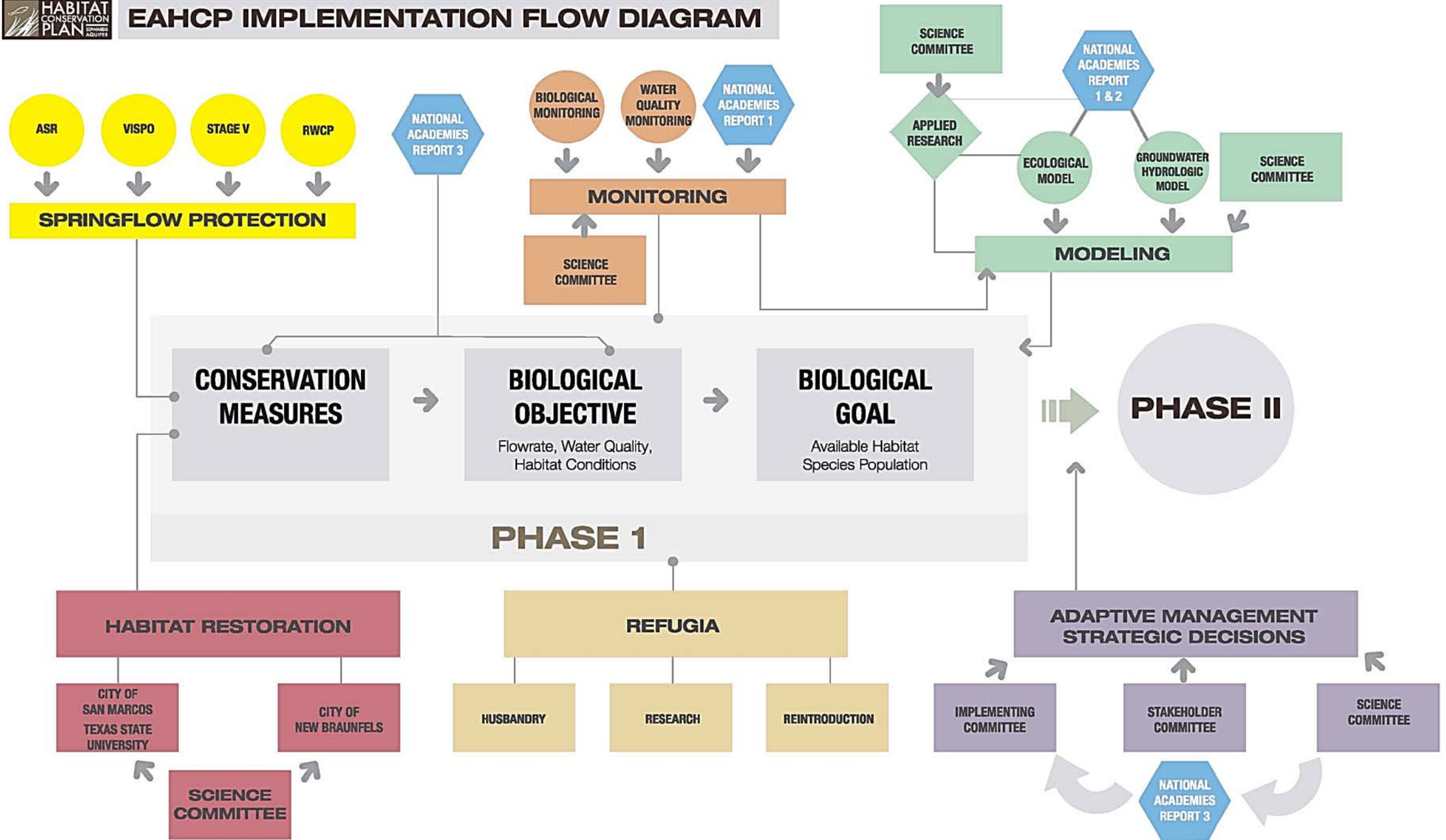


Comal Springs
Salamander

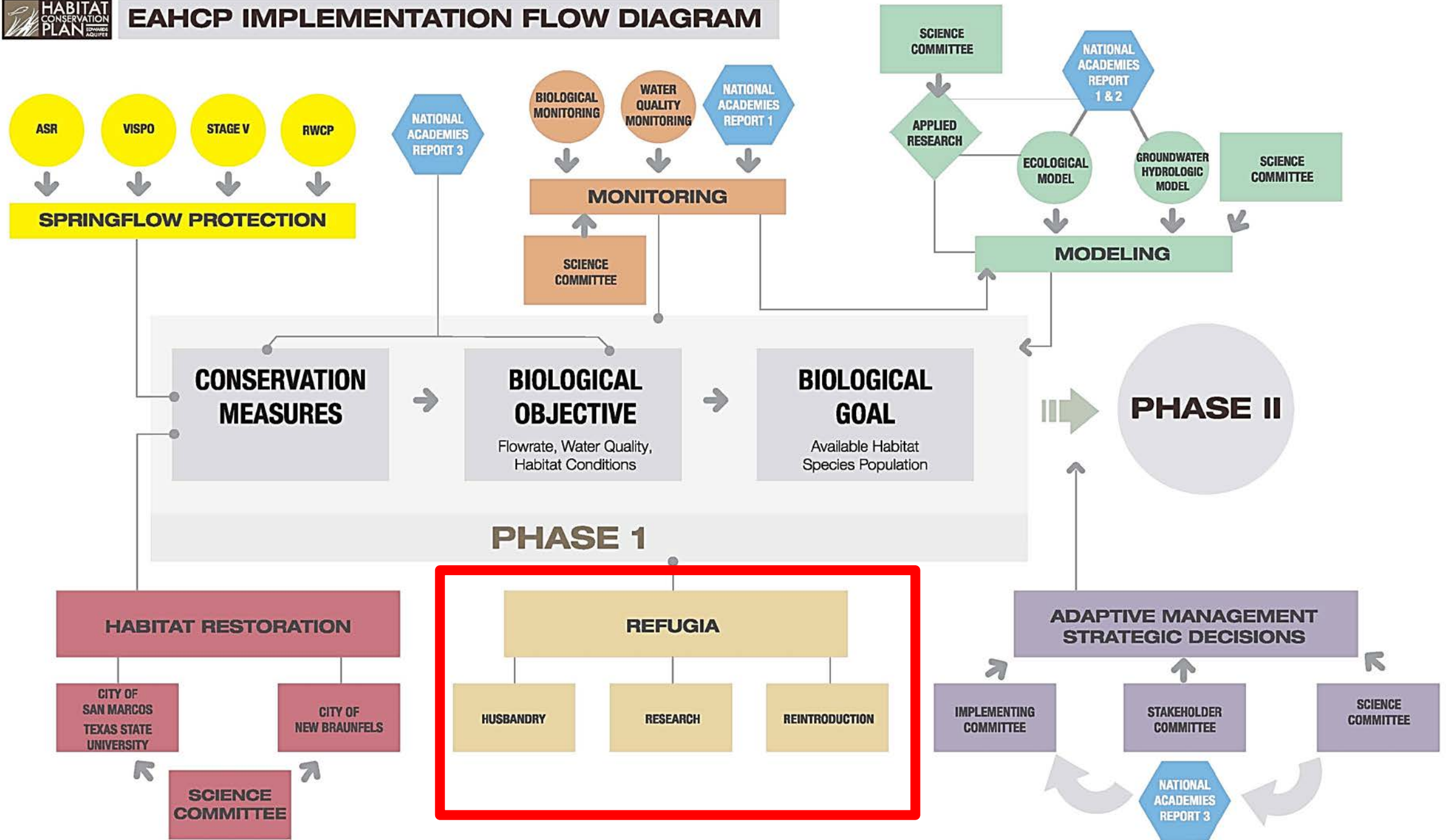


Texas Blind Salamander

EAHCP IMPLEMENTATION FLOW DIAGRAM



EAHCP IMPLEMENTATION FLOW DIAGRAM

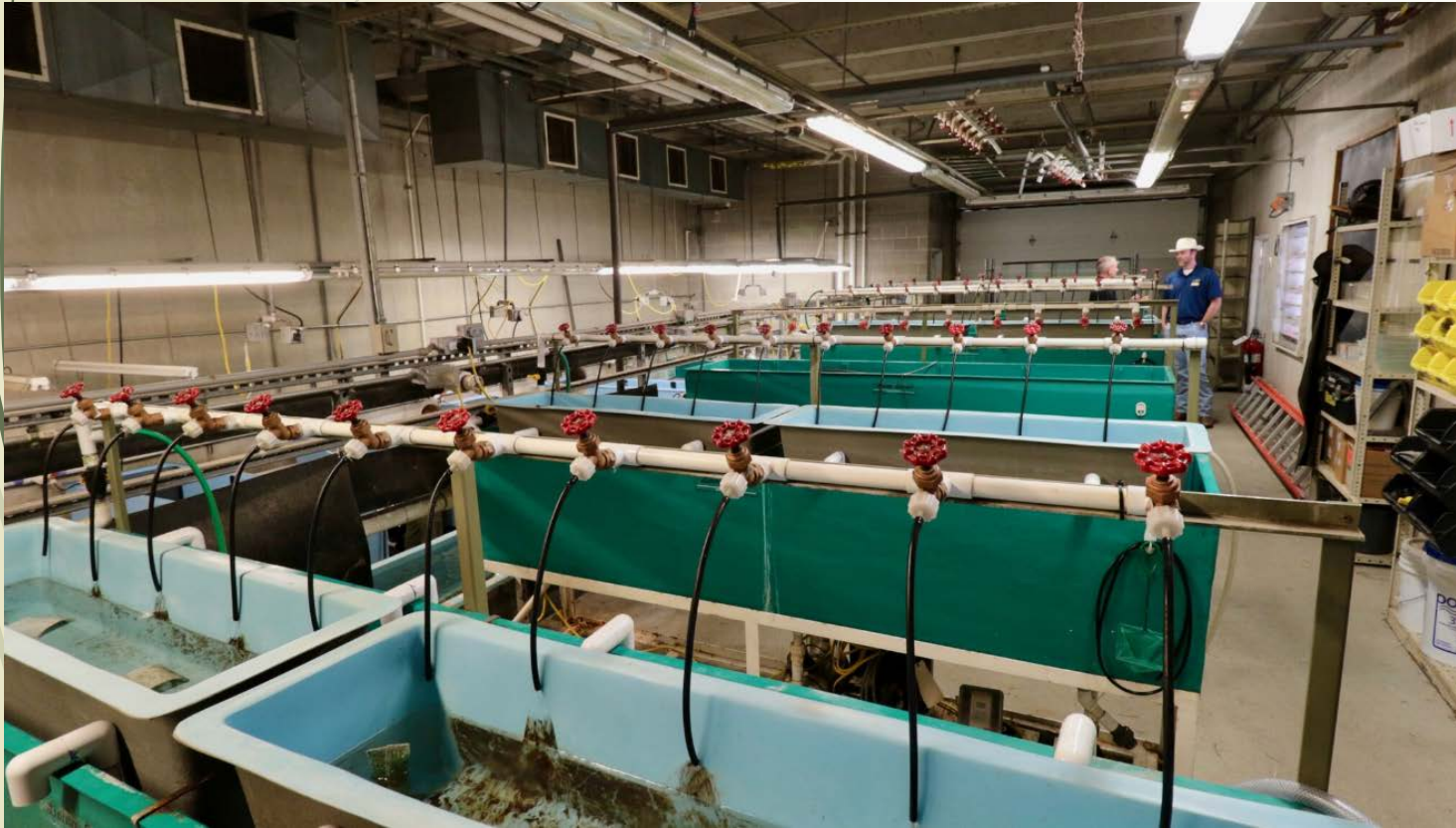


EAHCP REFUGIA PROGRAM

The HCP defines a refugium as:

A population of a Covered Species, housed at a series of aquatic facilities, for the purpose of reintroduction of the Covered Species into the Comal or San Marcos systems, in the event the Covered Species go extinct in their native habitat.

Edwards Aquifer HCP Refugia



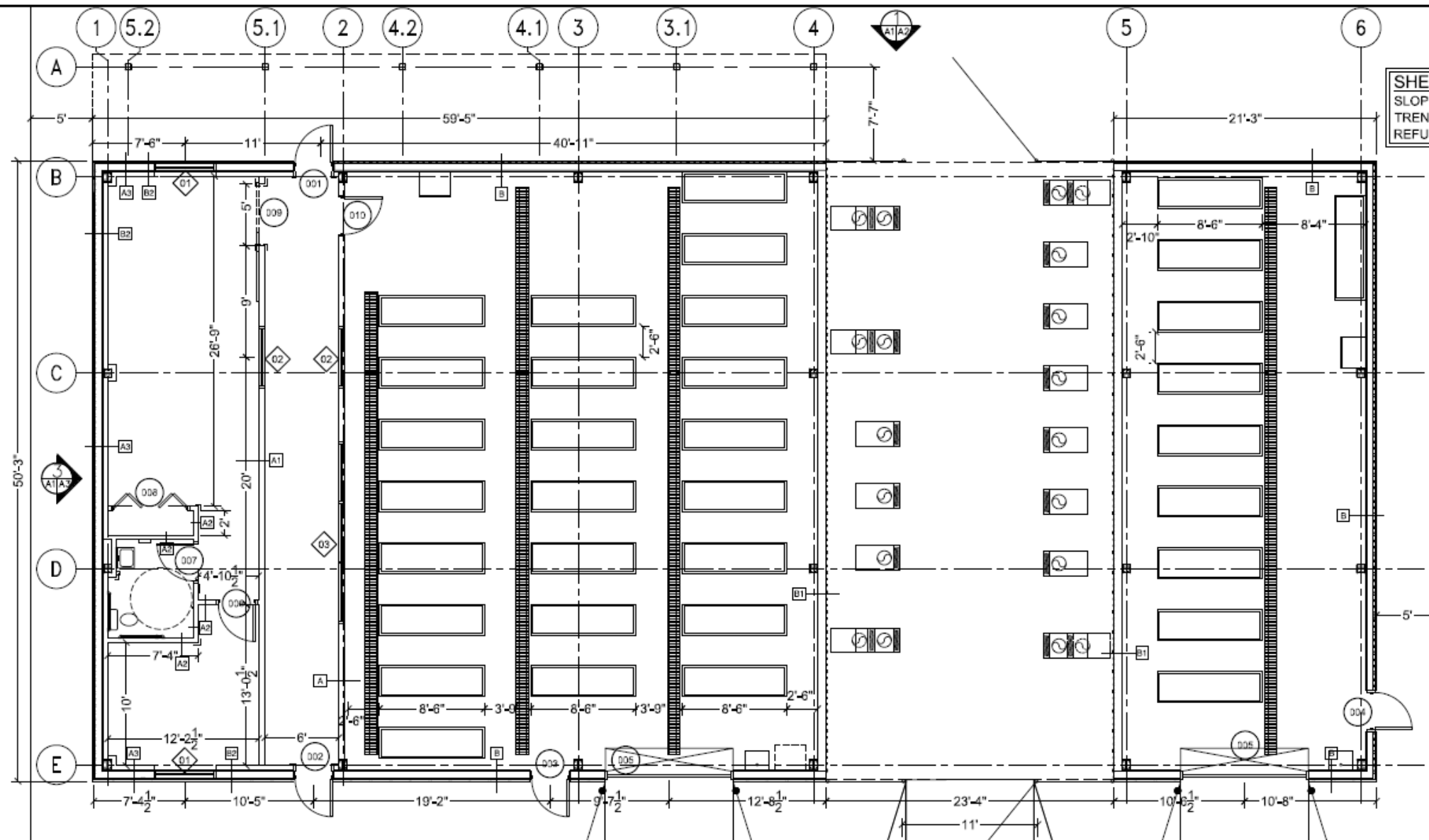
In 2017, the EAA entered into a contract with USFWS to provide refugia services through the ITP.

The contract includes budget for collections, husbandry, propagation, infrastructure improvements, and research for two off-site refugia.

USFWS SMARC

- ~2,500 ft² main house and 1,000 ft² quarantine bldg.
- Construction should be complete late Summer/ early Fall.





SHEET NOTE:
SLOPE FLOOR TO
TRENCH DRAINS IN
REFUGIA & QUARANTINE.

DIM FLOOR PLAN
SCALE: 1/8"=1'-0"



UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
DIVISION OF ENGINEERING

SAN MARCOS AQUATIC RESOURCES CENTER
HAYS COUNTY TEXAS

EAA REFUGIA/QUARANTINE BLDG.

DIM FLOOR PLAN
ARCHITECTURAL

DESIGN: RAYNER DRAWN: RAYNER CHECK: FREEMAN
DRAWING FILENAME AND NUMBER DATE: 8/15/2017

REF_Q SRT. NO. SEQ. NO.
2F-TX-831-73.0 A1-1 7 OF 44

USFWS UNFH

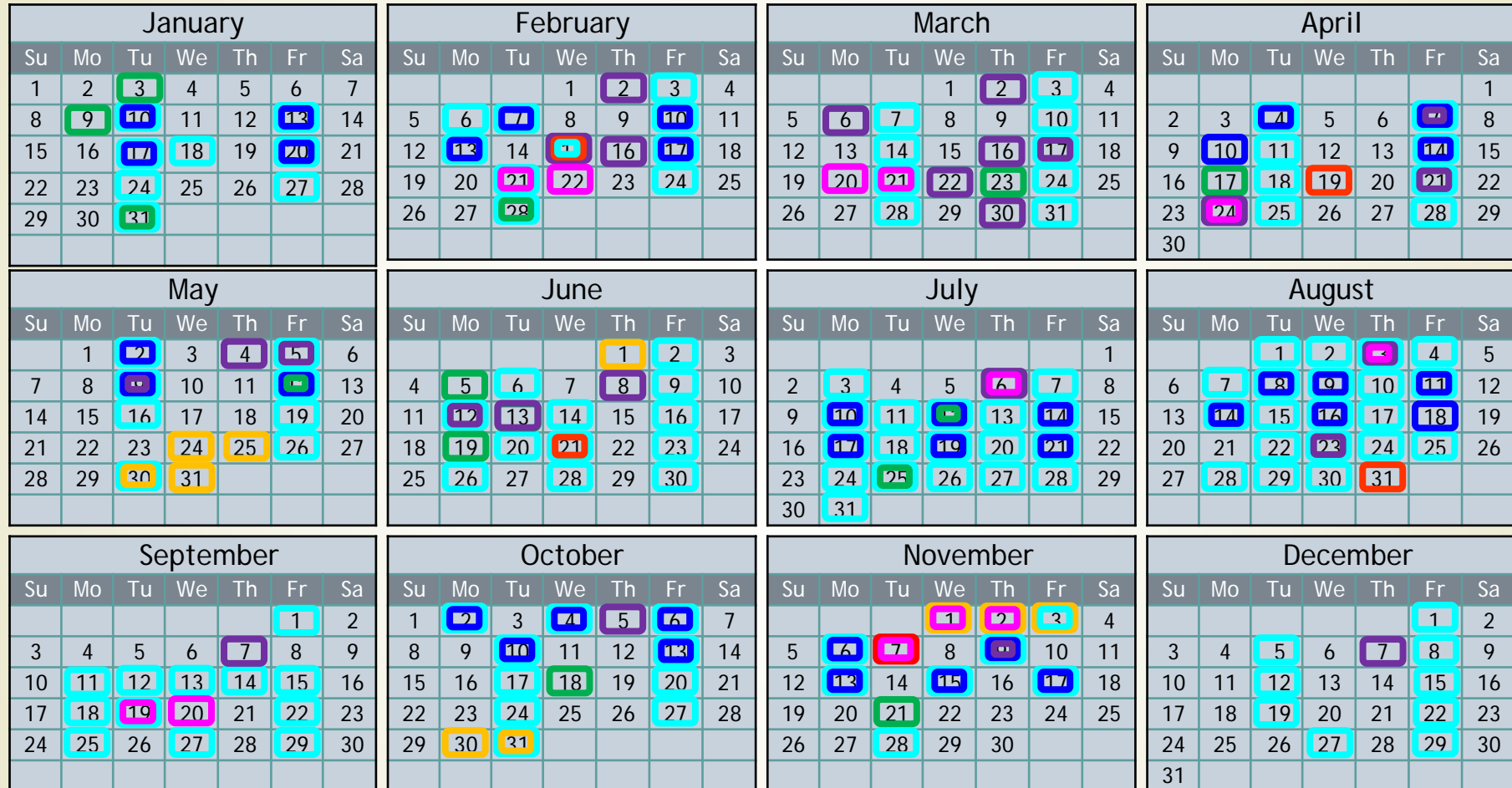
- Building remodels
- Project is on FedConnect
- Anticipated completion 12/2018



REFUGIA WILD STOCK

Species	Standing Stock Goal	Current SMARC census (12/1/2017)	2017 SMARC Work plan Goal	Current UNFH census (12/1/2017)	2017 UNFH Work Plan Goal
Fountain Darter (Comal)	1000	532	600	64	600
Fountain Darter (San Marcos)	1000	619	600	336	600
Texas Wild Rice	430	243	197	67	129
Texas Blind Salamander	500	34	36	0	25
San Marcos Salamander	500	260	250	185	250
Comal Springs Salamander	500	50	50	4	50
Comal Springs Riffle Beetle	500	123	250	61	250
Peck's Cave Amphipod	500	197	250	57	250
Comal Springs Dryopid Beetle	500	18	*	3	*
Texas Troglobitic Water Slater	500	43	*	0	*
Edwards Aquifer Diving Beetle	500	0	*	0	*

USFWS FIELD ACTIVITIES 2017



Yellow box: Fountain darter

Green box: Texas wild rice

Purple box: Invert lures

Red box: Peck's handpick

Cyan box: Driftnets in San Marcos: salamanders & inverts

Blue box: Traps for Texas blind salamanders

Magenta box: Hand collect salamanders

2017 REFUGIA: FOUNTAIN DARTERS

- Collected with Dipnets and SCUBA divers
- San Marcos River: Upper, Middle, and Lower
- Comal River: Upper and Lower



2017 REFUGIA: TEXAS WILD-RICE

- Collected by river section
- Tillers collected by hand & SCUBA divers
- GPS coordinates are recorded
- Seeds collected



TEXAS BLIND SALAMANDERS

- ▶ Trapped in wells, caves
 - 1 of 3 collected are retained for refugia
- ▶ Drift nets at Spring Lake & locations on the Texas State University campus
- ▶ Measured & swabbed



0-Know nothing
To
5-Documented
procedures

	Collection	Husbandry	Propagation	Genetics	Reintroduction
Fountain darter	5	5	5	4	5
Texas wild rice	5	5	5	4	5
Texas blind salamander	4	5	2	1	0
San Marcos salamander	5	4	3	3	0
Comal Springs salamander	5	4	2	2	0
Comal Springs riffle beetle	5	3	2	2	0
Comal Springs dryopid beetle	3	2	0	2	0
Texas troglobitic water slater	1	1	0	0	0
Peck's cave amphipod	3	3	2	2	0
Edwards aquifer diving beetle	1	0	0	0	0

REFUGIA RESEARCH



➤ Comal Springs Riffle Beetle Life History

- Can sex males and females
- Reproductive Cycle (instars)

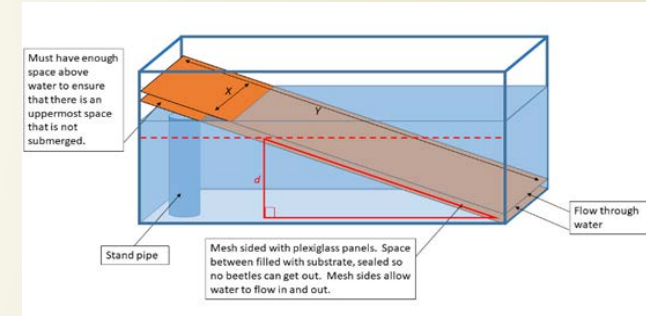


➤ Comal Springs Dryopid Beetle Life History

- Can we differentiate males and females
- Are larvae aquatic?
 - Fecundity, egg incubation, larval growth rates, instars

➤ Peck's Cave Amphipod Life History

- Growth rates
- At what stage can we differentiate from other species?
- How long do eggs incubate? Fecundity?
- # molts or size classes before sexually mature?



An aerial photograph of a calm lake surrounded by dense green trees and vegetation. In the foreground, there are large, clumpy patches of green aquatic plants. A person is visible in a small blue kayak on the right side of the lake, near the shore. The word "QUESTIONS?" is overlaid in the center of the image.

QUESTIONS?