NEON FISH SAMPLING AND AQUI-S20E: AN APPLICATORS PERSPECTIVE

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NEON Fish Sampling and AQUI-S20E:
An Applicators Perspective

1. NEON Overview
2. AADAP Participation
3. Use of AQUI-S20E
4. Opportunities & Needs

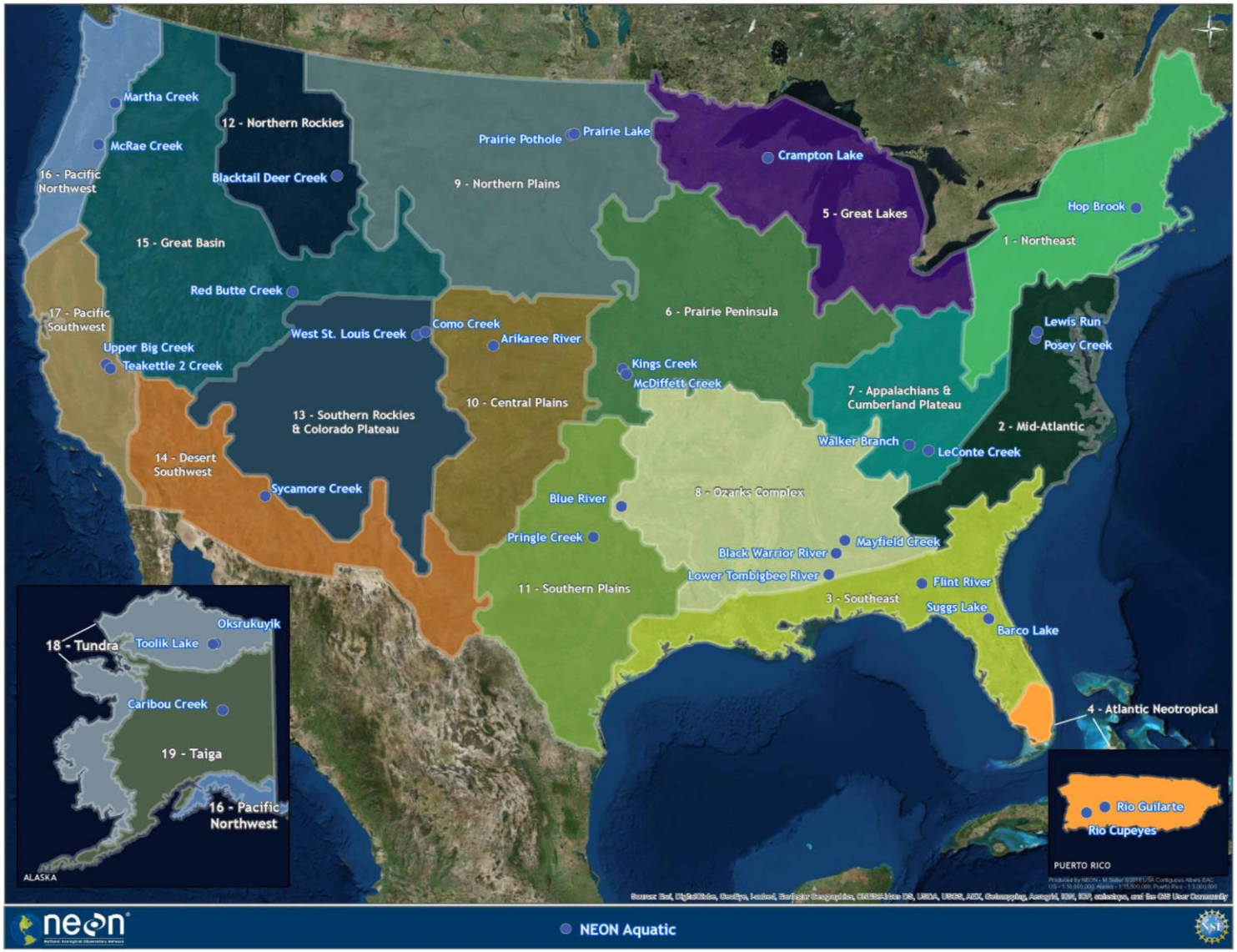
What is NEON?

National Science Foundation
WHERE DISCOVERIES BEGIN

Battelle
The Business of Innovation

neon®
National Ecological Observatory Network

What is NEON?



Continental-scale ecological observatory

20 Eco-climatic Domains

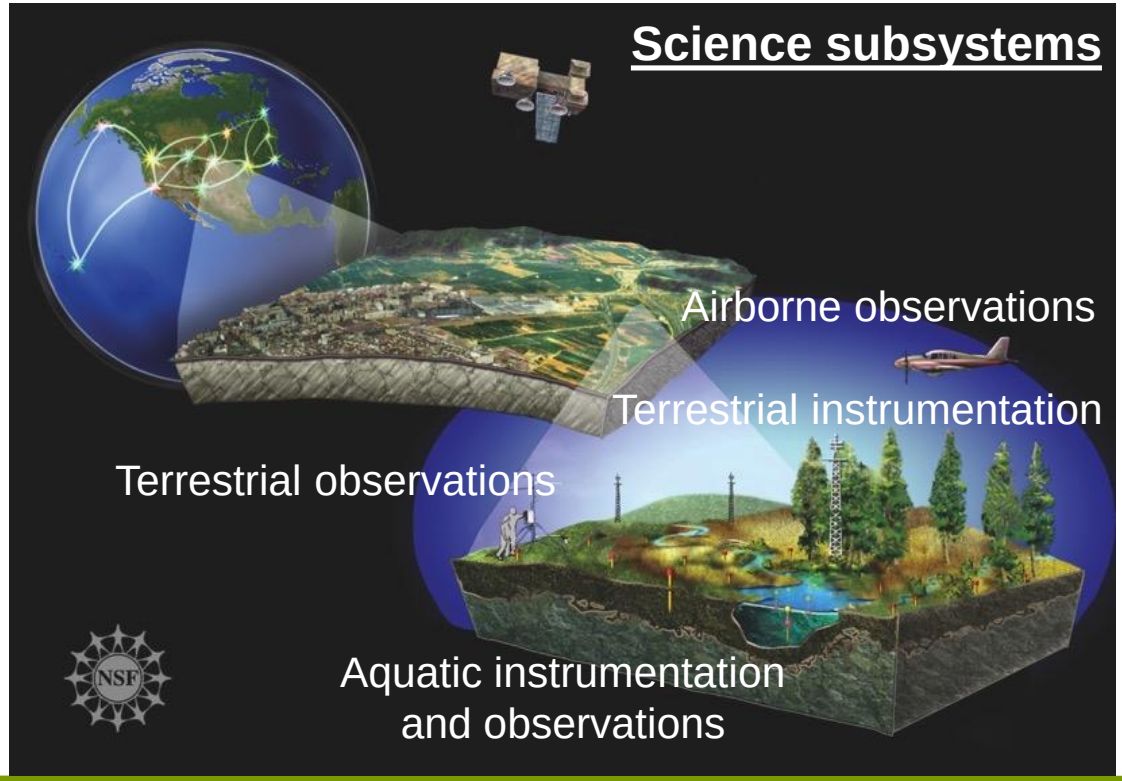
1 core site (30 years)

1-2 relocatable sites (5-10 years)

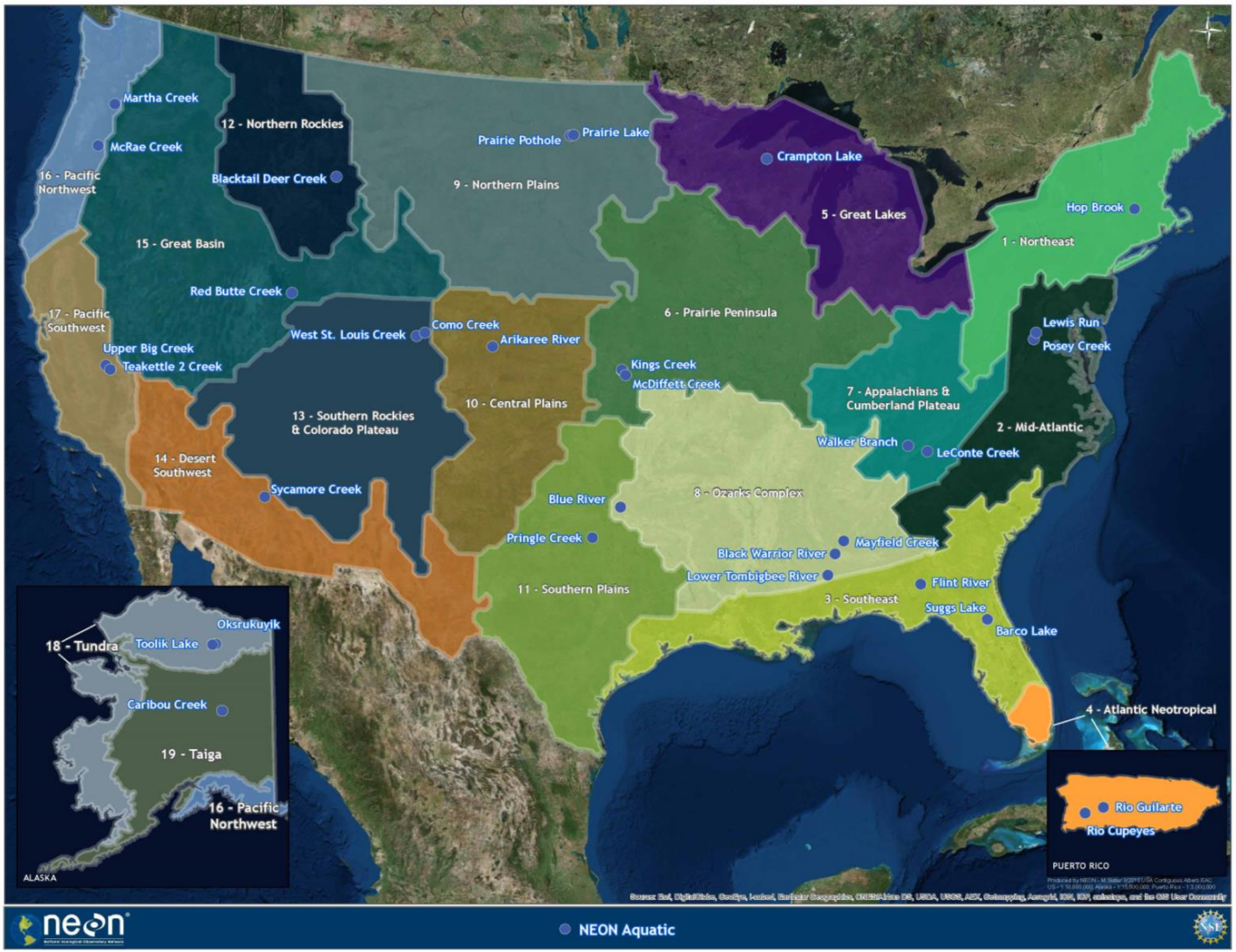
The NEON Mission

First NSF Major Research Equipment Facilities Construction (MREFC) project designed to detect and forecast **ecological** change

- Collect and integrate data over **30 years**
- **Open source data**
- Standardized data and sample collection procedures
- Standardized physical and information infrastructure



NEON Aquatic Program



34 Aquatic Sites

24 Wadeable Streams

3 Rivers

7 Lakes

Range of hydrologic regimes, physical characteristics, land use types

NEON Aquatic Program

Sensors

In-stream/lake

- Pressure transducer
- Multisonde: Water temp, DO, turbidity, pH, conductivity
- Nutrient analyzer
- PAR

Meteorology Station

- Air temp, barometric pressure, precipitation, PAR, net radiation
- Wind speed and direction
- Camera

Groundwater

- Water temp, water level, conductivity

NEON Aquatic Program

Observations

Discharge/Hydrology

Morphology

Chemistry/Isotopes
- Surface water
- Ground water
- Sediment

Biology
- Microbes
- Aquatic plants
- Algae
- Macroinvertebrates/Zooplankton
- Fish

NEON Fish Sampling Protocol

Purpose: Fish are used to assess alterations to ecosystem health because they are a diverse taxonomic group with a broad range of habitat requirements, life history strategies, and they respond rapidly to environmental change.

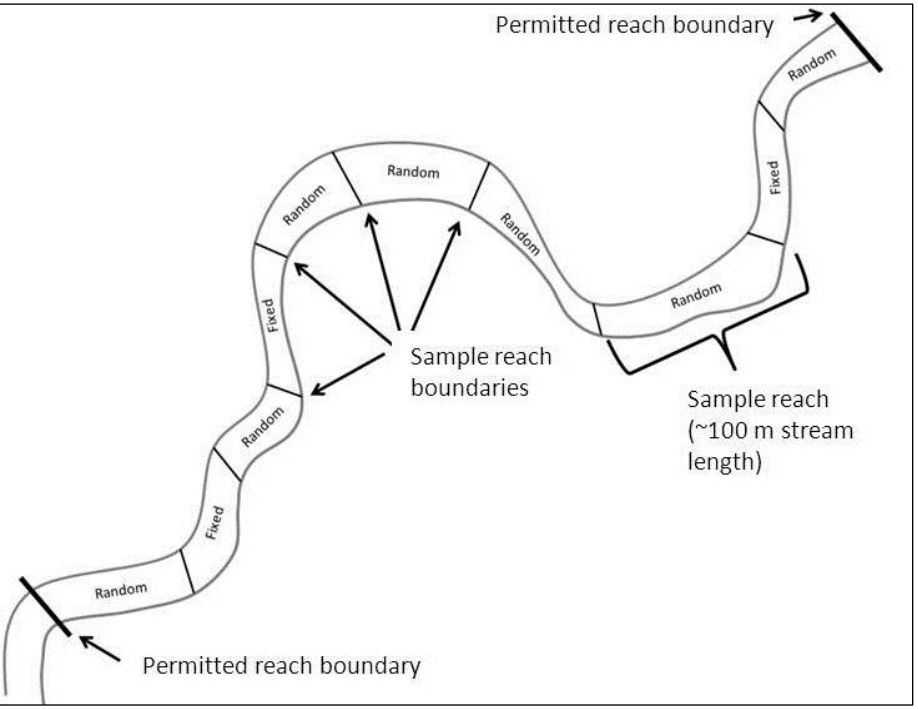
Measurements:

- Number of species collected
- Estimated species richness
- Species Diversity and Evenness
- Estimated abundance
- Capture efficiency by species
- Percent individuals at site with deformities, eroded tissue, lesions, or tumors
- Percent and number of individuals and species that are alien

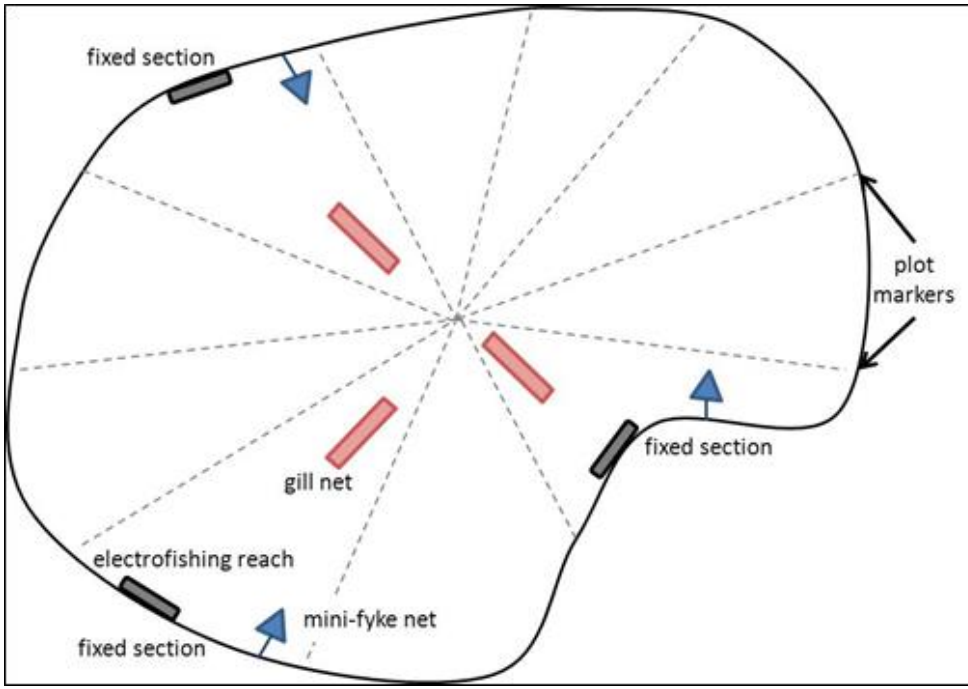
NEON Fish Sampling Protocol

Sampling strategy

- 2 times per year during the spring and fall



1 km Reach



0.5 – 1.5 km^2 Area

NEON Fish Sampling Protocol

Data collected

Site ID (4 letter code):		Tech 1 ID:	Tech 2 ID:	Tech 3 ID:	
Date Collected (YYYYMMDD):			Collection Time (24:00; Local Time)		Page _____ of _____
Start:	End:		Start:	End:	
Sub-sampling Reach ID:	Water Temp (°C):	DO (mg/L):	Conductivity (µS/cm):	Weather:	Gear (electrofish or minnow trap):
Frequency (Hz):	Duty Cycle (%):		Voltage (V):	EF time (seconds):	Settings Changed During Sampling?

Reminder to print and record data in the INAD forms!

Specimen No.	Pass No.	Species Identification (Lowest taxonomic level)	Total Length (mm)	Weight (g)	DELT/Mortalities	Electrofishing Injury? (Y/N)	Observations	Voucher Specimen Collected? (Y/N)	Photo No.

INAD forms filled out during field sampling

NEON Fish Sampling Protocol

Anesthesia

Mix anesthetic in one 5-gallon bucket.

- Fill the bucket approximately half full with stream water (2.5 US gallons or ~10 L).
- A dosage treatment of **20-30 mg/L AQUI-S20E** is recommended to sedate all fish species to handleable in most situations.

Target Concentration of AQUI-S20E (10% eugenol)	Volume of Treatment Water (gal)					
	2.5	5	10	15	20	25
20 mg/L	1.9 mL	3.8 mL	7.6 mL	11.3 mL	15.1 mL	18.9 mL
25 mg/L	2.4 mL	4.7 mL	9.5 mL	14.2 mL	18.9 mL	23.6 mL
30 mg/L	2.8 mL	5.7 mL	11.3 mL	17.0 mL	22.7 mL	28.4 mL

AADAP Enrollment

How did we get here?

2013 - NEON IACUC required the use of anesthetics (MS-222) when handling fish and non-target species **(Improved stewardship/reduce harm to techs)**

2014 - Difficult to obtain permits to use MS-222 at NEON aquatic sites

- **Identified AQUI-S20E as an option**

2015 - NEON IACUC approved the **discretionary** use of AQUI-S20E

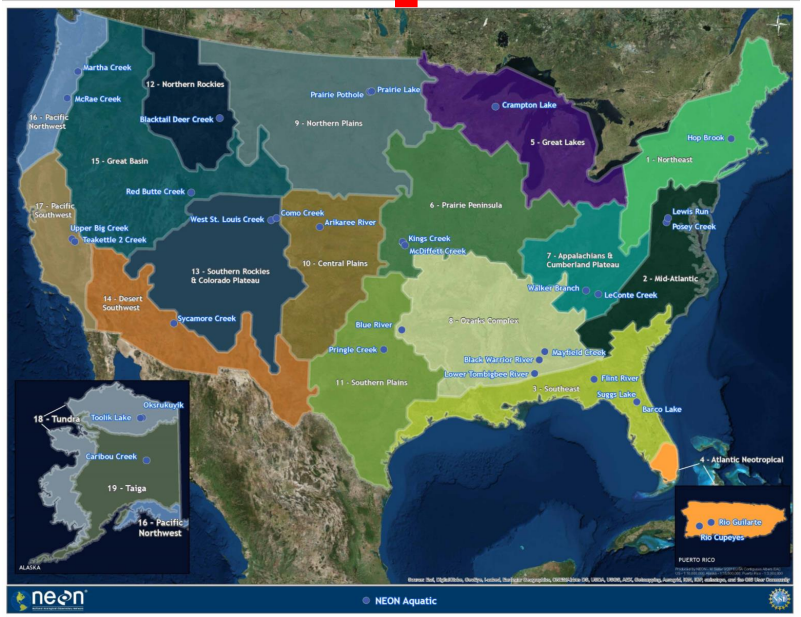
- Initial enrollment in the AADAP Program

2016 - NEON will be fully enrolled by the fall

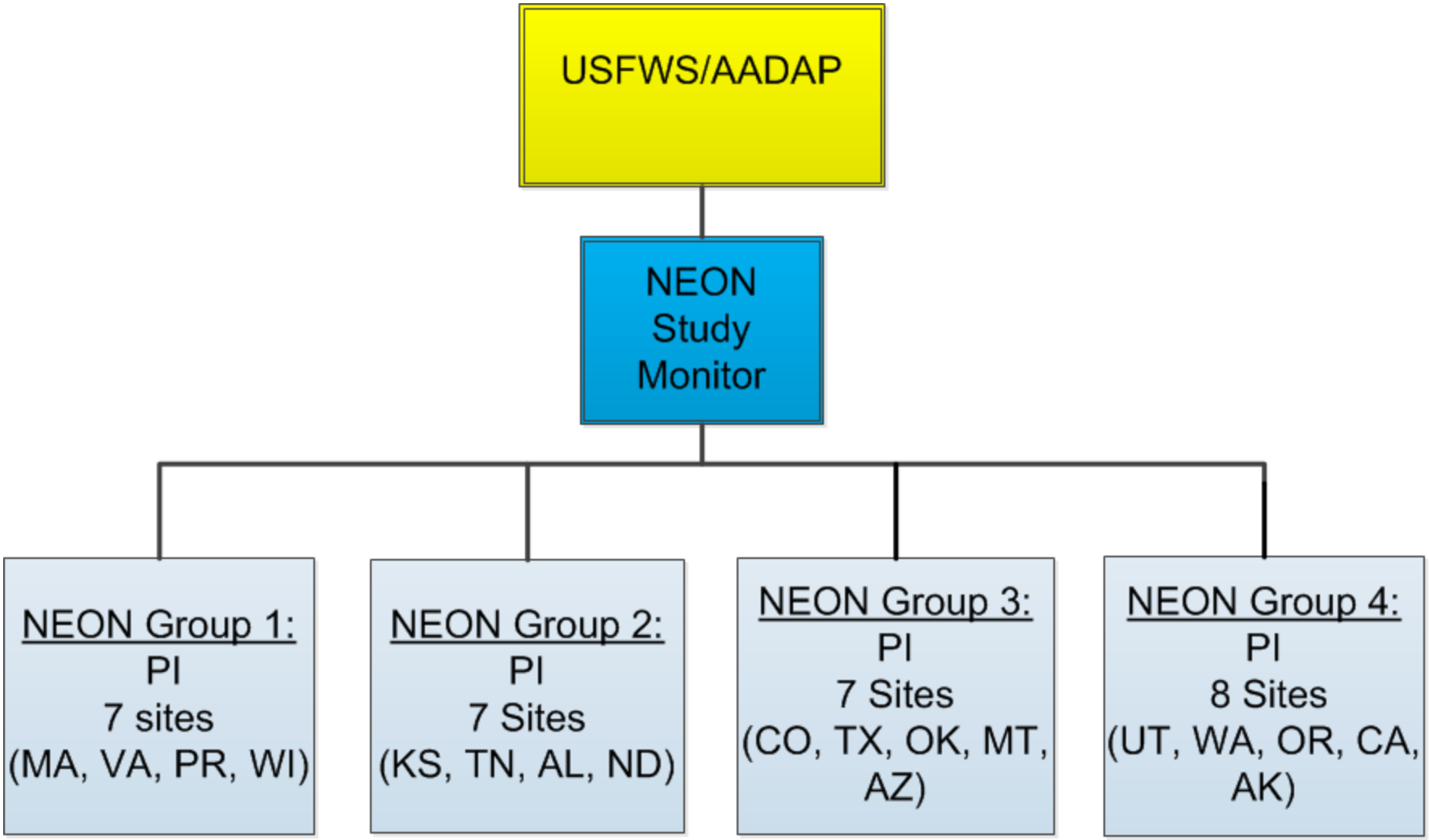
AADAP Enrollment

USFWS/AADAP

?



AADAP Enrollment



AADAP Enrollment

So how are we doing?

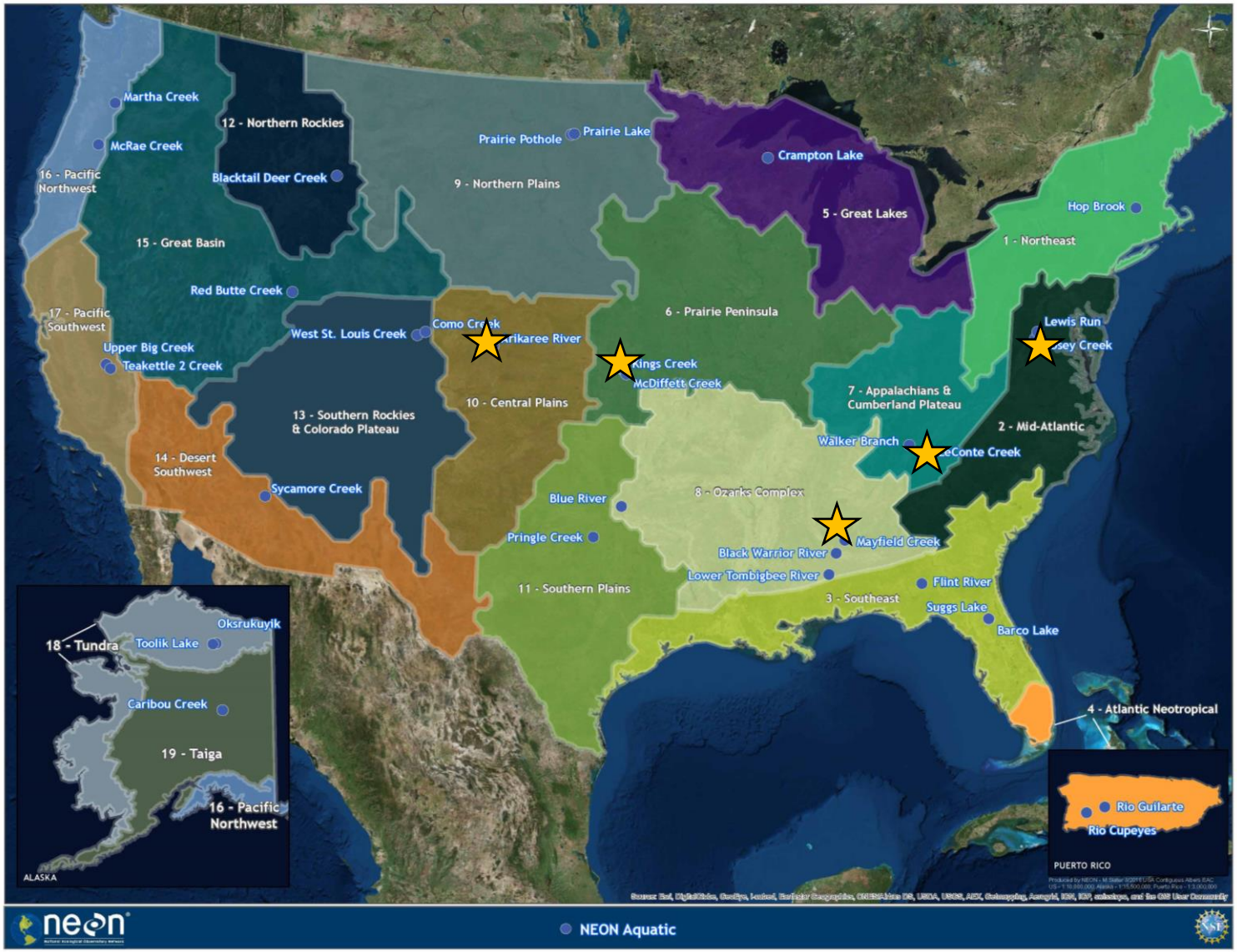
AQUI-S20E

First NEON Trial

<u>Smith-Root Fish Sampling Training</u>:

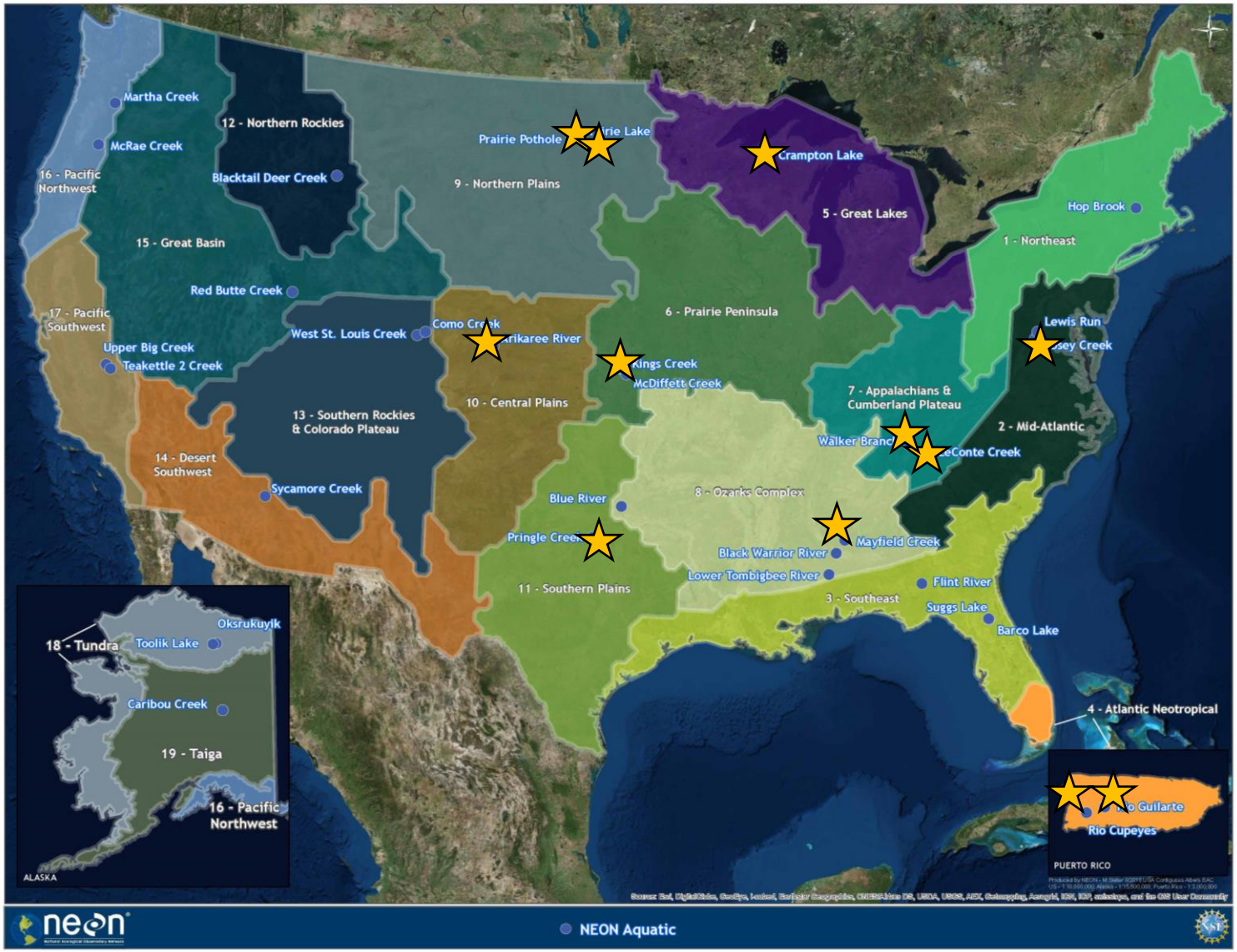
- Lacamas Creek, Vancouver, WA February 9-10, 2016
- 2nd NEON training at Smith-Root June 21-22, 2016

AQUI-S20E



2016
~2,000 fish
~350 treated

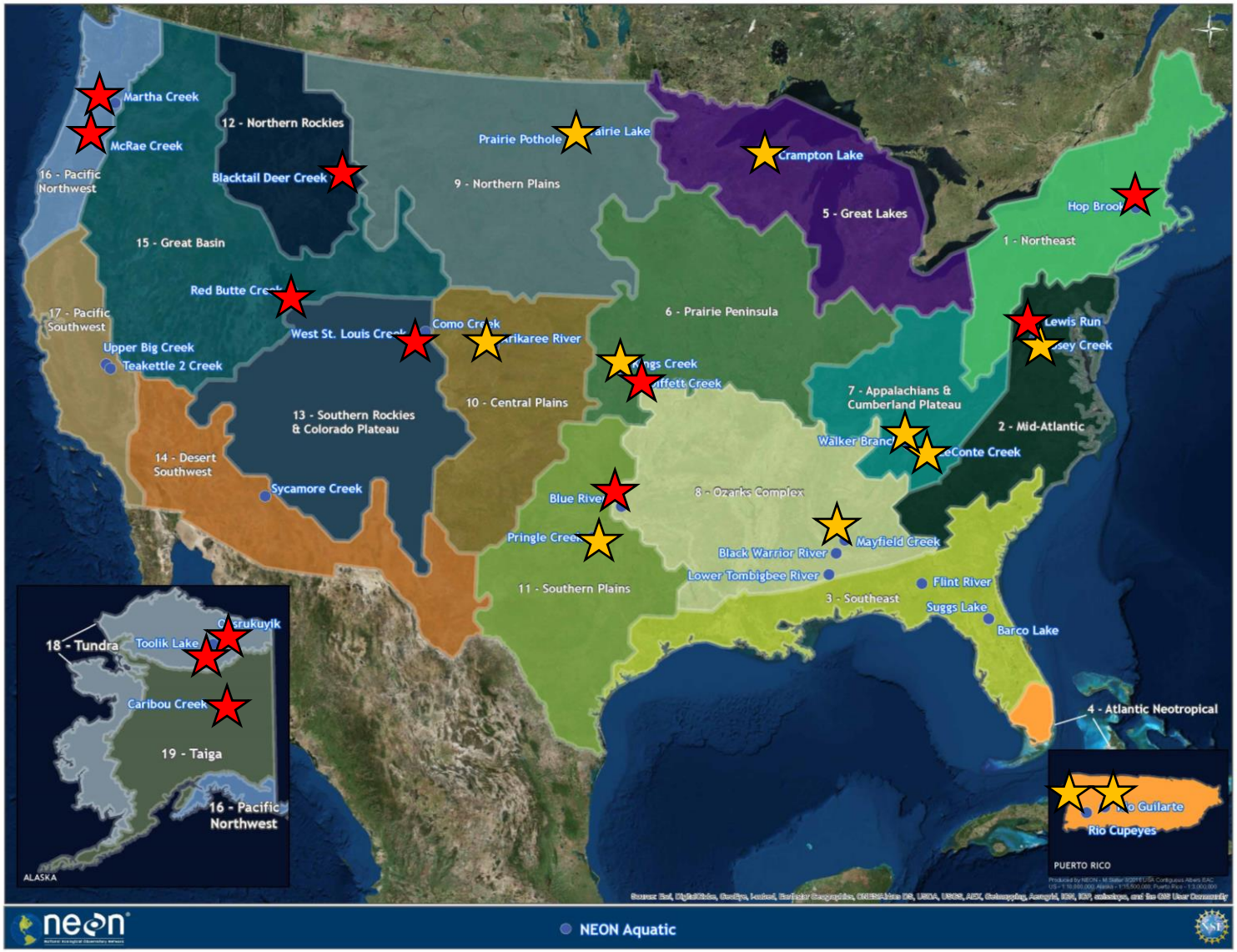
AQUI-S20E



2016
~2,000 fish
~350 treated

12 sites by this fall including PR

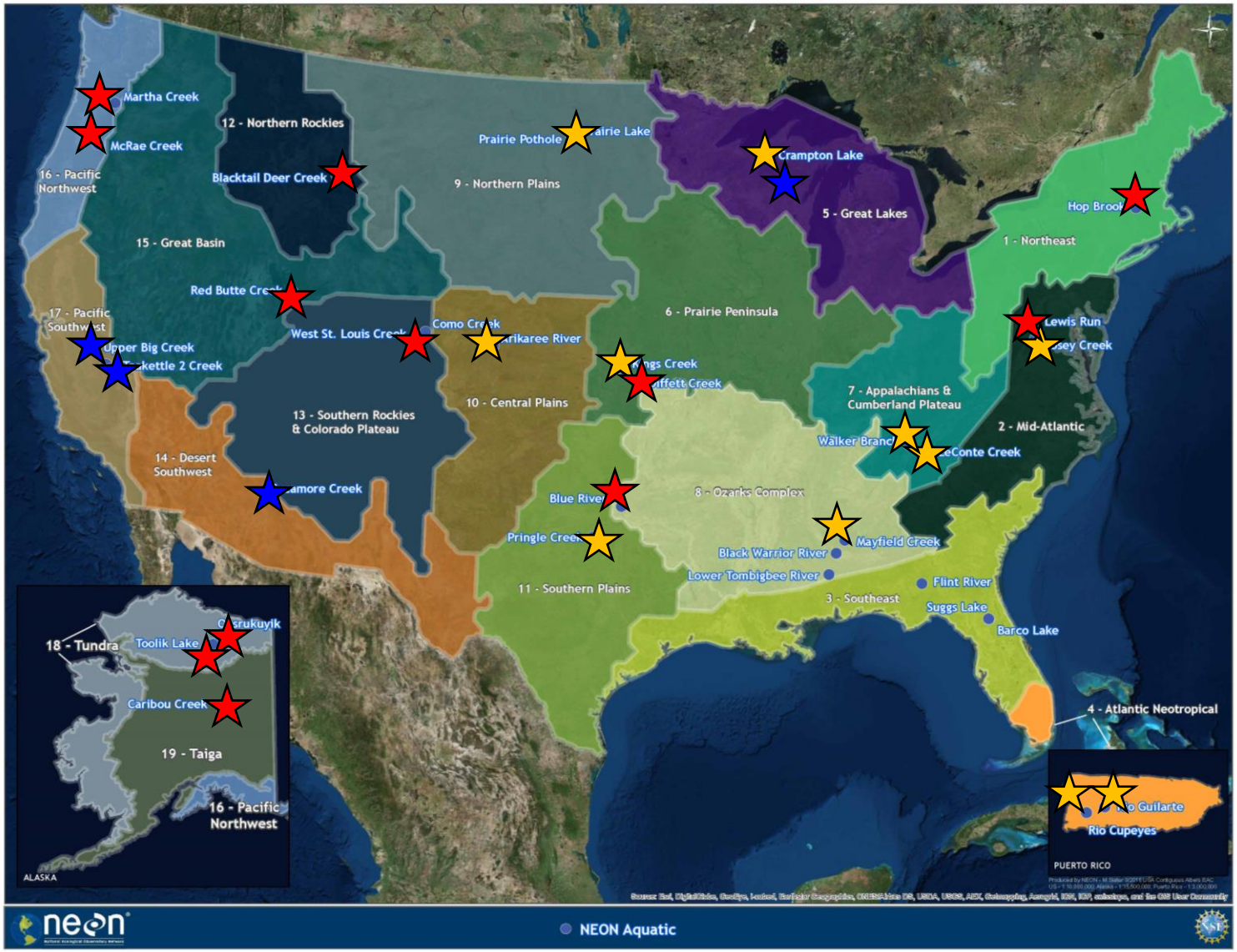
AQUI-S20E



2016

2017
12 more sites
Including AK

AQUI-S20E



2016

2017

2018
All fishable NEON sites fishing!

Paradigm Shift

- NEON experience using AQUI-S20E suggests that this drug is **very effective and easy** to administer.

- Leading edge science. Increasing trend in fish science supporting **"low dose, zero withdrawal, immediate release"** sedatives when handling fish. (AFS and USFWS)

- Chemically immobilizing captured fish prior to handling can minimize mechanical damage to the specimen while physically restraining them (Trushenski et al. 2013).

- Protect fish techs too!

Opportunities

- AQUI-S20E will be applied across several aquatic ecoregions to a large diversity of fish species **adding to the INAD body of knowledge**
- **Directly educating** resource managers, agencies, institutions, and private property owners about AQUI-S20E
- Battelle Ecology: **Study support?** Let's talk

Future Needs

- Develop dose and **procedures for euthanizing** fish, amphibians, and reptiles with AQUI-S20E
- **Continue to educate** resource managers and the public about the beneficial use of AQUI-S20E
- Clearer understanding of **field disposal** of “spent” AQUI-S20E

Acknowledgements

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Questions?

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