Spokane River Watershed EDT Draft Study Design

Spokane Tribe of Indians

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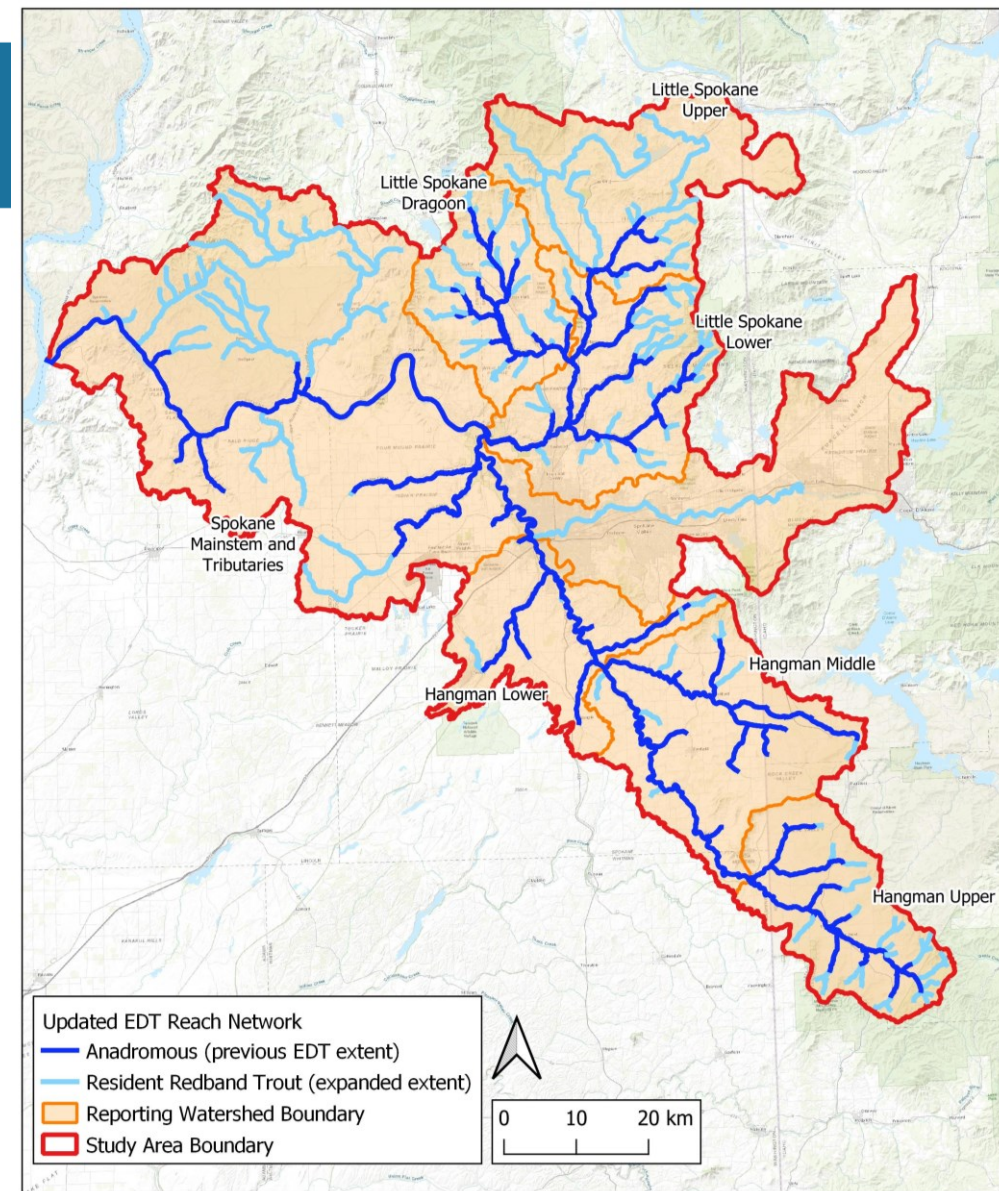
TECHNICAL TEAM MEETING

FEBRUARY 21, 2024

CRAMER FISH SCIENCES:

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Overview

- CFS is developing a sampling study design to fill identified data gaps in prep for an updated EDT model run for the Spokane River watershed
  - **Habitat surveys** - channel unit composition, substrate, benthic macroinvertebrates, etc.
  - **Temperature loggers**
  - **eDNA** – fish richness
  - **Remote sensing** – gradient, confinement, riparian, others attributes where possible

Updated EDT Reach Network
- Anadromous (previous EDT extent)
- Resident Redband Trout (expanded extent)
- Reporting Watershed Boundary
- Study Area Boundary

0 10 20 km

Today we're sharing our progress, draft design, and soliciting feedback.

Data evaluation

- Incorporated newly identified benthic richness and water quality data from ECY
- Developed data age cutoffs to determine which attributes need updated data based on best professional judgement
    - Most habitat data was from the early 2000's, may not reflect current condition
    - Local expert opinion on the degree of watershed change since last assessment was limited, thus required a standard set of cutoffs.
    - Age cutoffs set were attribute specific

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Type	EDT Attribute	Attribute sensitivity	Data age cutoff (years)	Type	EDT Attribute	Attribute sensitivity	Data age cutoff (years)
Channel morphometry	Channel length	5	20	Riparian and channel integrity	Bed scour	4	10
Channel morphometry	Channel wetted width	5	20	Riparian and channel integrity	Riparian/stream interface	2	10
Channel morphometry	Gradient	5	20	Riparian and channel integrity	Woody Debris	3	20
Confinement	Confinement - natural	1	20	Substrate	Embeddedness	5	10
Confinement	Confinement - artificial	2	10	Substrate	Fine sediment	5	10
Habitat composition	Backwater Pools	5	20	Water Temperature	Temperature: Daily Maximum	5	10
Habitat composition	Beaver Ponds	5	20	Water Temperature	Temperature: Daily Minimum	5	10
Habitat composition	Glides	5	10	Water quality	Alkalinity	4	10
Habitat composition	Large Cobble Riffles	5	20	Water quality	Dissolved oxygen	4	10
Habitat composition	Pool Tails	5	10	Water quality	Total Suspended Solids	3	10
Habitat composition	Scour Pools	5	10	Biological community	Benthic Richness	4	10
Habitat composition	Small Cobble Riffles	5	10	Biological community	Fish Community Richness	3	10
Habitat composition	Side Channel	5	10	Biological community	Fish Species Introductions	4	10
Habitat composition	Peripheral/transitional habitat - Seasonally inundated floodplain	5	20	Biological community	Predation Risk	3	10
Habitat composition	Peripheral/transitional habitat - Floodplain ponds	5	20	Biological community	Hatchery Fish Outplants	4	10
Habitat composition	Peripheral/transitional habitat - Groundwater channels	5	20	Biological community	Fish Pathogens	3	any
Habitat composition	Limnetic	5	20	Obstructions and withdrawals	Obstructions	4	any
Habitat composition	Littoral	5	20	Obstructions and withdrawals	Water Withdrawals	4	any

Study Design Prep

Compilation of access data

- Obtained list of lat/longs for sites with previous access and existing landowner relationships from agencies
- Downloaded parcel data for WA, has land use codes, addresses and limited contact info
- Will provide this info to the sample teams to help start the process of securing access
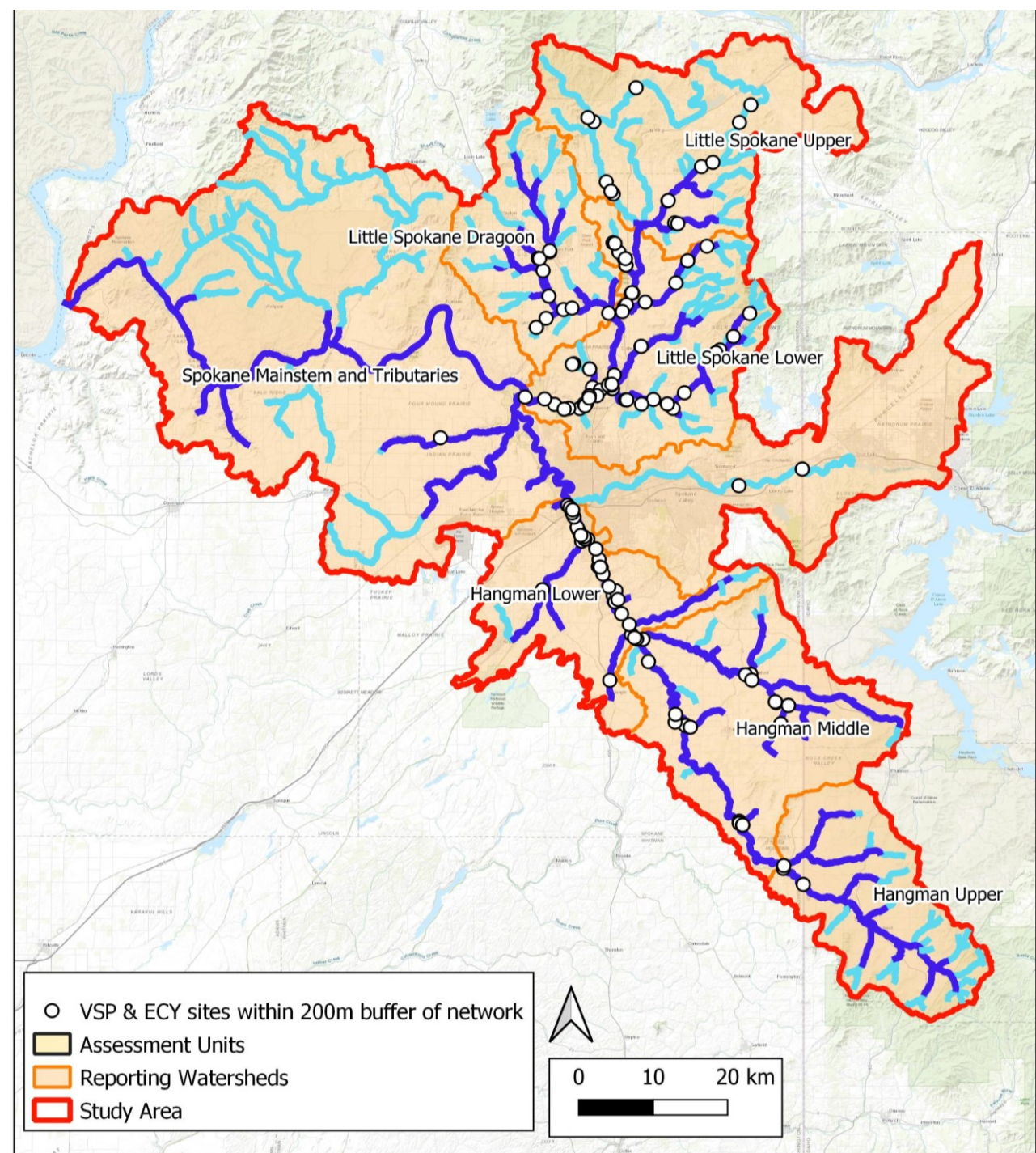
Lake and reservoir habitats

- Attributes included in the lake and reservoir EDT rule structure are channel length, channel width, limnetic habitat composition (percent), littoral habitat composition (percent), woody debris, temperature: daily maximum, dissolved oxygen, and predation risk.
- Channel length, width, habitat composition and woody debris will be fully censused using remote sensing for reaches needing data
- Good existing spatial coverage for temperature and DO for lake/reservoir habitats – filling with interpolation and targeted sampling at a couple of sites.
- Predation risk to be filled using existing data on fish community, targeted eDNA sampling and best professional judgement
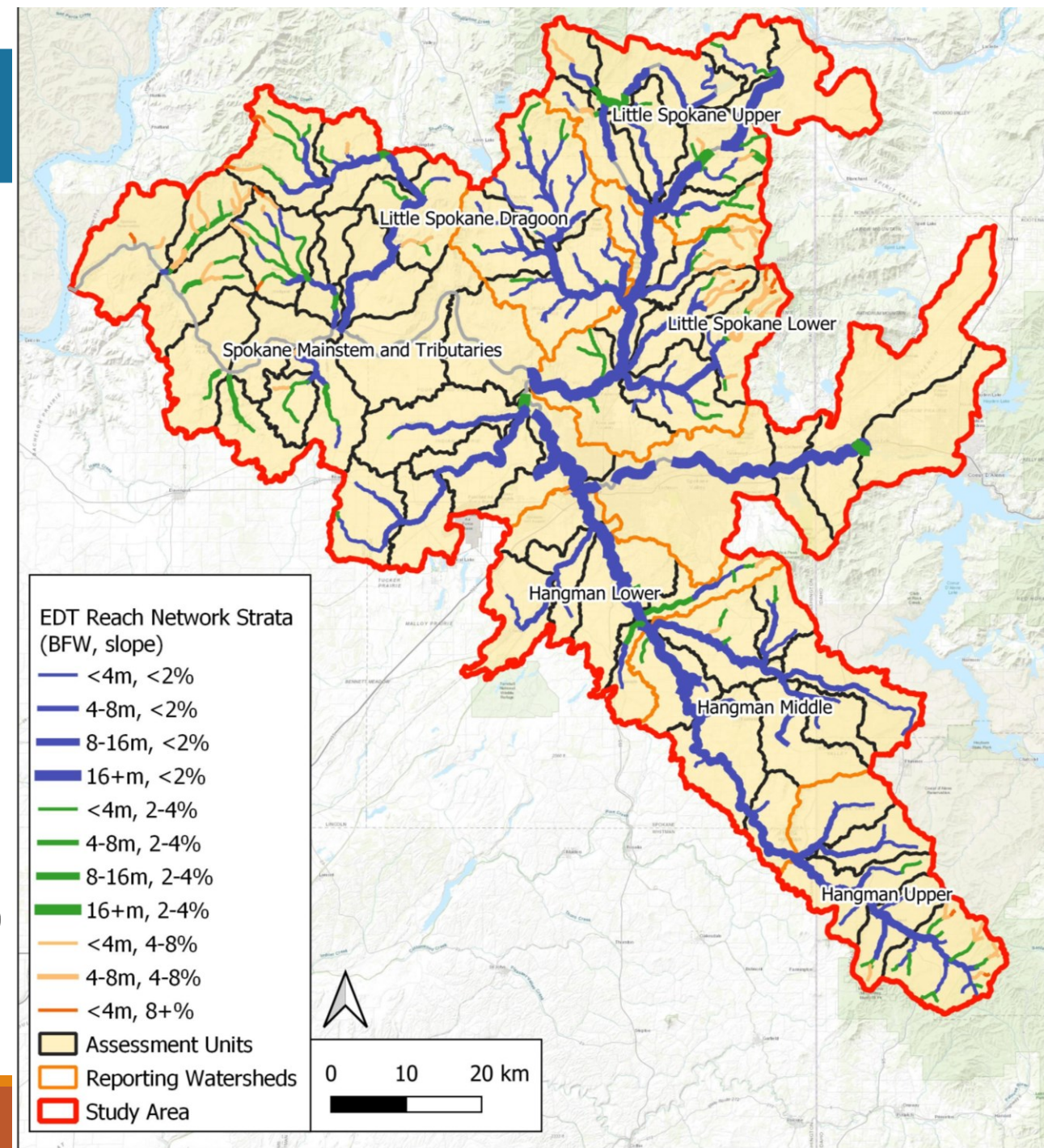
Riverine habitat

- 563 riverine reaches in the reach network, representing a total of 1,442 km
  - Subsampling necessary
- Stratified sample:

  - **EDT Assessment Unit (AU)**: equivalent to HUC12 watershed

  - **Stream gradient**: Bins of <2%, 2-4%, 4-8% and >8% (Beechie & Imaki 2014)

  - **Bankfull width:** Bins of <4m, 4-8m, 8-16m and >16m (Beechie & Imaki 2014)

- Extrapolate to similar reaches within the same stratum
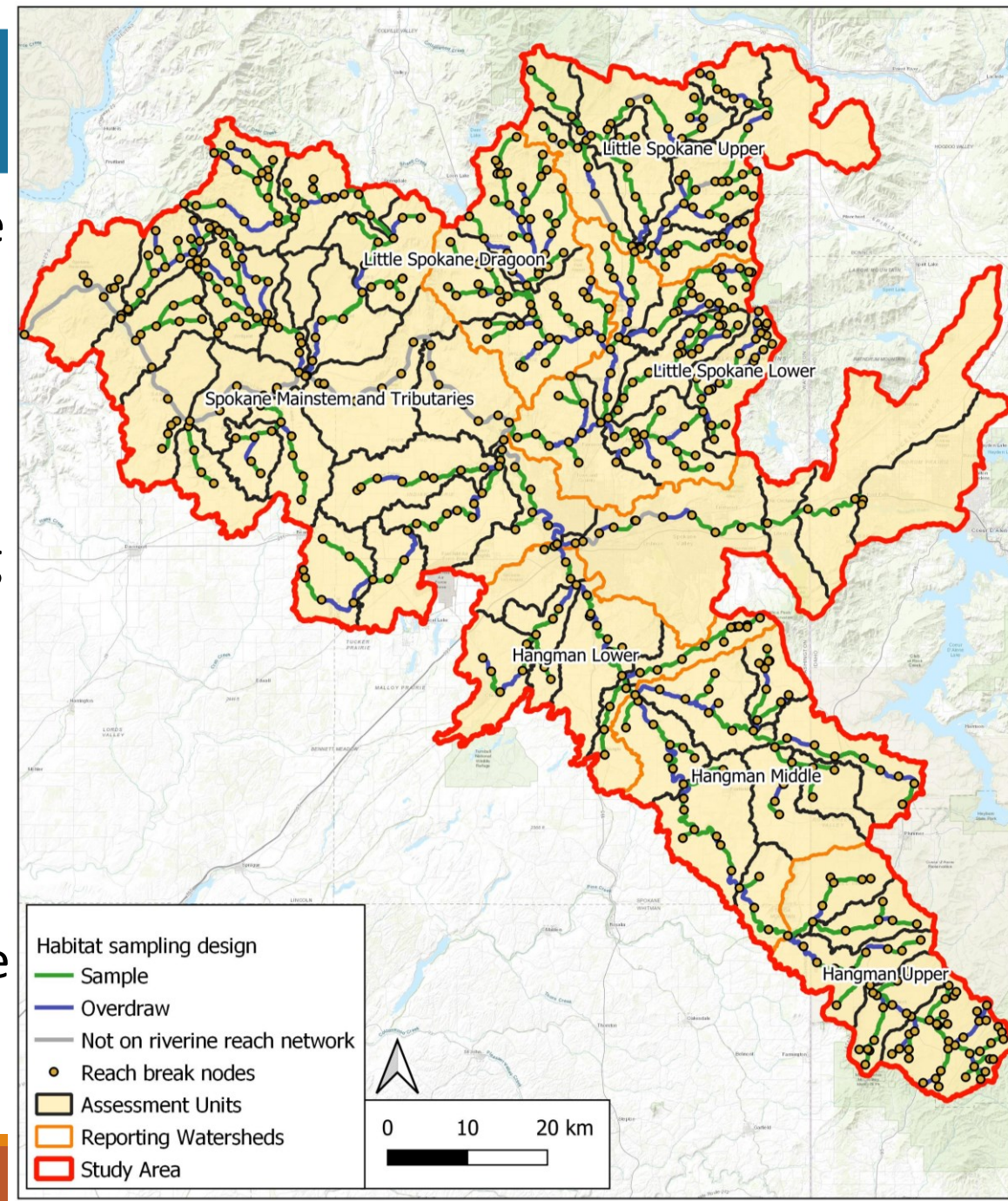
Riverine stratification

Sample fraction

- Sample draw targets 50% of reaches within each stratum, with 50% of the stream length to be surveyed for each selected reach.
  - total of 25% of the stream length per stratum within each AU
- Reaches were ranked for sampling by Need Score (measure of data gap severity)
  - Higher need score (more data gaps) were prioritized for selection

EDT Reach Network Strata
(BFW, slope)
— <4m, <2%
— 4-8m, <2%
— 8-16m, <2%
— 16+m, <2%
— <4m, 2-4%
— 4-8m, 2-4%
— 8-16m, 2-4%
— 16+m, 2-4%
— <4m, 4-8%
— 4-8m, 4-8%
— <4m, 8+%
▢ Assessment Units
▢ Reporting Watersheds
▢ Study Area

0   10   20 km

Reach selection

- Reaches were ranked for sampling by Need Score
  - Need score = data gap severity, accounts for model sensitivity to attributes with missing data
  - Reaches with higher need score sum were prioritized for selection (not random) – trying to maximize data gain per site visit, others retained as overdraws
  - Random rank assigned to break need score ties
- Access issues: replace lost survey length or whole reaches as needed with overdraws from the same assessment unit and strata to maintain 25% sample fraction by length

Habitat sampling design
— Sample
— Overdraw
— Not on riverine reach network
• Reach break nodes
▢ Assessment Units
▢ Reporting Watersheds
▢ Study Area

0   10   20 km

Reach selection

- 382 reaches were selected to be surveyed (322 reaches excluding Idaho)
    - Represents 33.9% of the riverine stream network by length (487 km)
- Assuming two years of survey effort (July-Sep) and three crews, this represents approximately 64 surveys per crew/year (54 when excluding Idaho reaches). Crews will likely accomplish 1 to 2 surveys per field day depending on travel time, safety, and access.

Slope	<2%				2-4%				4-8%		>8%	
BFW	16+m	8-16m	4-8m	<4m	16+m	8-16m	4-8m	<4m	4-8m	<4m	<4m	Total
Total Stream Length (km)	182	229	297	299	5	9	55	208	13	127	16	1,441
Total # Reaches	56	74	103	117	3	4	27	92	6	65	16	563
Stream length to survey (km)	54	70	103	100	3	4	23	75	5	43	7	**487**
Reaches to survey	35	43	69	78	3	3	22	66	5	44	14	**382**

How to know what reach to try to sample?

- Table 3 in the report (note, currently being revised) lists selected and overdraw reaches and corresponding existing access locations, will also be provided as an excel file and spatial layers
- Example with AU Hangman-California: work down in order by strata, use overdraw as needed

Reach Name	Strata	Assessment Unit	Strata (BFW, slope)	Reach length (m)	Length to survey (m)	Need Score Rank	Selected	CFS_ID
California 4a	Hangman - California, <4m <2%	Hangman - California	<4m <2%	633	316.5	133.15	Sample	
California 3	Hangman - California, <4m <2%	Hangman - California	<4m <2%	4275	2137.5	84.07	Sample	
California 4c	Hangman - California, <4m 2-4%	Hangman - California	<4m 2-4%	1137	568.5	270.39	Sample	
California Trib 1	Hangman - California, <4m 2-4%	Hangman - California	<4m 2-4%	1187	593.5	269.24	Sample	
California 4b	Hangman - California, <4m 2-4%	Hangman - California	<4m 2-4%	506	253	132.04	Overdraw	
California Trib 2	Hangman - California, <4m 4-8%	Hangman - California	<4m 4-8%	233	116.5	269.03	Sample	
California 5	Hangman - California, <4m 4-8%	Hangman - California	<4m 4-8%	1908	954	257.05	Sample	
California 2b	Hangman - California, 4-8m <2%	Hangman - California	4-8m <2%	3702	1851	90.69	Sample	
California 2a	Hangman - California, 4-8m 2-4%	Hangman - California	4-8m 2-4%	3702	1851	95.95	Sample	
California 1b	Hangman - California, 4-8m 2-4%	Hangman - California	4-8m 2-4%	2554	1277	90.79	Sample	
California 1a	Hangman - California, 4-8m 2-4%	Hangman - California	4-8m 2-4%	2554	1277	82.21	Overdraw	113, 127

Where to sample within a selected reach?

Reach Name	Strata	Assessment Unit	Strata (BFW, slope)	Reach length (m)	Length to survey (m)	Need Score Rank	Selected	CFS_ID
California 2a	Hangman - California, 4-8m 2-4%	Hangman - California	4-8m 2-4%	3702	1851	95.95	Sample	
California 1b	Hangman - California, 4-8m 2-4%	Hangman - California	4-8m 2-4%	2554	1277	90.79	Sample	
California 1a	Hangman - California, 4-8m 2-4%	Hangman - California	4-8m 2-4%	2554	1277	82.21	Overdraw	113, 127

- It's going to depend on where you can get access.
- Potential process using the spatial data that we'll provide:
  - Locate the AU and reach you want to sample
  - Turn on parcel layer, select largest contiguous parcels within your reach.
  - View attribute table to see the parcel data, which includes a link to the county accessor page for the parcel
  - Look at available "CFS_ID" locations to see if they'd be helpful, get contact info from Caleb with master list
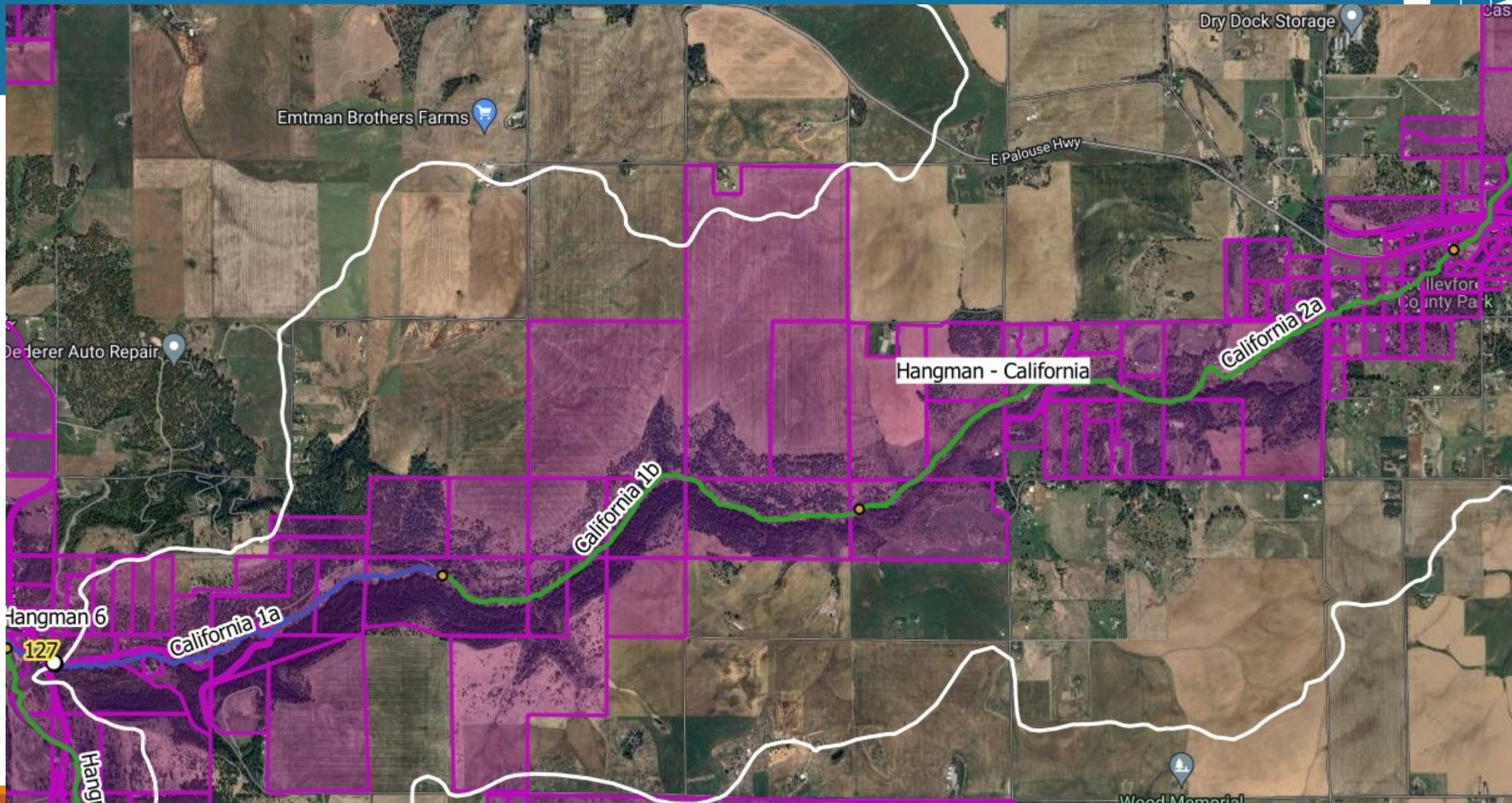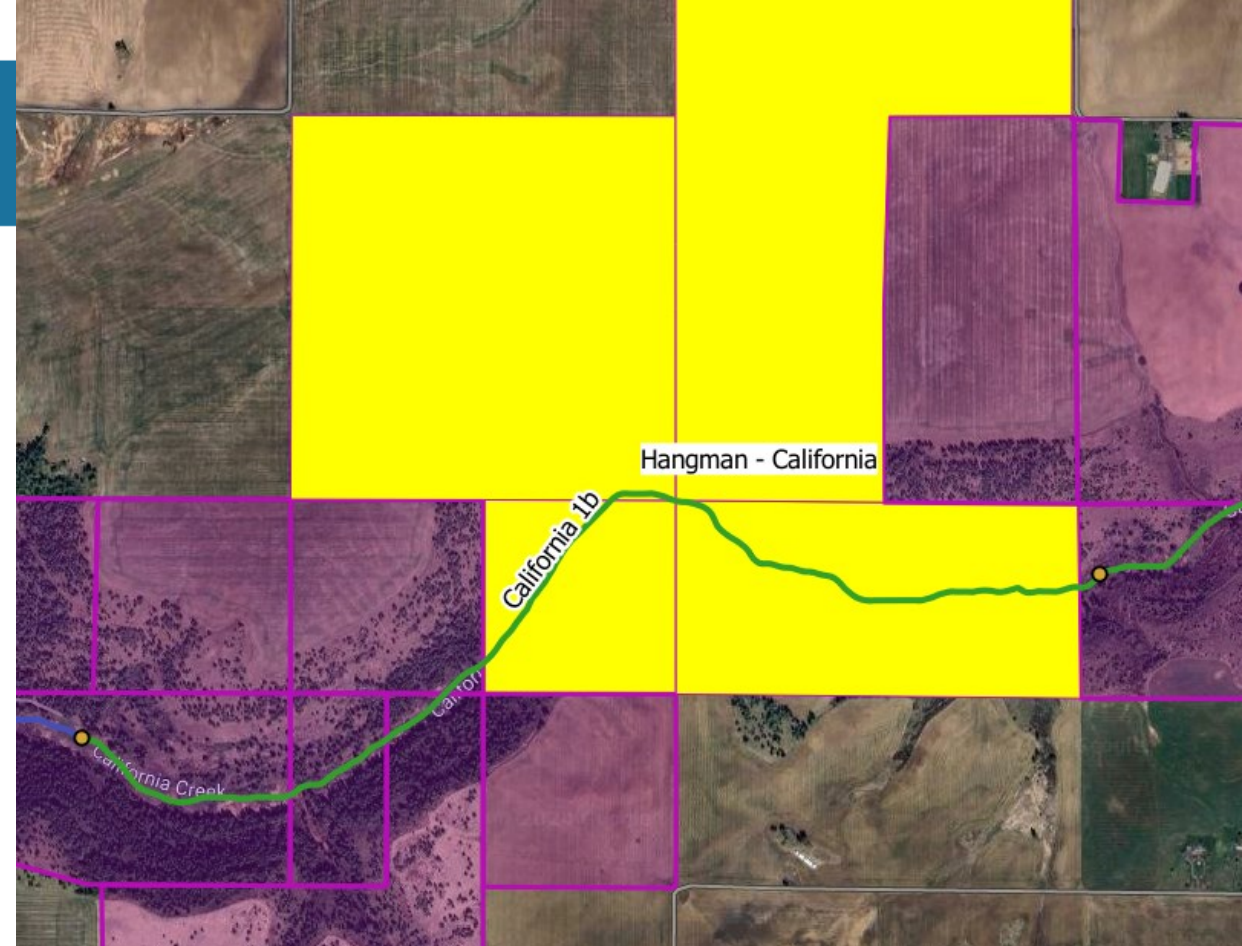
Example with California 1b:
- Selected the largest parcels that cover approx. half the reach length
- Look into parcel data
- Search for contact info

Parcels within 200m buffer of reach network — Features Total: 17040, Filtered: 17040, Selected: 4

_PARCE	SITUS_ADDR	SUB_ADDRES	SITUS_CITY	SITUS_ZIP_	LANDUSE_CD	VALUE_LAND	VALUE_BLDG	DATA_LINK
001	UNASSIGNED ADDRESS	NULL	VALLEYFORD	99036	83	80200	0	https://cp.spokanecounty.org/SCOUT/propert...
009	UNASSIGNED ADDRESS	NULL	VALLEYFORD	99036	11	320000	0	https://cp.spokanecounty.org/SCOUT/propert...
002	UNASSIGNED ADDRESS	NULL	VALLEYFORD	99036	88	0	0	https://cp.spokanecounty.org/SCOUT/propert...
021	UNASSIGNED ADDRESS	NULL	VALLEYFORD	99036	83	778510	0	https://cp.spokanecounty.org/SCOUT/propert...

Temperature logger study design

- Targeted locations: downstream site on each major stream, 3 loggers at each major confluence (upstream, downstream and on trib), additional loggers on mainstems to ensure spatial coverage, loggers on downstream end of a subset of small tributaries in each assessment unit.
- Placement: when possible, at road crossings and previously used access points

eDNA study design

- Evaluating spacing of samples and numbers of replicates to get a reasonable probability of detection for this study's needs

Remote sensing analysis needs

EDT Attribute	Data needed	Survey need	Where remote sensing is needed	Ground truth requirement	When to complete
Channel length	Length of the reach along the thalweg	Habitat survey or remote sensing	All reaches, tune with habitat survey data	none	Anytime
Channel wetted width	Average baseflow wetted width measurements and bankfull width (BFW) (measured or modeled)	Habitat survey or remote sensing	All reaches without existing or planned habitat survey data	Select reaches tbd	Anytime
Gradient	Reach-scale gradient	Remote sensing	All reaches	none	Anytime
Confinement - natural	Reach-scale valley width to BFW ratio	Remote sensing	All reaches	none	Anytime
Confinement - artificial	% of reach length with hydromodifications (each bank)	Habitat survey or remote sensing	All reaches without existing or planned habitat survey data	none	After some habitat data has been collected and reach field visit list is finalized (access secured).
Peripheral/transitional habitat - Seasonally inundated floodplain	Proportional value relative to the bankfull wetted area of the main channel of the parent reach.	Remote sensing	Subsample - same reaches as were selected for habitat surveys	yes	Prior to habitat surveys but after reach list is finalized (access secured)
Peripheral/transitional habitat - Floodplain ponds	Proportional value relative to the bankfull wetted area of the main channel of the parent reach.	Remote sensing	Subsample - same reaches as were selected for habitat surveys	yes	Prior to habitat surveys but after reach list is finalized (access secured)
Peripheral/transitional habitat - Groundwater channels	Proportional value relative to the bankfull wetted area of the main channel of the parent reach.	Remote sensing	Subsample - fraction tbd	yes	Prior to habitat surveys but after reach list is finalized (access secured)
Riparian/stream interface	Percent of stream interface composed of intact native vegetation providing cover and complexity.	Remote sensing	All reaches	yes	Anytime
Woody Debris	Wood >0.1 m diameter and >2 m length (# per unit of channel length), numbers of large pieces (> 50 cm diameter at its midpoint, and counts of LWD jams	Habitat survey of wood, model, or remote sensing	All reservoir reaches with no existing data, riverine reaches tbd	none	Reservoir: anytime, riverine: after some habitat data is collected and only if model performs poorly

Questions & Feedback

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