Northwest **Power** and **Conservation** Council

June 5, 2018

MEMORANDUM

TO: **Fish and Wildlife Committee Members**

FROM: **Stacy Horton, Washington Policy Analyst/Biologist**

SUBJECT: **Lake Roosevelt Fish Harvest Data in Near Real-Time**

BACKGROUND:

Presenter: Dr. Brent Nichols, Manager, Spokane Tribal Fisheries and Mike Hawbecker, Chief Technology Officer, Real Time Research

Summary: Dr. Brent Nichols, Manager, Spokane Tribal Fisheries and Mike Hawbecker, Real Time Research, will be presenting a modernized creel-data approach that utilizes electronic methods for data collection and incorporates near real-time access to catch data.

Relevance: A portion of the mitigation that goes into Lake Roosevelt is to provide hatchery fish for harvest purposes. In a reservoir that is 150 miles long with 660 miles of shoreline like Lake Roosevelt, a tool that delivers anglers with real-time catch and harvest data helps to provide access to Bonneville-funded hatchery fish. This tool allows anglers to make informed decisions about where to catch triploid rainbows, triploid kokanee, sturgeon, and other resident species. Lake Roosevelt co-managers, the Spokane Tribe, Colville Confederated Tribes, and Washington Department of Fish and Wildlife will further use this tool for adaptive management of release strategies, regulation and policy changes, and to help protect wild fish from harvest impacts.

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Background: Prior to 2014, Spokane Tribal Fisheries applied a creel sampling scheme and R analysis program developed by Cheng et al. (2004). The Spokane Tribe conducted a review and update to the Cheng et al. (2004) protocol and developed a new R analysis tool. The updated survey protocol and analysis tool is intended to assist Spokane Tribal Fisheries in monitoring the impacts from annual FCRPS operations on Lake Roosevelt's fisheries.

The objectives of designing a new recreational fishing creel protocol for Lake Roosevelt were to:

- Assess the validity and performance of the Cheng et al. (2004) protocol.
- Design an angler survey that provides estimates of effort, harvest, and catch.
- Provide a thorough documentation of the new protocol, including the motivation for the sampling scheme choice, the sampling methods, the resulting statistical analysis, and references.
- Provide an updated analysis tool in R, including user-friendly help files, for continuity of results through changes in staff.
- Developing a cloud-based database, electronic data collection application, and web-based dashboards for dissemination of near real-time harvest and catch data on Lake Roosevelt.

Field-based creel surveys are generally of two major types: access point surveys or roving surveys. In roving surveys, a creel clerk moves through a fishery, interviewing and periodically counting anglers available for interception along a given route. Roving surveys are used primarily where access to the fishery is diffuse, yet anglers can still be seen and interviewed easily (e.g., streams paralleled by a roadway). Instantaneous counts are usually recommended to estimate effort in roving surveys. Therefore, roving surveys are normally conducted over small spatial scales where the entire body of water can be viewed at once. During an access point survey, anglers are intercepted at public fishing access points and anglers are interviewed in person after they have completed their trips (e.g., in boats returning to the launch). Thus, roadside anglers or anglers that do not use the access points are ignored.

The new protocol refers to two types of access point surveys: bus route surveys and traditional access surveys. In a bus route survey, the surveyor visits all access points (or a subset of all access points) in a sampling day on a single route. The time spent at each access site (a.k.a. 'stops' along the bus route) can be allocated proportional to the sites' relative use. In comparison, a 'traditional' access survey is typically only

conducted at one site for the entire day. Bus route and traditional access surveys can be complementary.

In certain circumstances, one can perform better than the other. For example, when there is low fishing effort and short waiting times, traditional access point surveys provide a better estimate of angler effort than a bus route survey. This is primarily a function of the bus route surveyor's probability of intercepting an angler completing their trip. If either the wait times or fishing effort are increased, then the likelihood of intercepting anglers completing their trips increases and the bus route design is more precise.

Creel survey methods across Lake Roosevelt are identical and lead by the Spokane Tribe, but they are implemented by three different agencies. The creel survey in the northern part of the reservoir (Reach 1) is administered by the Washington Department of Fish and Wildlife. In the middle and eastern sections of the reservoir (Reach 2), the Spokane Tribe of Indians administers the creel survey. Finally, the Confederated Tribes of the Colville Reservations administers the creel survey in the southern and western sections of the reservoir (Reach 3).

The key component to an effective creel survey that is implemented by multiple agencies is ensuring adequate communication and data flow from the angler back to the angler. To accomplish this, Spokane Tribal Fisheries, has implemented an electronic data acquisition and management system that allows information to flow from creel clerks in the field to publicly accessible web-based data summaries in near real-time.

More Info: http://spokanetribalfisheries.com/current-fishing-trends/

Lake Roosevelt Angler Creel Update

REAL TIME RESEARCH

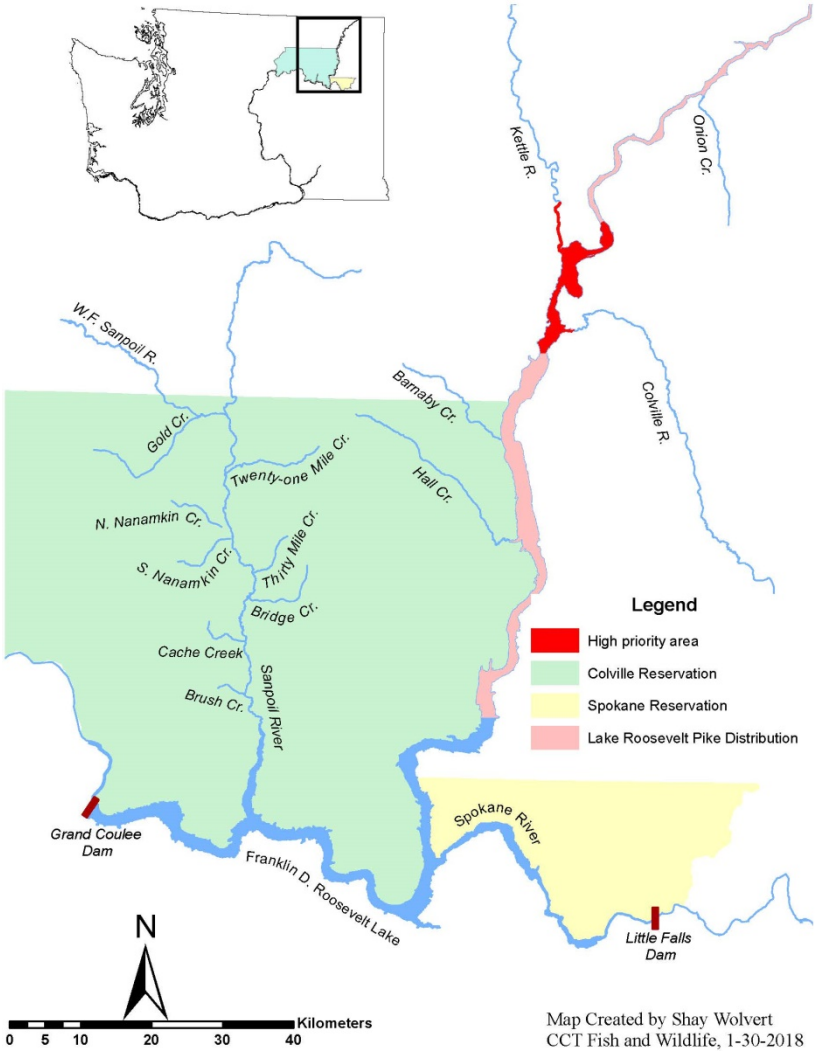
Spokane Tribe of Indians: Brent Nichols, Manager, Spokane Tribal Fisheries
Real Time Research: Mike Hawbecker, Chief Technology Officer

Presented to The Northwest Power Council on June 11th, 2018

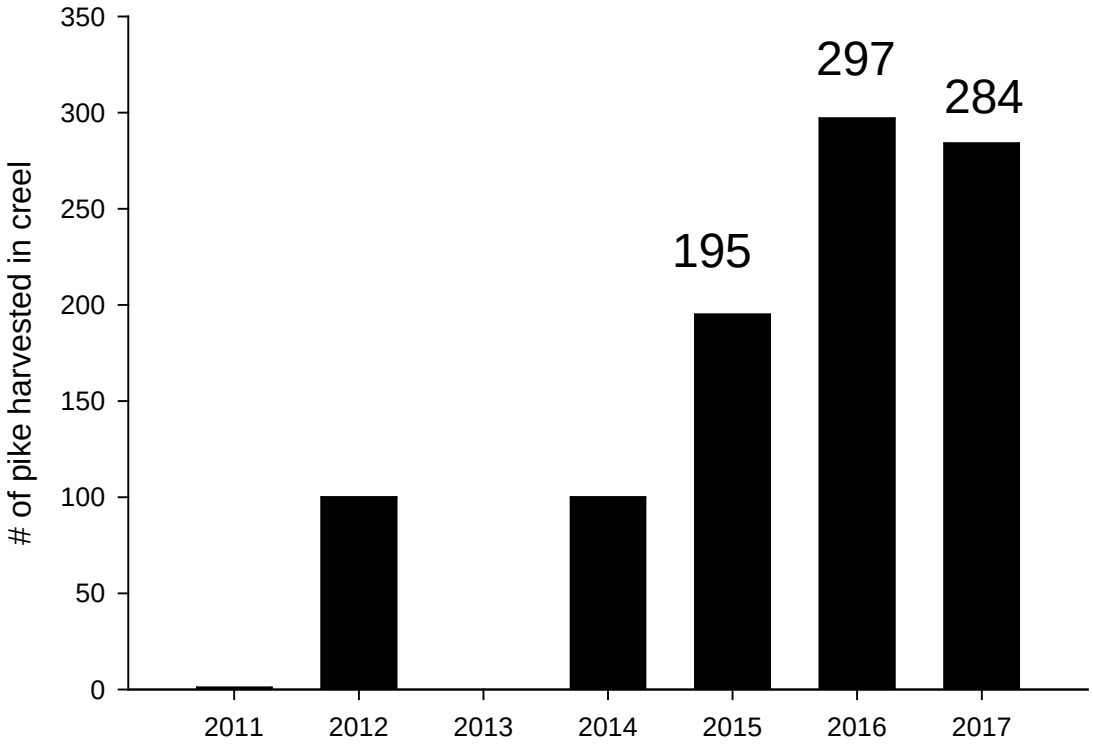
Spokane Tribal Fisheries

Creel History

- Lake Roosevelt
- Managed by the Spokane Tribe
- Implemented by STI, CCT, & WDFW
  - Sections
  - Seasons
  - Sites



Harvest Trends in the Creel



*Data estimates 2011-2014 preliminary

Angler harvest of Northern Pike

Creel Review and update

- 2004 Cheng Protocol reviewed in 2010
- Concluded that: The protocol lacked adequate documentation and that we needed increased creel effort
- Updated the protocol to a probability model.

Draft Creel implemented in 2015

| Lake Roosevelt Angler Creel Survey

2018 Survey Design and Protocol

Spokane Tribal Fisheries

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Fisheries Biologist
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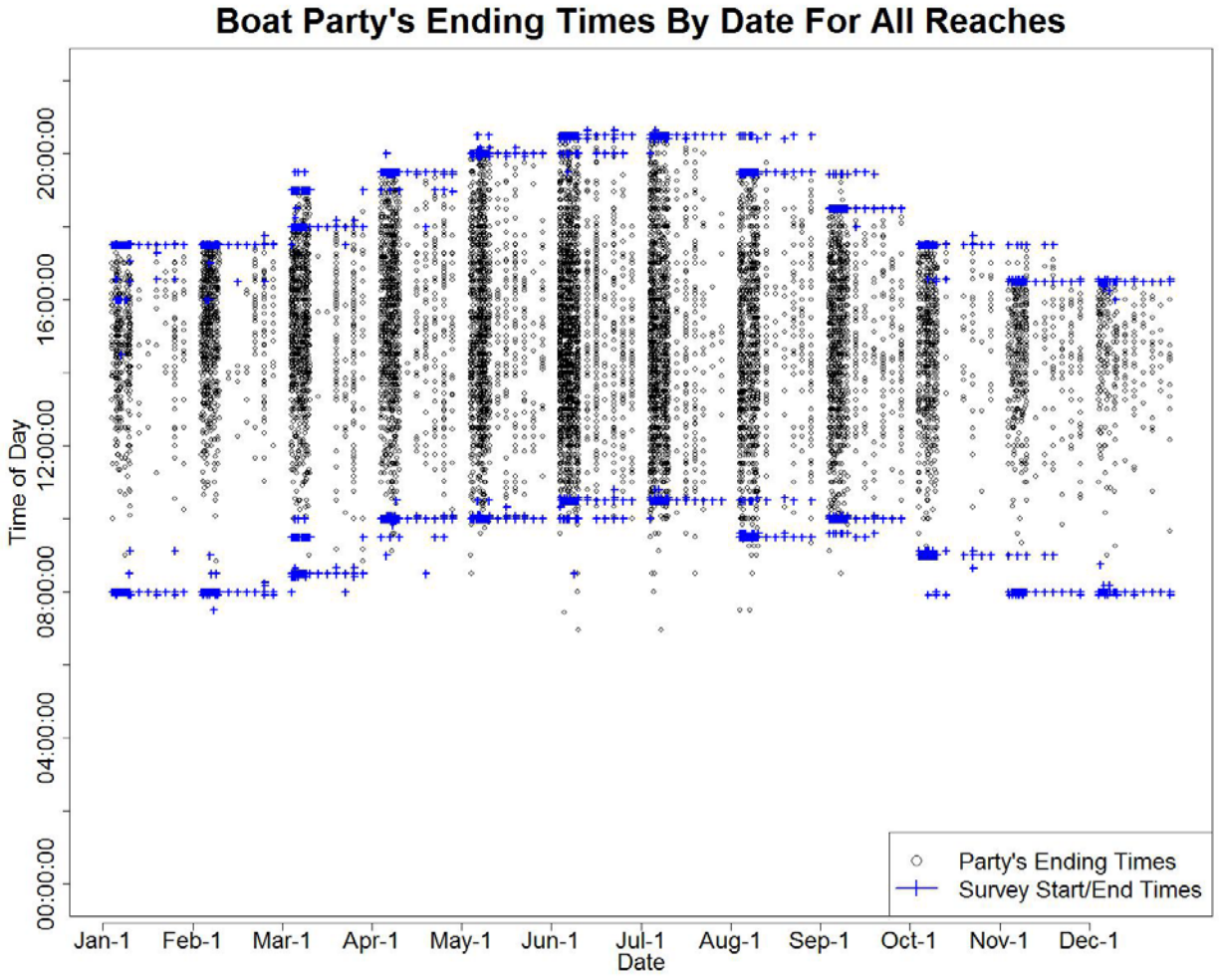
Elliott.Kittel@SpokaneTribe.com

Draft Creel implemented in 2015



Draft Creel implemented in 2015

July 14, 2016

Type Package

Title LRFEP Creel Analysis

Version 2.1.2

Date 2016-07-14

Depends R (>= 2.10), chron, xlsx

Author Fawn Hornsby (WEST, Inc.)

Maintainer Fawn Hornsby <fhornsby@west-inc.com>

Description This package is to be used on LFREP creel analyses with data collected under the protocol described in Hornsby and Kittel (2015).

Reference Hornsby, F. and Kittel, E. 2015. Lake Roosevelt 2016 Survey Survey Design And Protocol. Lake Roosevelt Fisheries Evaluation Program. Wellpinit, WA. Version 2.0.

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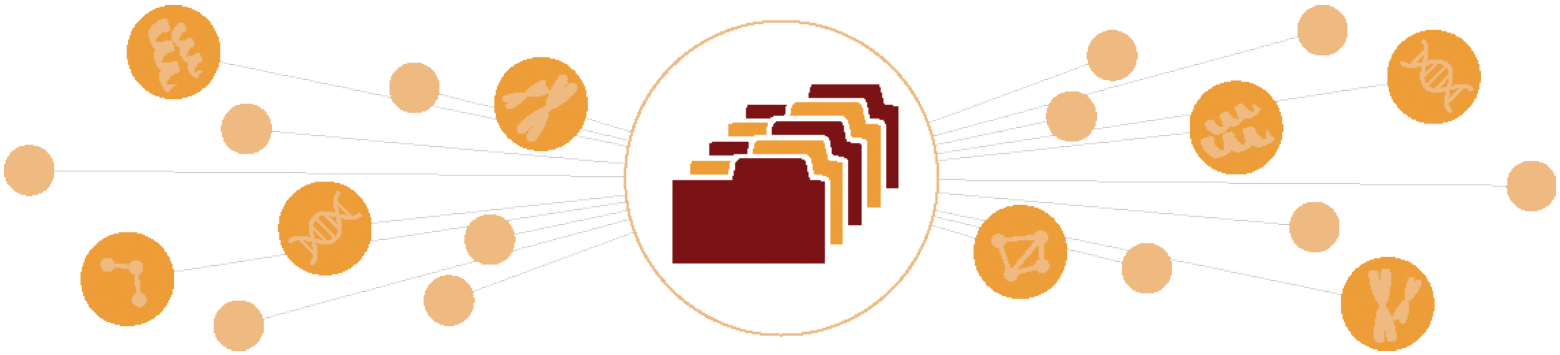
R topics documented:

2016 Update and Revision

- Started building a cloud based data management tool for easier manipulation and dissemination of creel data.
  - Finalized R Code
  - Started Development of SQL Server Database
  - Started Development of Electronic data collection (field-based Tablet PC's)
  - Developed Private web accessible data dashboards
  - Developed Public web accessible data dashboards



LR Angler Creel Survey

Lake Roosevelt Creel Survey Form 3.2

Date: _____ Survey Type: ☐ Access ☐ Bus Route Start Work Day: _____ Start Creel: _____

Loc. No: _____ Session: ☐ AM ☐ PM Finish Work Day: _____ Finish Creel: _____

Loc. Name: _____ Day: Mon Tue Wed Thu Fri Sat Sun Clerk Name: _____ Page ____ of ____

	ANGLER PARTY INFORMATION														ANGLER CATCH INFORMATION								
LOCATION CODE	*START CREEL	*FINISH CREEL	PARTY NO.	TIME CHECKED	NO. ANGLERS	ANGLER TYPE	ANGLER START TIME	ANGLER END TIME	COMPLETE TRIP (Y/N)	ZIP CODE	ANGLER SATISFACTION	TARGET SPP 1	TARGET SPP 2	SPP CAUGHT	NO. HARVEST	NO. RELEASED	TOTAL LENGTH (mm)	WEIGHT (g)	FIN CLIP CODE	ORIGIN	TAG CODE	TAG CODE/ COLOR/ NO.	COMMENT #

Species Key

RBT	Rainbow Trout	CP	Common Carp	LMB	Largemouth Bass	NP	Northern Pike	WCT	W. Cutthroat
KOK	Kokanee	CTT	Cutthroat Trout	LW	Lake Whitefish	SMB	Smallmouth Bass	WS	White Sturgeon
BUR	Burbot	EB	E.Brook Trout	MWF	Mt. Whitefish	TT	Tiger Trout	YP	Yellow Perch
CK	Chinook	BRN	Brown Trout	NPM	N. Pikeminnow	WAL	Walleye	NP	Northern Pike

Target Species:

Any	SMB
RBT	BUR
KOK	YP
WAL	Trout= Any Salmonid

Origin:

U= Unknown
H= Hatchery
W= Wild

Fin Clip Code

AD = Adipose
None = no clip
LV = left ventral
RV = right ventral
LP = left pectoral
RP = right pectoral

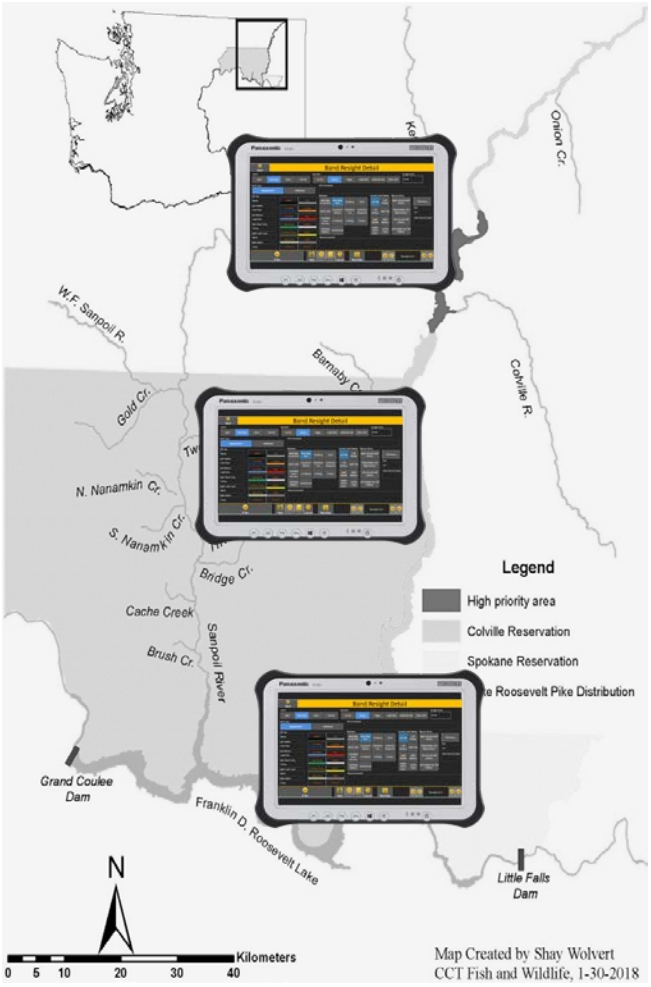
Tag Code:

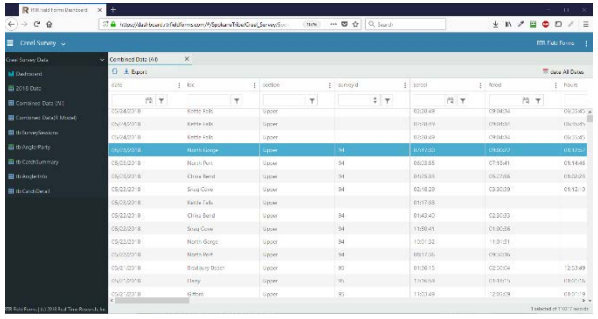
PIT = PIT tag
FLOY= Floy tag
CWT = Coded Wire tag
O = Other

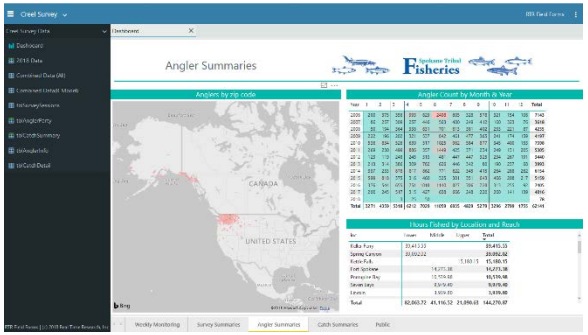
*BUS ROUTE - SURVEY START/FINISH TIME MUST BE RECORED FOR EACH LOCATION CODE

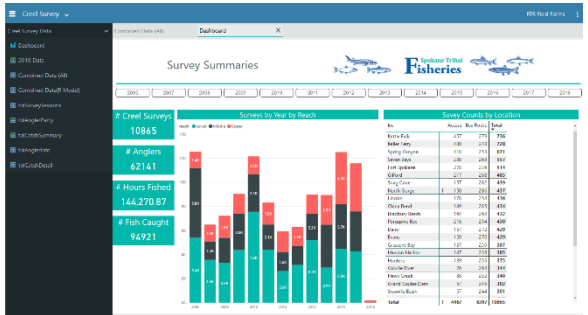
LR Angler Creel Survey

Mobile Data Collection ⇒ Centralized Database ⇒ Real Time Data Analytics









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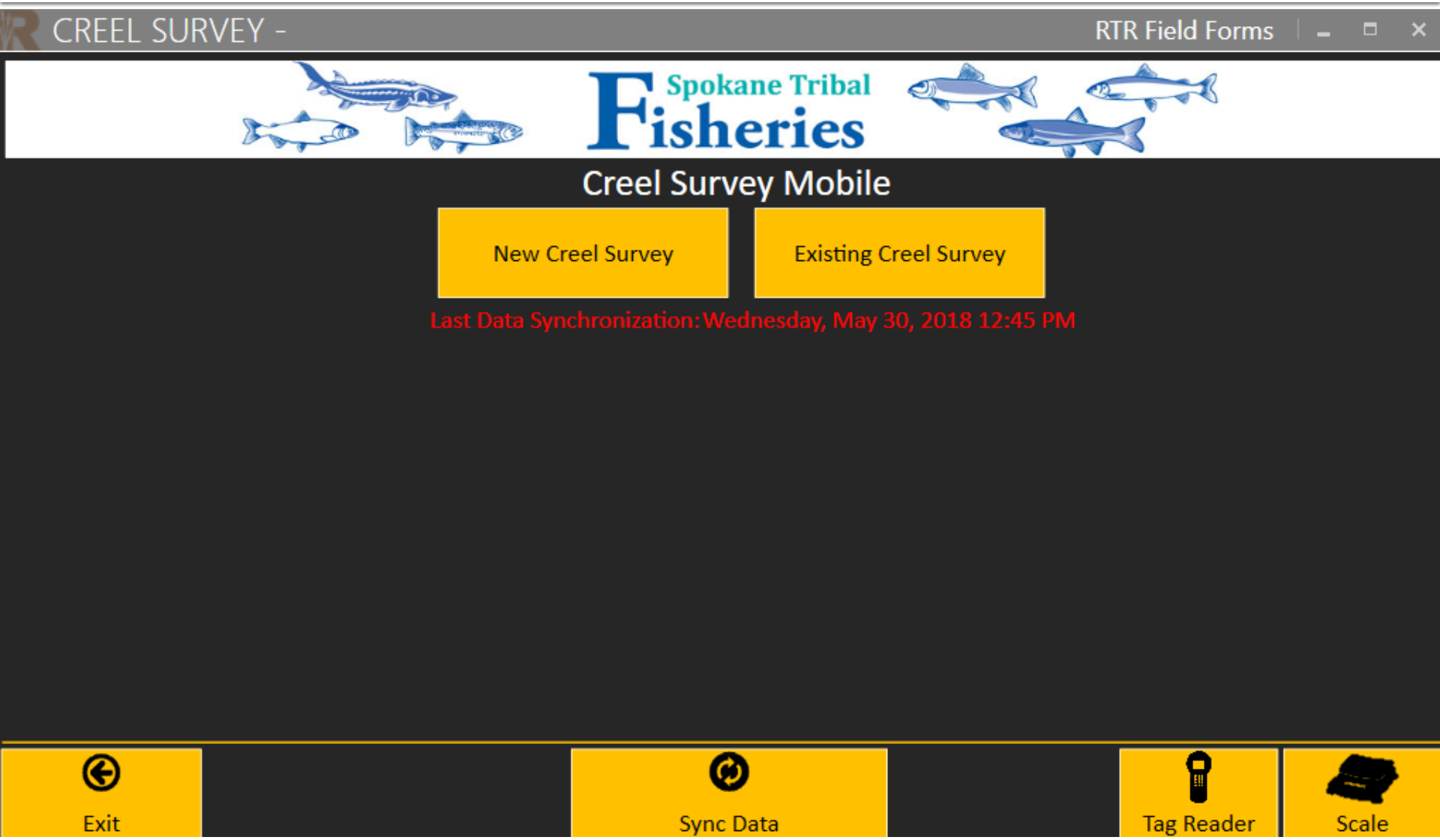

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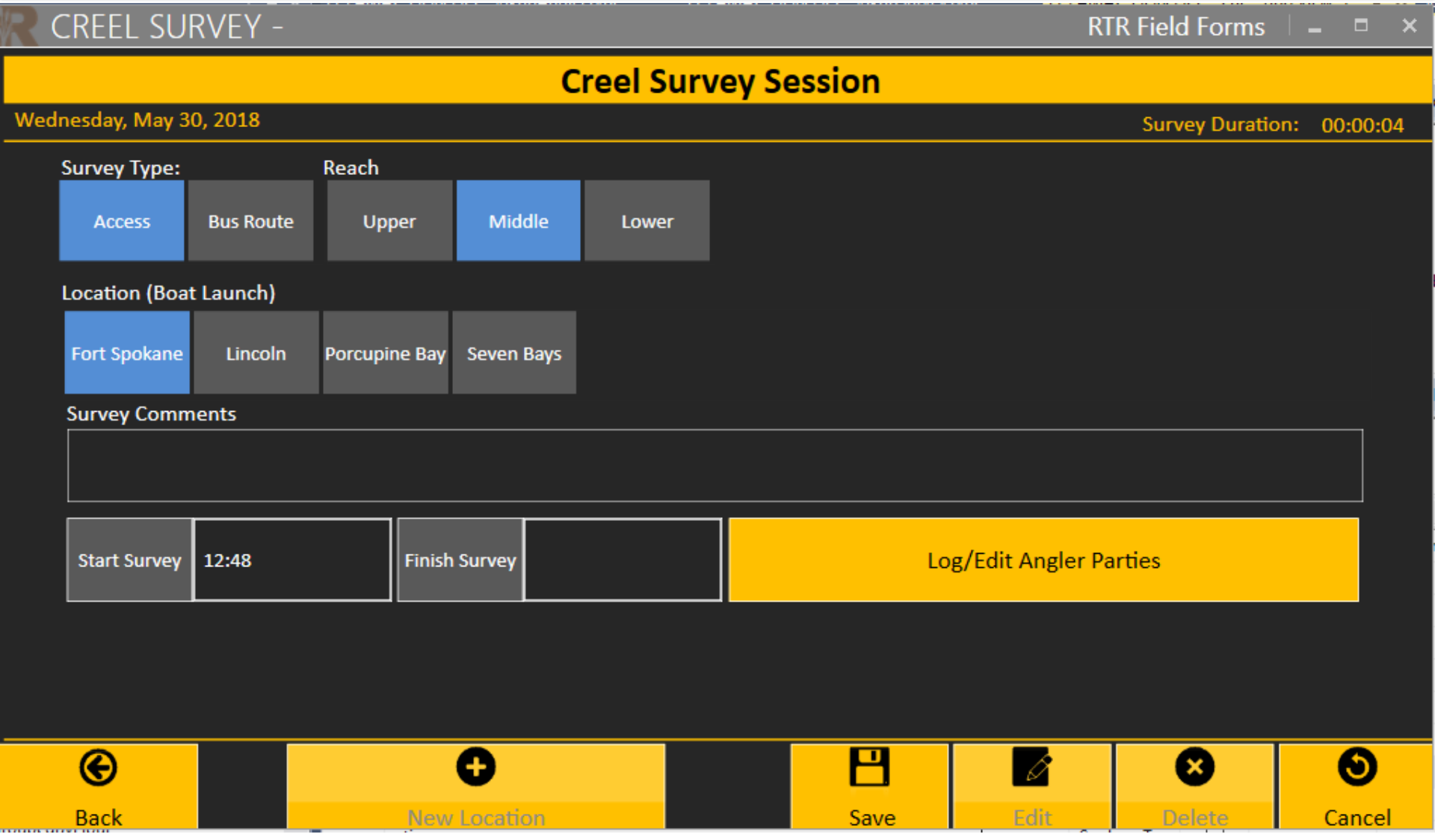

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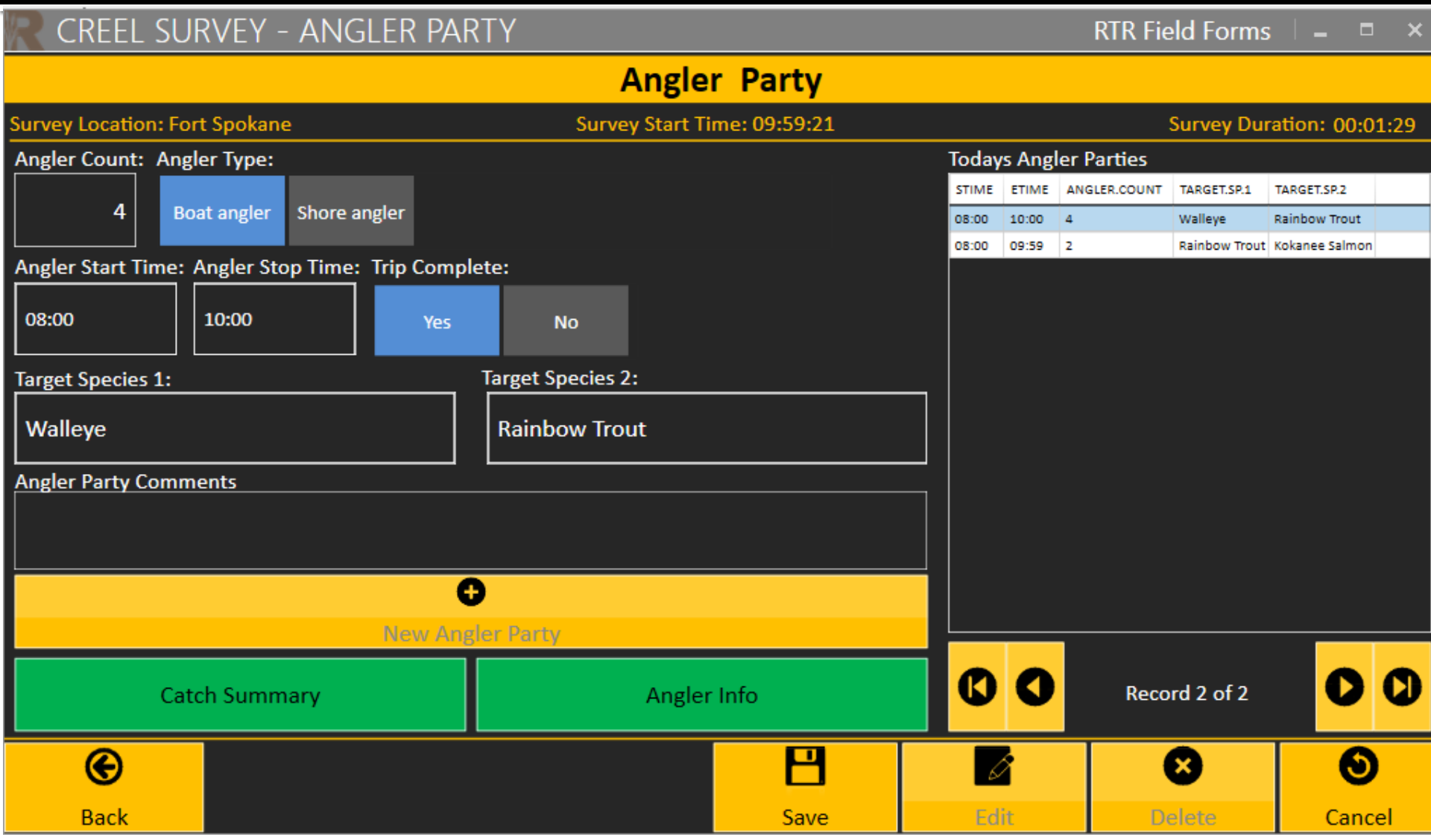

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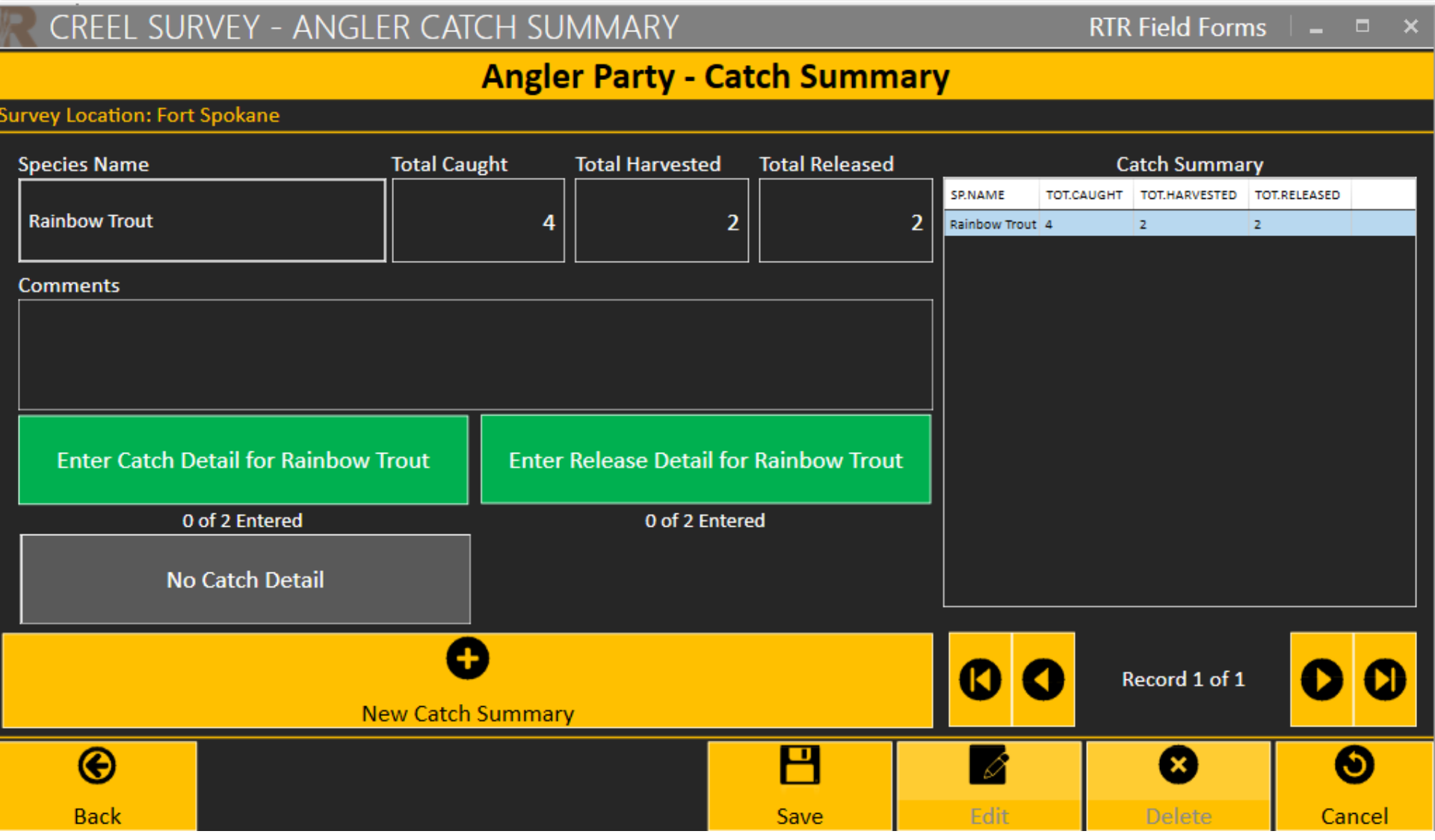

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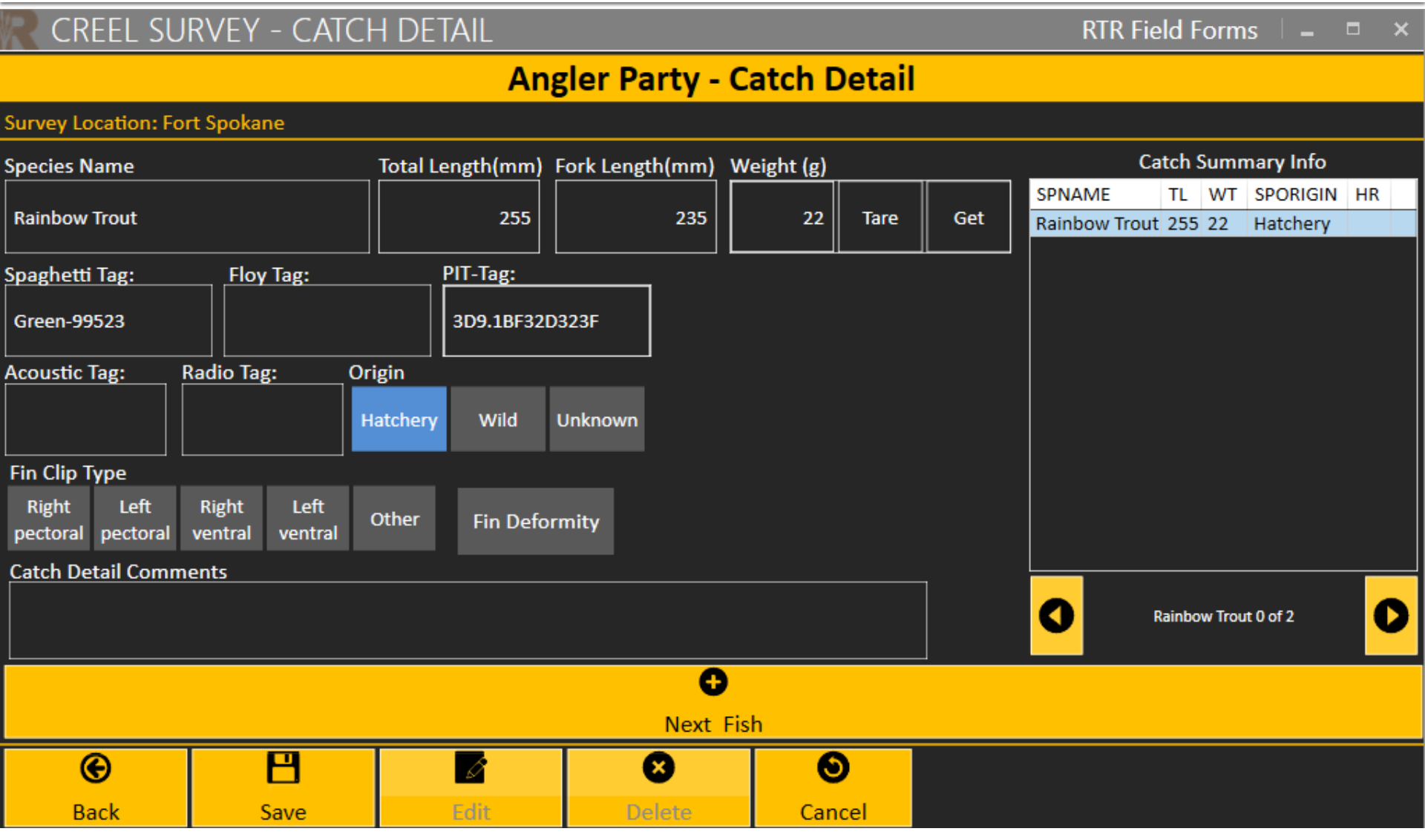

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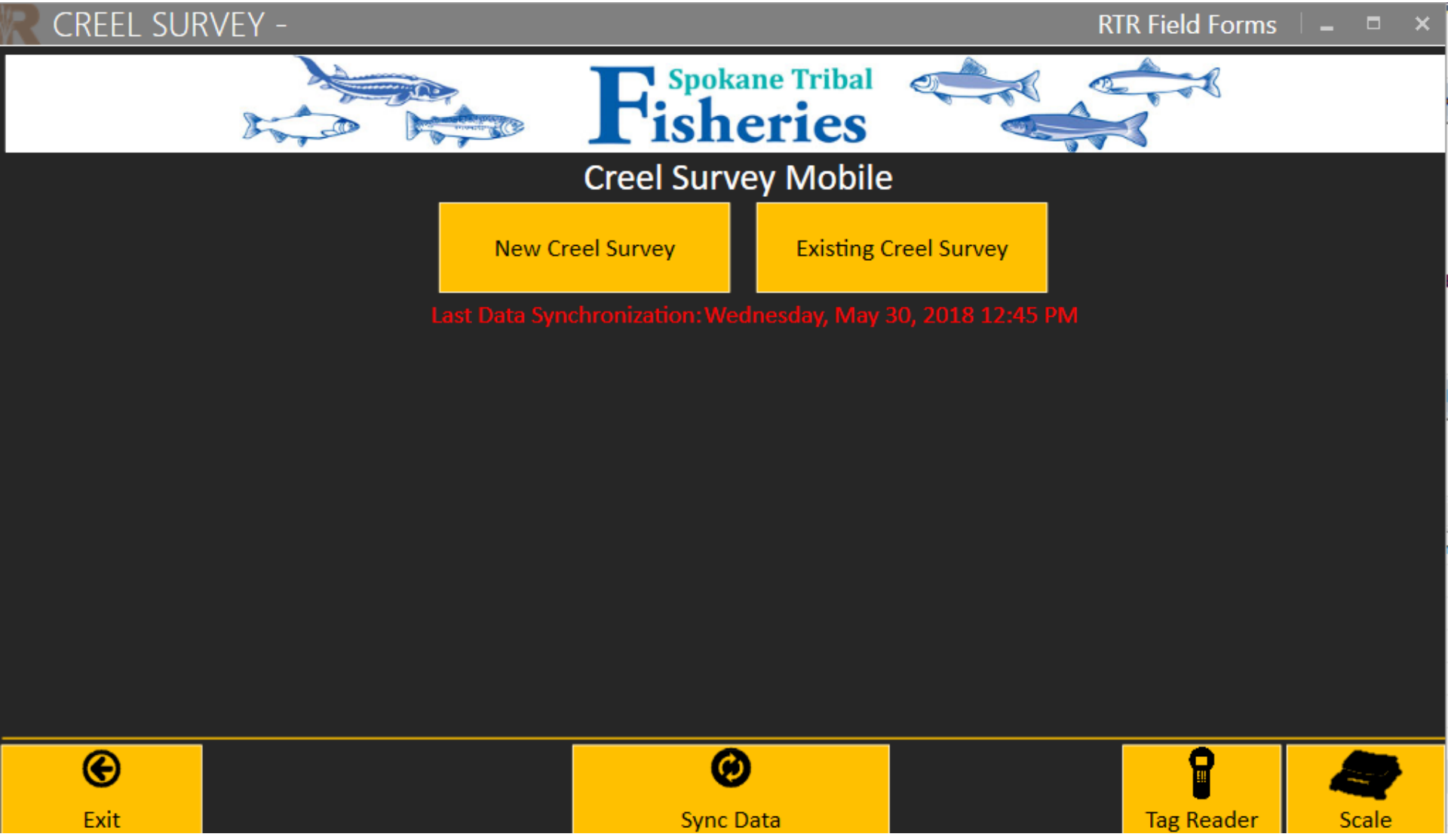
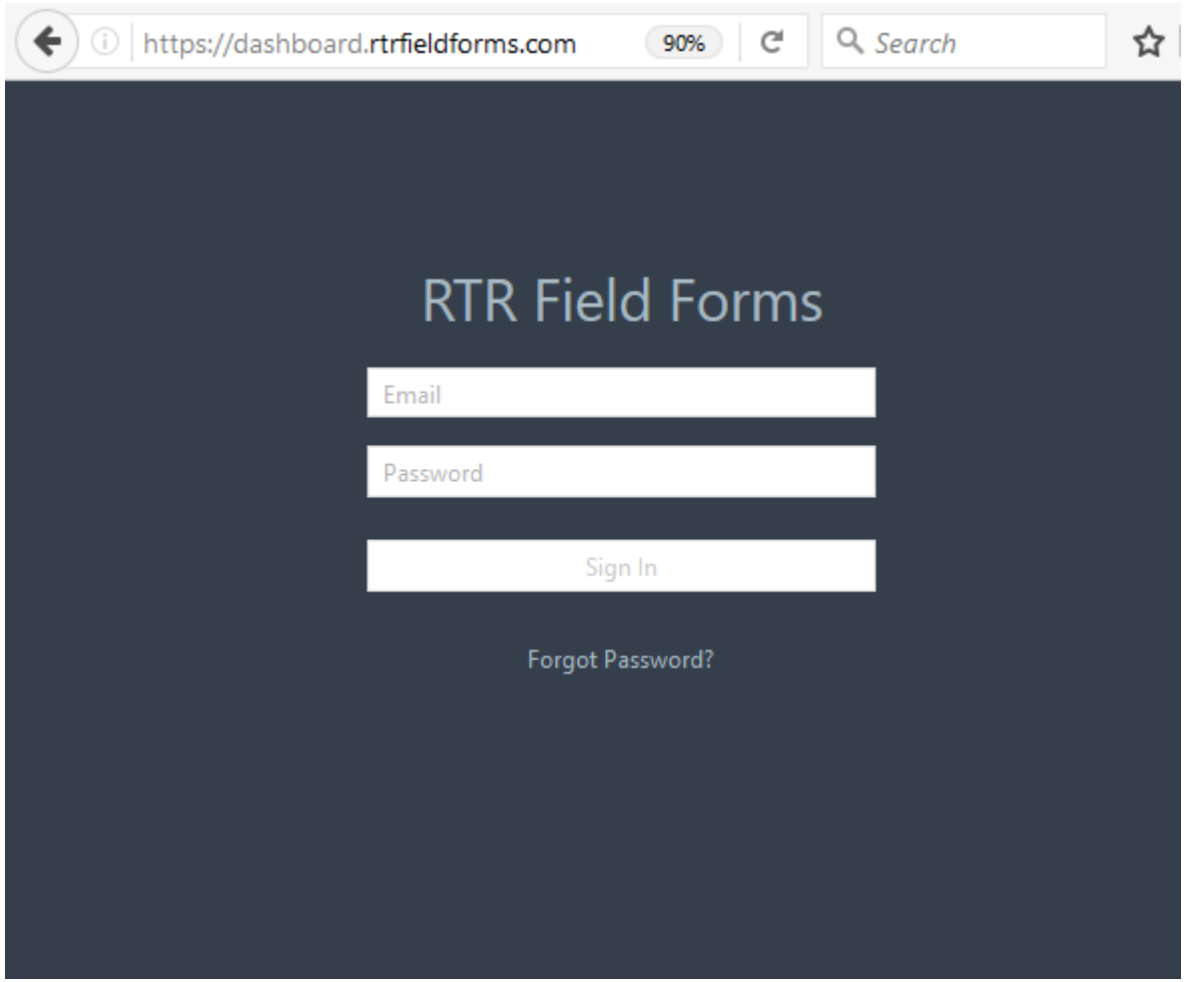


Data Dashboards



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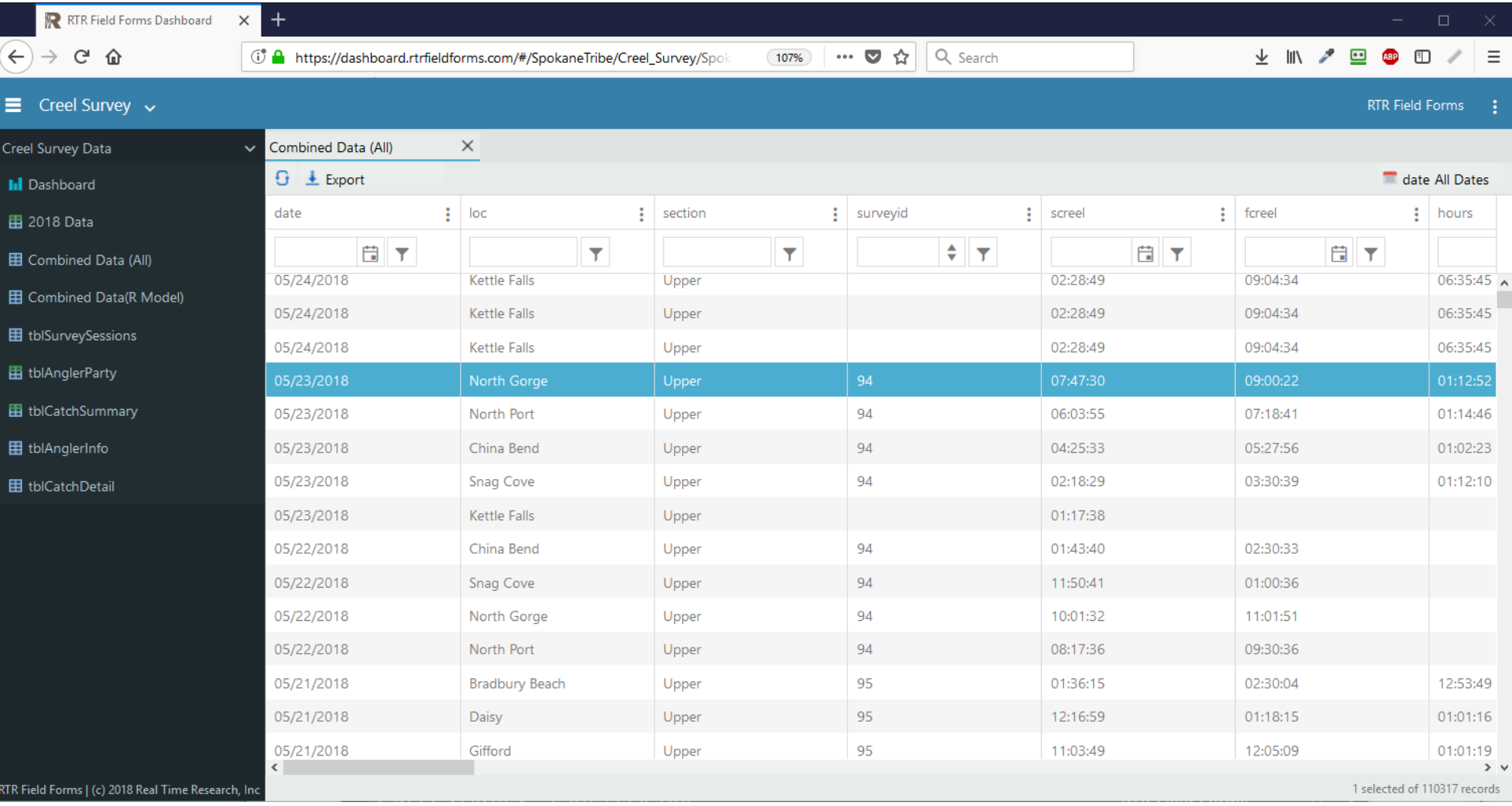

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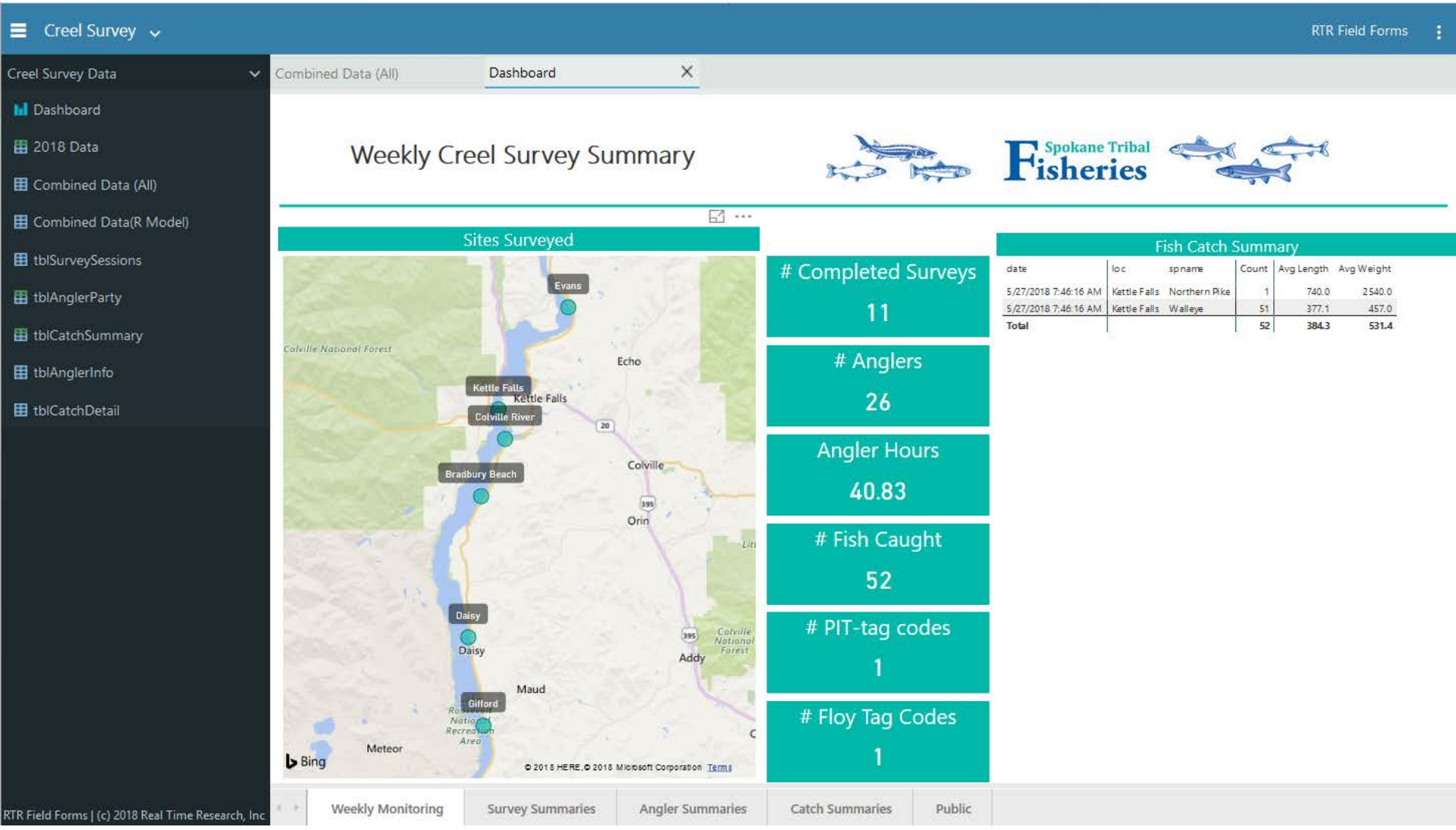

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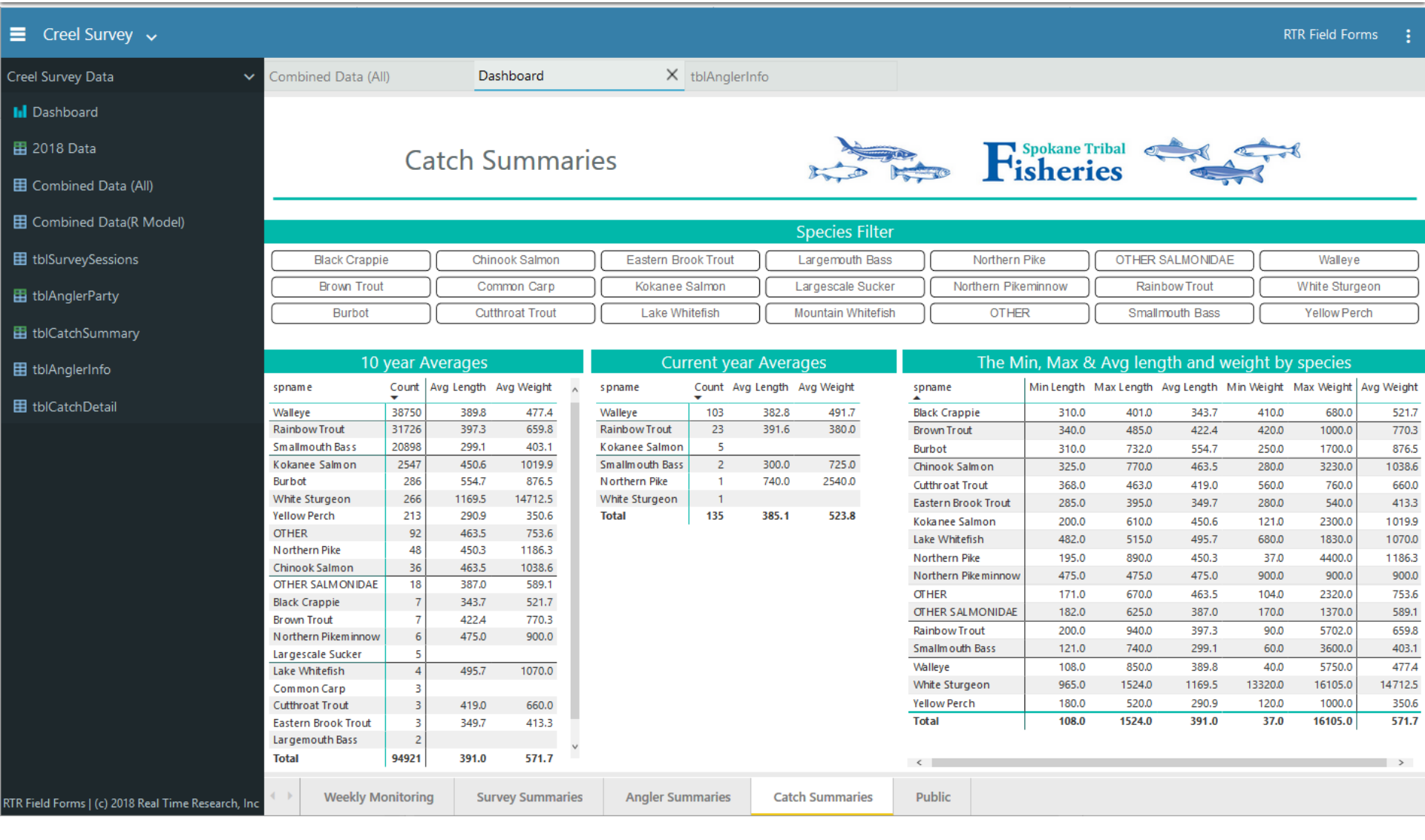


10 year Averages

spname	Count	Avg Length	Avg Weight
Walleye	38750	389.8	477.4
Rainbow Trout	31726	397.3	659.8
Smallmouth Bass	20898	299.1	403.1
Kokanee Salmon	2547	450.6	1019.9
Burbot	286	554.7	876.5
White Sturgeon	266	1169.5	14712.5
Yellow Perch	213	290.9	350.6
OTHER	92	463.5	753.6
Northern Pike	48	450.3	1186.3
Chinook Salmon	36	463.5	1038.6
OTHER SALMONIDAE	18	387.0	589.1
Black Crappie	7	343.7	521.7
Brown Trout	7	422.4	770.3
Northern Pikeminnow	6	475.0	900.0
Largescale Sucker	5		
Lake Whitefish	4	495.7	1070.0
Common Carp	3		
Cutthroat Trout	3	419.0	660.0
Eastern Brook Trout	3	349.7	413.3
Largemouth Bass	2		
Total	**94921**	**391.0**	**571.7**

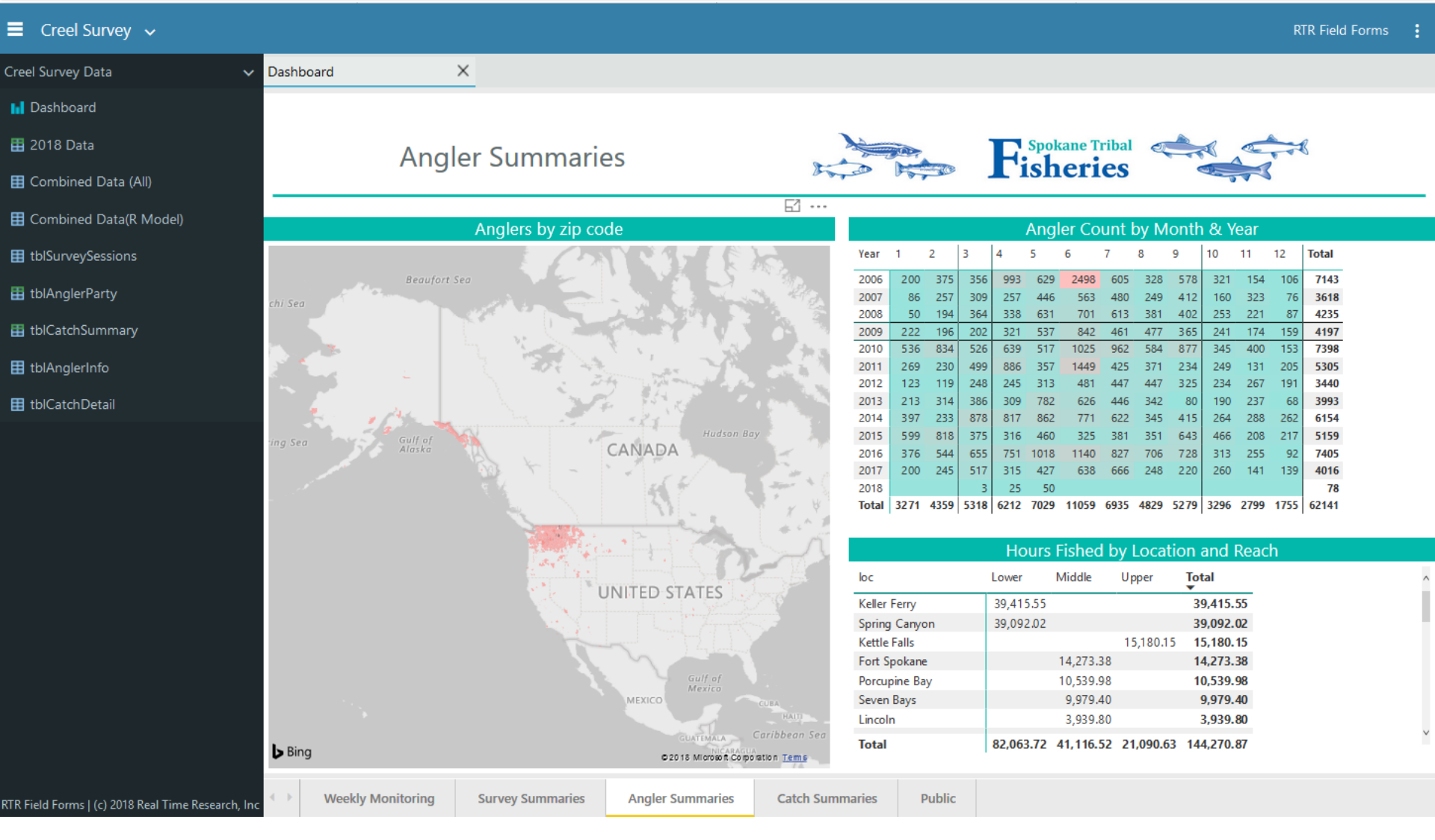
Current year Averages

spname	Count	Avg Length	Avg Weight
Walleye	103	382.8	491.7
Rainbow Trout	23	391.6	380.0
Kokanee Salmon	5		
Smallmouth Bass	2	300.0	725.0
Northern Pike	1	740.0	2540.0
White Sturgeon	1		
Total	**135**	**385.1**	**523.8**

The Min, Max & Avg length and weight by species

spname	Min Length	Max Length	Avg Length	Min Weight	Max Weight	Avg Weight
Black Crappie	310.0	401.0	343.7	410.0	680.0	521.7
Brown Trout	340.0	485.0	422.4	420.0	1000.0	770.3
Burbot	310.0	732.0	554.7	250.0	1700.0	876.5
Chinook Salmon	325.0	770.0	463.5	280.0	3230.0	1038.6
Cutthroat Trout	368.0	463.0	419.0	560.0	760.0	660.0
Eastern Brook Trout	285.0	395.0	349.7	280.0	540.0	413.3
Kokanee Salmon	200.0	610.0	450.6	121.0	2300.0	1019.9
Lake Whitefish	482.0	515.0	495.7	680.0	1830.0	1070.0
Northern Pike	195.0	890.0	450.3	37.0	4400.0	1186.3
Northern Pikeminnow	475.0	475.0	475.0	900.0	900.0	900.0
OTHER	171.0	670.0	463.5	104.0	2320.0	753.6
OTHER SALMONIDAE	182.0	625.0	387.0	170.0	1370.0	589.1
Rainbow Trout	200.0	940.0	397.3	90.0	5702.0	659.8
Smallmouth Bass	121.0	740.0	299.1	60.0	3600.0	403.1
Walleye	108.0	850.0	389.8	40.0	5750.0	477.4
White Sturgeon	965.0	1524.0	1169.5	13320.0	16105.0	14712.5
Yellow Perch	180.0	520.0	290.9	120.0	1000.0	350.6
Total	**108.0**	**1524.0**	**391.0**	**37.0**	**16105.0**	**571.7**

Data Dashboards



Year	1	2	3	4	5	6	7	8	9	10	11	12	Total
2006	200	375	356	993	629	2498	605	328	578	321	154	106	7143
2007	86	257	309	257	446	563	480	249	412	160	323	76	3618
2008	50	194	364	338	631	701	613	381	402	253	221	87	4235
2009	222	196	202	321	537	842	461	477	365	241	174	159	4197
2010	536	834	526	639	517	1025	962	584	877	345	400	153	7398
2011	269	230	499	886	357	1449	425	371	234	249	131	205	5305
2012	123	119	248	245	313	481	447	447	325	234	267	191	3440
2013	213	314	386	309	782	626	446	342	80	190	237	68	3993
2014	397	233	878	817	862	771	622	345	415	264	288	262	6154
2015	599	818	375	316	460	325	381	351	643	466	208	217	5159
2016	376	544	655	751	1018	1140	827	706	728	313	255	92	7405
2017	200	245	517	315	427	638	666	248	220	260	141	139	4016
2018			3	25	50								78
Total	**3271**	**4359**	**5318**	**6212**	**7029**	**11059**	**6935**	**4829**	**5279**	**3296**	**2799**	**1755**	**62141**

loc	Lower	Middle	Upper	Total
Keller Ferry	39,415.55			**39,415.55**
Spring Canyon	39,092.02			**39,092.02**
Kettle Falls			15,180.15	**15,180.15**
Fort Spokane		14,273.38		**14,273.38**
Porcupine Bay		10,539.98		**10,539.98**
Seven Bays		9,979.40		**9,979.40**
Lincoln		3,939.80		**3,939.80**
Total	**82,063.72**	**41,116.52**	**21,090.63**	**144,270.87**

Data Dashboards

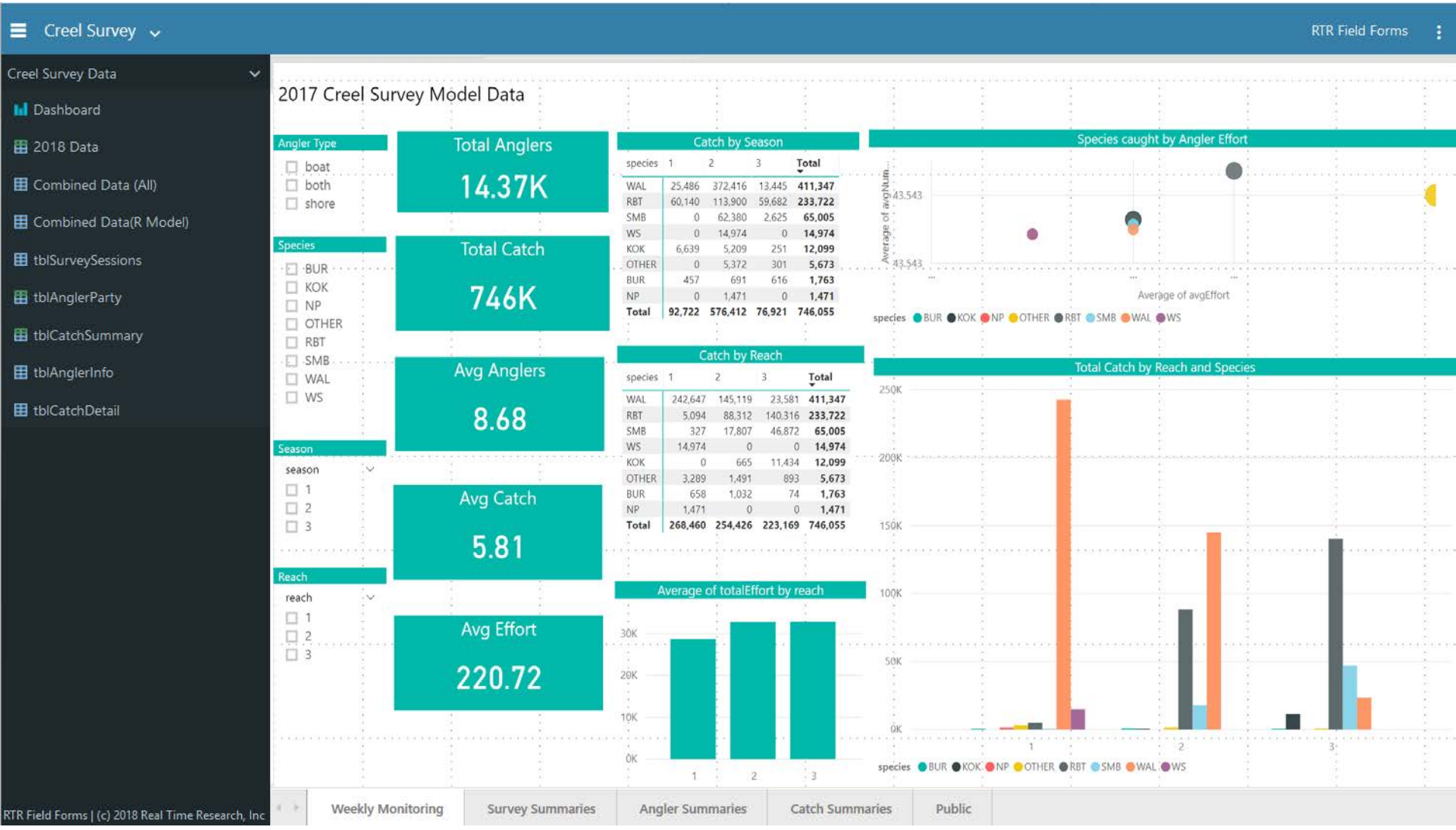
Public Dashboards

Hey Karl, Click HERE!

Future plans

- Incorporate R Script into Database and link to Public Web Dashboards

Future Plans



Future plans

- Incorporate R Script into Database and link to Public Web Dashboards
- Meet quarterly to discuss application needs and updates
- Increase the public image of the Lake Roosevelt Creel
- Provide near real-time data to managers and public.

Questions and Comments

Many thanks to the Northwest Power and Conservation Council, our funding agencies and dedicated staff:

- Spokane Tribe, Real Time Research, CCT, and WDFW staff
- National Park Service and multiple funding agencies

Bonneville
POWER ADMINISTRATION

REAL TIME RESEARCH