

From: Staples, Rose
Sent: Friday, January 20, 2017 3:08 PM
To: 'William Foster - NOAA Federal' <william.foster@noaa.gov>
Subject: RE: Add William Foster to list of NMFS contacts for P-14581 & P-2299

Thank you for the advisory; I have added your email address to the general email groups for both projects (and at the same time removed John Wooster's).

I have also added your name (and removed John's) on the La Grange Project's Temperature Criteria Subcommittee. As you mentioned in your email, the next meeting of this subcommittee, jointly with the Reintroduction Goals Subcommittee, is scheduled for January 26.

The next general meeting is the USR meeting scheduled for February 16, where the topic of discussion will be the La Grange Project Updated Study Report, due to be released prior to the meeting (about February 1st).

Rose Staples, CAP-OM, MOS
D 207-239-3857

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From: William Foster - NOAA Federal [<mailto:william.foster@noaa.gov>]
Sent: Friday, January 20, 2017 12:37 PM
To: Staples, Rose <Rose.Staples@hdrinc.com>
Cc: Jean Castillo - NOAA Federal <jean.castillo@noaa.gov>; Edmondson, Steve <Steve.Edmondson@noaa.gov>; John Wooster - NOAA Federal <john.wooster@noaa.gov>
Subject: Add William Foster to list of NMFS contacts for P-14581 & P-2299

Dear Rose Staples:

I am replacing John Wooster as the NMFS contact for the LaGrange / P-14581 and New Don Pedro / P-2299 Projects.

While John can still be reached via his email, he has moved out of the FERC Branch and over to the CA Coastal Office, Environmental Services Branch, Santa Rosa, CA., (Richard Wantuck, Supervisor).

I am interested in getting a copy of your Process Plan.

I am also interested in a schedule of any upcoming meetings, preferably notice of them several weeks out at least so that I can coordinate my time.

Please include me in any such email notices for both projects.

I will attend the Jan. 26 P-14581 meeting (1-4 in Modesto).

I note you have also scheduled an Updated Study Report (USR) meeting for Feb 16 (times tbd). I will likely attend that as well.

The Feb. meeting appears to be the roll-out of the USR document? (as I have not found one yet).

Thanks

William E. Foster, M.S., Fishery Biologist
NOAA Fisheries, West Coast Region
California Central Valley Area Office
FERC Branch, Sacramento, CA
(916) 930-3617

From: Jean Castillo - NOAA Federal [mailto:jean.castillo@noaa.gov]
Sent: Friday, March 17, 2017 2:11 PM
To: Staples, Rose <Rose.Staples@hdrinc.com>
Subject: Re: Tech Memos

Figured out, thanks.

Jean M. Castillo, MSCE, P.E.
Hydraulic/Fish Passage Engineer

*NOAA Fisheries West Coast Region
U.S. Department of Commerce
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4700*
Office: [916-930-3613](tel:916-930-3613)
jean.castillo@noaa.gov

On Thu, Mar 16, 2017 at 7:58 AM, Staples, Rose <Rose.Staples@hdrinc.com> wrote:
Let me check and get back to you on that.
Rose Staples, CAP-OM, MOS
D [207-239-3857](tel:207-239-3857)



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From: Jean Castillo - NOAA Federal [mailto:jean.castillo@noaa.gov]
Sent: Wednesday, March 15, 2017 6:13 PM
To: Le, Bao <ChiBao.Le@hdrinc.com>; Staples, Rose <Rose.Staples@hdrinc.com>
Subject: Tech Memos

Hello,
Do either the La Grange or Don Pedro projects have a Technical Memo #7?
Thanks,
Jean

Jean M. Castillo, MSCE, P.E.
Hydraulic/Fish Passage Engineer
NOAA Fisheries West Coast Region
U.S. Department of Commerce
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4700
Office: [916-930-3613](tel:916-930-3613)
jean.castillo@noaa.gov

From: Patrick Koepele [mailto:patrick@tuolumne.org]
Sent: Friday, March 31, 2017 2:25 PM
To: Staples, Rose <Rose.Staples@hdrinc.com>
Subject: Re: Don Pedro Relicensing

Hi Rose - the cd's arrived today. Thanks!

Patrick Koepele
Executive Director
patrick@tuolumne.org
[209-588-8636](tel:209-588-8636)



On Fri, Mar 31, 2017 at 9:50 AM, Patrick Koepele <patrick@tuolumne.org> wrote:
Yes that would be great. And if its not too late, 3 copies would be even better.

The address you list is correct.

Thank you!

Patrick Koepele
Executive Director
patrick@tuolumne.org
[209-588-8636](tel:209-588-8636)



On Fri, Mar 31, 2017 at 6:49 AM, Staples, Rose <Rose.Staples@hdrinc.com> wrote:

We can send you two copies on DVDs; would that work?

Also, to confirm the mailing address:

Patrick Koepele

Tuolumne River Trust

67 Linoberg St

Sonora, CA 95370

Thank you.

Rose Staples, CAP-OM, MOS

D [207-239-3857](tel:207-239-3857)



hdrinc.com/follow-us

From: Patrick Koepele [mailto:patrick@tuolumne.org]

Sent: Tuesday, March 28, 2017 4:48 PM

To: Staples, Rose <Rose.Staples@hdrinc.com>

Subject: Re: Don Pedro Relicensing

Rose - just checking if you have any news on this?

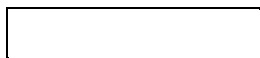
Thanks

Patrick

Patrick Koepele

Executive Director

patrick@tuolumne.org
[209-588-8636](tel:209-588-8636)



On Mon, Mar 20, 2017 at 12:49 PM, Staples, Rose <Rose.Staples@hdrinc.com> wrote:

Thanks for your query. Let me check to see if there is anything newer—and how best to get it to you. Thank you.

Rose Staples, CAP-OM, MOS

D [207-239-3857](tel:207-239-3857)



hdrinc.com/follow-us

From: Patrick Koepele [mailto:patrick@tuolumne.org]
Sent: Monday, March 20, 2017 3:47 PM
To: Staples, Rose <Rose.Staples@hdrinc.com>
Subject: Don Pedro Relicensing

Rose,

I am writing to request a copy of the latest version of the Don Pedro Operation Model from W&AR-02. The last version I have is version 2.00 from a cd dated May 30, 2013.

If it is available for download can you send me the link.

Otherwise, could you please mail 2 cd copies to me at:

Tuolumne River Trust

67 Linoberg St

Sonora, CA 95370

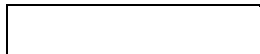
Thank you.

Patrick

Patrick Koepele

Executive Director

patrick@tuolumne.org
[209-588-8636](tel:209-588-8636)



From: Jean Castillo - NOAA Federal [mailto:jean.castillo@noaa.gov]
Sent: Wednesday, April 5, 2017 1:21 PM
To: Garelo, Michael <Mike.Garelo@hdrinc.com>
Cc: Steve Boyd <seboyd@tid.org>; Le, Bao <ChiBao.Le@hdrinc.com>; Staples, Rose <Rose.Staples@hdrinc.com>
Subject: Schematics of Don Pedro Dam

Hello,

When we were on site a conversation came up if we could get some schematics of Don Pedro and the regulating outlet. I remember that someone from the Districts said they would send some.

Is this still a possibility? If yes could you please send them to me?

Thank you,
Jean

Jean M. Castillo, MSCE, P.E.
Hydraulic/Fish Passage Engineer

NOAA Fisheries West Coast Region
U.S. Department of Commerce
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4700
Office: [916-930-3613](tel:916-930-3613)
jean.castillo@noaa.gov

From: Staples, Rose
Sent: Thursday, April 27, 2017 3:02 PM
To: Hildeburn, Chase@Waterboards <Chase.Hildeburn@Waterboards.ca.gov>
Subject: RE: La Grange Notifications

There should be notifications forthcoming within the day or so regarding upcoming meetings on both La Grange and Don Pedro. I will add your email address to the group list, so that you get those and any future announcements. Thank you.

Rose Staples, CAP-OM, MOS
D 207-239-3857



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From: Hildeburn, Chase@Waterboards [<mailto:Chase.Hildeburn@Waterboards.ca.gov>]
Sent: Wednesday, April 26, 2017 7:21 PM
To: Staples, Rose
Subject: La Grange Notifications

Hi Rose,

I've joined the SWRCB recently working under Jeff Wetzel and have been assigned to the La Grange and Don Pedro Hydro projects. I am wondering if you could tell me if there are any upcoming meetings or calls scheduled for the La Grange project? I have looked through the final notes for the last WTI and Reintroduction Goals meetings and didn't see anything there. On that note, would you mind also adding me onto the list so that I'll be notified if there are any other updates in the future please? I'd appreciate it.

Thanks in advance,
Chase Hildeburn

Chase Hildeburn
Water Resource Control Engineer
State Water Resources Control Board
Water Quality Certification Unit
1001 I Street, 14th Floor | P.O. Box 2000
Sacramento, CA 95812
(916) 323-0358

From: Staples, Rose

BCC: Don Pedro Relicensing Participants Email Group

Sent: Thursday, April 27, 2017 3:57 PM

Subject: Hold May 18 Afternoon for Don Pedro Project Models Meeting

Don Pedro Project Relicensing Participants,

On **Thursday, May 18, 2017, from 1:00 pm to 3:00 pm**, the Districts will be hosting a meeting with relicensing participants to present recent minor updates to the Project Operations Water Balance Model ([W&AR-02](#)), the Reservoir Temperature Model ([W&AR-03](#)), the Chinook Salmon Population Model ([W&AR-06](#)), the *O. mykiss* Population Model ([W&AR-10](#)), and the Lower Tuolumne River Temperature Model ([W&AR-16](#)). The meeting will be held at TID's C.C. Wright Hall (formerly the War Memorial Building), located at 247 East Canal Drive in Turlock, CA. As the date approaches, the Districts will circulate meeting materials, including an agenda.

Rose Staples, CAP-OM, MOS

Senior Administrative Assistant



HDR

970 Baxter Boulevard Suite 301

Portland ME 04103

D 207-239-3857

rose.staples@hdrinc.com

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From: [Jean Castillo - NOAA Federal](#)
To: [Garello, Michael](#)
Subject: Don Pedro
Date: Monday, May 1, 2017 3:06:26 PM

Hi Mike,

Do you know where I could find the bathymetric survey data, and the topographic survey data for Don Pedro Dam?

Anchor would like to understand where the head of the pool is at different forebay elevations.

They have forebay elevations by month but don't have the topography/bathymetry of the river channel.

Is this something you can assist me with or would it be better if I contact Bao.

Thanks,

Jean

Jean M. Castillo, MSCE, P.E.
Hydraulic/Fish Passage Engineer

*NOAA Fisheries West Coast Region
U.S. Department of Commerce
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4700
Office: [916-930-3613](tel:916-930-3613)
jean.castillo@noaa.gov*

From: Staples, Rose

BCC: Don Pedro Relicensing Participants Email Group

Sent: Monday, May 15, 2017 5:17 PM

Subject: May 18 2017 Don Pedro Hydroelectric Project Modeling Tool Updates Meeting

Don Pedro Project Relicensing Participants,

On **Thursday, May 18, 2017, from 1:00 pm to 3:00 pm**, the Districts will be hosting a meeting with relicensing participants to present recent minor updates to the Project Operations Water Balance Model ([W&AR-02](#)), the Reservoir Temperature Model ([W&AR-03](#)), the Chinook Salmon Population Model ([W&AR-06](#)), the *O. mykiss* Population Model ([W&AR-10](#)), the Lower Tuolumne River Temperature Model ([W&AR-16](#)), and the Lower Tuolumne River Floodplain Hydraulic Assessment ([W&AR-21](#)). The meeting will be held at TID's C.C. Wright Hall (formerly the War Memorial Building), located at 247 East Canal Drive in Turlock, CA.

Please find attached the meeting agenda and a map of where C.C. Wright Hall is located and directions for parking. **The Districts strongly encourage participants to attend in-person; although a conference line will be available, acoustics in the room may make it difficult to hear the discussion.**

Rose Staples, CAP-OM, MOS

Senior Administrative Assistant



Don Pedro Relicensing Modeling Tool Updates Meeting Agenda

Thursday, May 18, 2017, 1:00 pm to 3:00 pm

C.C. Wright Hall (formerly the War Memorial Building)

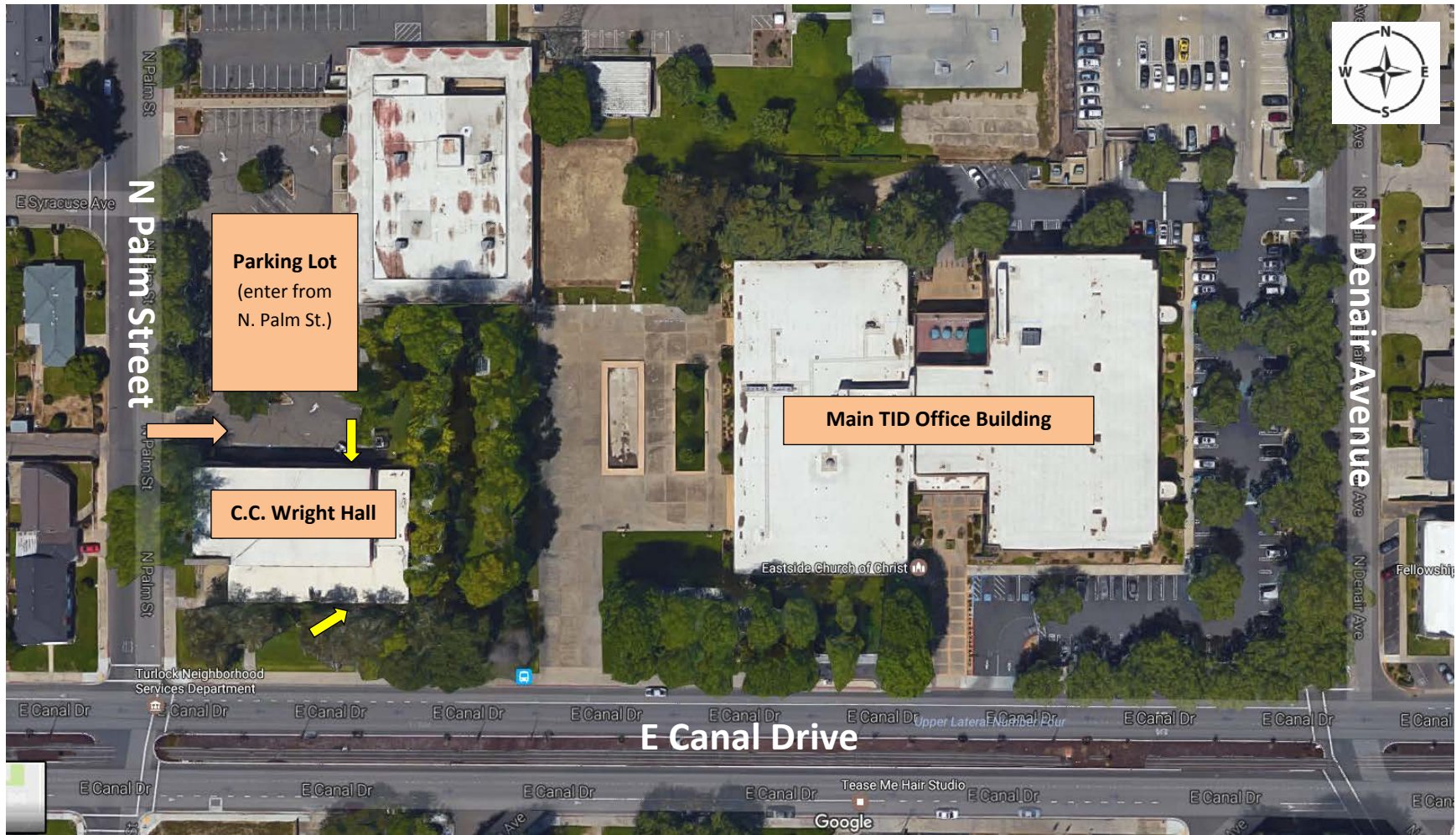
247 East Canal Drive, Turlock, California

Conference Line: 1-866-583-7984, Passcode: 230-0743

Join Lync Meeting <https://meet.hdrinc.com/jenna.borovansky/3D64F0F5>

TIME	TOPIC
1:00 pm - 1:10pm	Introduction of Participants and Goals of Meeting
1:10 pm – 1:40 pm	Project Operations - Water Balance Model (W&AR-02)
1:40 pm – 2:00 pm	Don Pedro Reservoir Temperature Model (W&AR-03)
2:00 pm – 2:10 pm	Lower Tuolumne Temperature Model (W&AR-16)
2:10 pm – 2:50 pm	Chinook Salmon Population Model (W&AR-06)
	<i>Oncorhynchus Mykiss</i> Population Model (W&AR-10)
2:50 pm - 3:00 pm	Floodplain Hydraulic Analysis (W&AR-21)

C.C. Wright Hall, 247 E Canal Drive, Turlock CA



The parking lot north of C.C. Wright Hall is free and open to the public. Individuals may enter C.C. Wright Hall using either the north entrance or the main entrance located off of E Canal Drive.

From: Staples, Rose

BCC: Don Pedro Relicensing Participants Email Group

Sent: Thursday, May 18, 2017 12:59 PM

Subject: Additional Advance Documents for Today's Don Pedro Modeling Tool Updates Afternoon Meeting

Don Pedro Licensing Participants,

Five additional documents have been uploaded to the <http://www.donpedro-relicensing.com> website in advance of today's Don Pedro Relicensing Modeling Tool Updates Meeting scheduled for 1:00 p.m. at TID's C.C. Wright Hall. These documents have been uploaded as attachments to the May 18, 2017 meeting announcement under the CALENDAR tab.

Besides the map to Wright Hall and the parking directions printed on the map, you should now have 6 documents for reference at the meeting:

Emailed Previously

- (1) Agenda and C C Wright Hall Directions / Parking Info

Uploaded Today

- (2) Project Operations – Water Balance Model (W&AR-02) Presentation
- (3) Don Pedro Reservoir Temperature Model (W&AR-03) Presentation
- (4) Lower Tuolumne Temperature Model (W&AR-16) Presentation
- (5) Chinook Salmon Population Model (W&AR-06) and *O. mykiss* Population Model (W&AR-10) Presentation
- (6) Floodplain Hydraulic Analysis (W&AR-21) Presentation

If you have any difficulties accessing these documents, please let me know. Thank you.

Rose Staples, CAP-OM, MOS

Senior Administrative Assistant



HDR

970 Baxter Boulevard Suite 301

Portland ME 04103

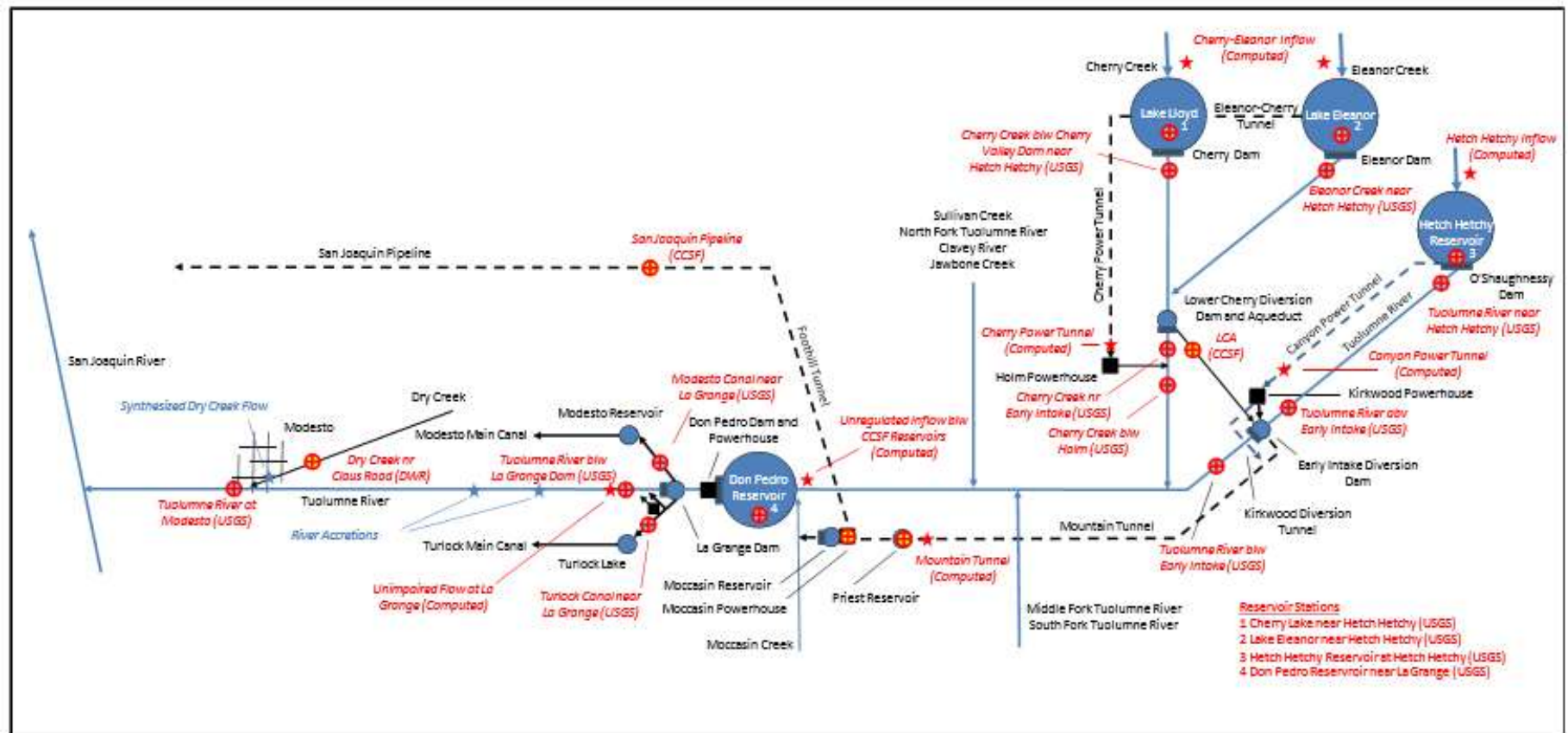
D 207-239-3857

rose.staples@hdrinc.com

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Project Operations Water Balance Model

Operations Model used to simulate current Don Pedro Project Operations and alternative scenarios for future operations of the Project



Tuolumne River Basin hydrologic measurement and computation points

Operations Model Version History

- Version 1.0 – Test Case used for training relicensing participants on model (October 2012)
 - Draft Report was filed in the ISR (January 2013)
 - ✦ Model Hydrology Report
 - ✦ Model Description and User's Guide
 - ✦ Model Validation Report
- Requests for study report changes and other study activities
 - Refinement of Tuolumne River Basin unimpaired hydrology (March 2013)
 - Completed field accretion measurements in February 2013, filed results with FERC (June 2013)
- Version 2.0 - Base Case added to model (May 2013)
- Version 3.0 – Base Case model updated with hydrology through WY2012 (December 2013), filed with Updated Study Report (January 2014)

RP Modeling Interaction History

- Consultation Workshop No. 1 – Focusing on the development of the hydrology of the model (April 9, 2012)
- Consultation Workshop No. 2 – Discussion of accretion flows in the lower Tuolumne River, node locations, and results of field measurements (September 21, 2012)
- Consultation Workshop No. 3 – Discussion of operations model's architecture and computational methods, and review of the User's Guide (October 23, 2012)
- Consultation Workshop No. 4 – Discussion of model validation, and hands-on training session (December 7, 2012)
- Consultation Workshop No. 5 – Model modifications and Base Case presentation, Model Version 2.0 training (May 30, 2013)
- Updated Study Report Meeting - Model and hydrology extension, Model Version 3.00 with extended hydrology for a study period of WY 1971-2012 (January 2014)
- May 18, 2017 – Model Version 3.1 update/revision discussion

The Operations Model has been used to test alternative scenarios of flow management, supporting the investigation of fisheries and water supplies

During the course of these investigations several revisions to Version 3.0 have been identified to either correct oversights and errors, or to improve the depiction of operations

- San Francisco Operations
 - Hetch Hetchy Reservoir - Fixed August/September minimum flow schedules; Refined flow schedule for mid-month change; Refined year-type lookup trigger
 - Lake Eleanor – Refined flow schedules for mid-month change
- Don Pedro Project/District Operations
 - La Grange (Base Case) – Minimum flow schedule logic refined to provide mid-month change during October and April; Minimum flow requirement year type modified to occur on April 15; Corrected flow requirement for leap year February
 - Districts' Canals – Corrected day-of-month diversion factors to sum to 1.0000 for every month

Effects of changes

San Francisco Operation Changes

- Hetch Hetchy Reservoir minimum release schedule corrections affect several years adding additional water immediately below the reservoir, affecting timing and volume of other reservoir releases during a year. Net sum zero difference over the hydrologic study period.
- Lake Eleanor schedule refinement refines the daily distribution of minimum releases during April and September.
- Don Pedro Reservoir inflows follow changes in San Francisco releases, affecting timing of inflow. However, there is a net sum zero difference in inflow over the hydrologic study period.

Effects of changes

Don Pedro Project/District Changes

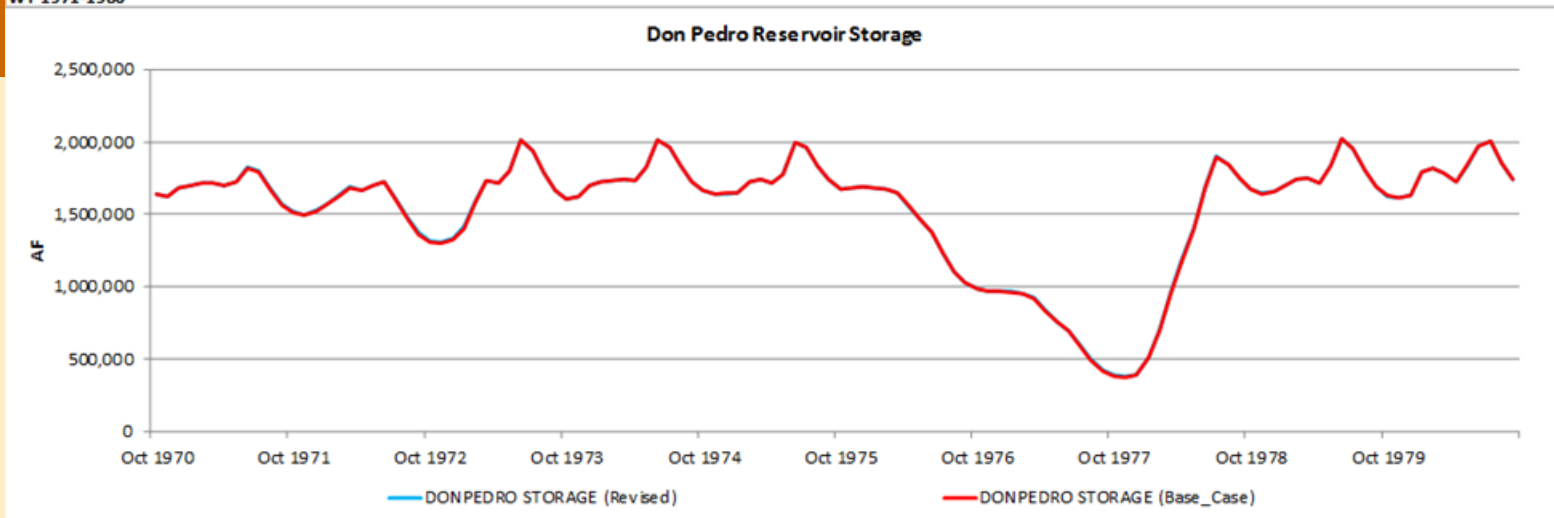
- La Grange current FERC schedule better represented during October with mid-month refinement – same monthly volume; Mid-month April year type change better represents current operations; Leap year correction better reflects current FERC schedule.
- District Diversions – Correction of daily factors better translates monthly water demands, results in a modeled decrease in water demand of approximately 6,600 acre-feet per year.

Illustration of Changes



Illustration of Changes

WY 1971-1980



WY 1981 - 1990

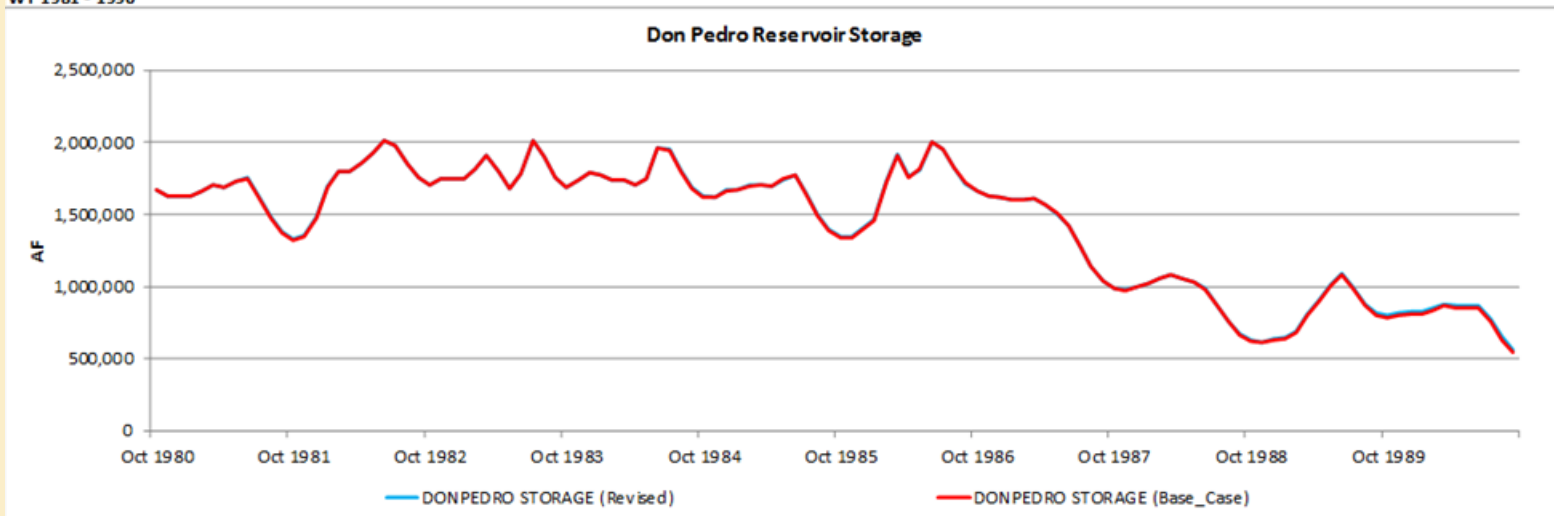
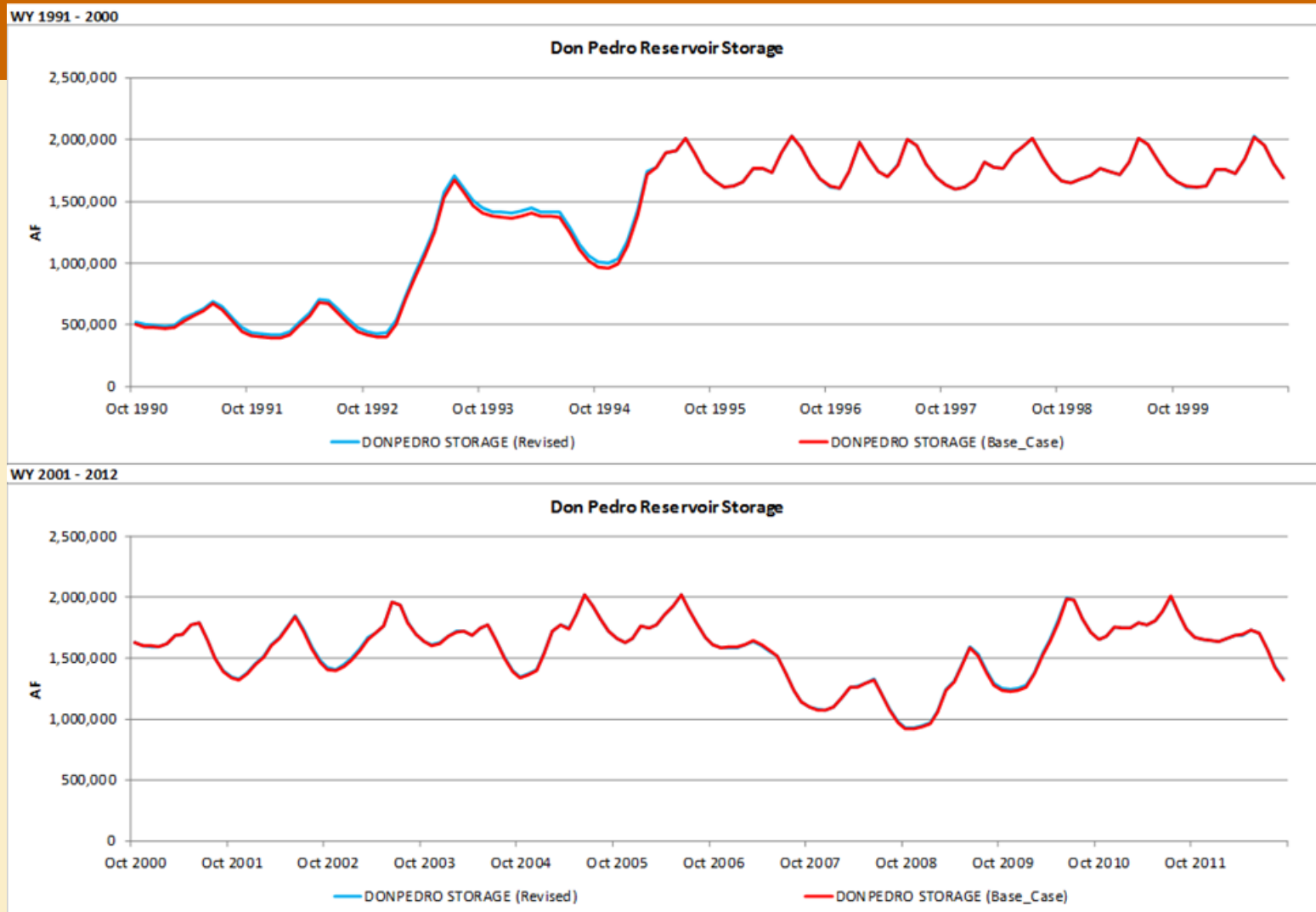


Illustration of Changes



Project Operations Water Balance Model

Questions?

Don Pedro Reservoir Temperature Model

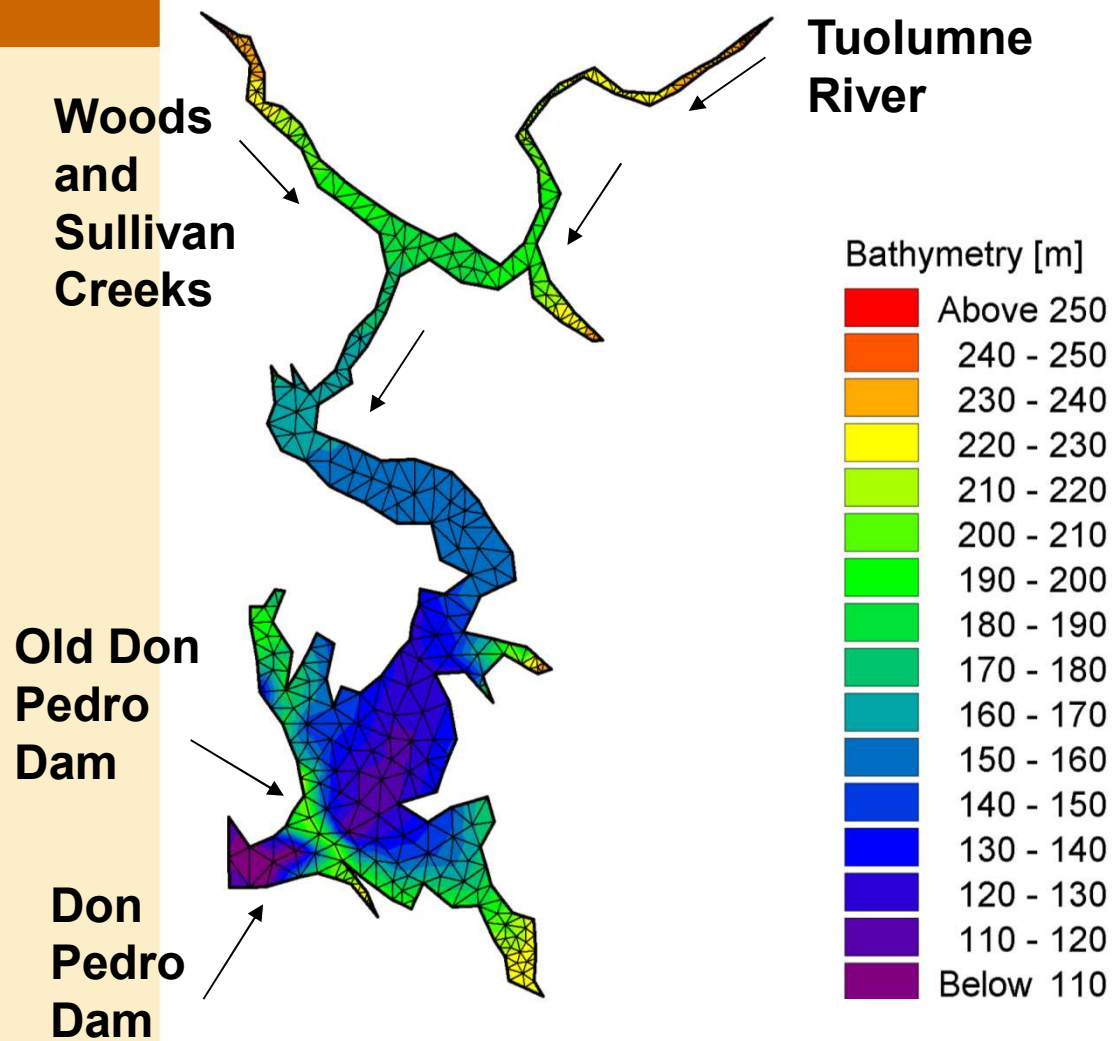
Background

- A numerical model was required that could model temperature in the reservoir and the temperature of water being released
- 1d, 2d and 3d modeling options were reviewed
- The complex geometry of the reservoir made a 3d model the preferred option
- The DHI MIKE model was chosen
 - It has a long development history and track record
 - It is widely used throughout the world
 - It has extensive scientific and software documentation
 - It has a user friendly interface

Relicensing Participant Workshops

W&AR-03 Reservoir Temperature Model Workshops	
<u>Date</u>	<u>Title</u>
April 10, 2012	Reservoir Temperature Model Overview, Input, and Output
October 26, 2012	Reservoir Temperature Model Update
January 24, 2013	Don Pedro Reservoir Temp-River Temp Models Training Session
June 4, 2013	Don Pedro Reservoir Temp-River Temp Models 2 nd Training Session
February 13, 2014	Reservoir Temperature Model 3 rd Training Session

Don Pedro Reservoir Model



Background

- The model was calibrated to the temperature of releases from the powerhouse
- The original calibration is shown below

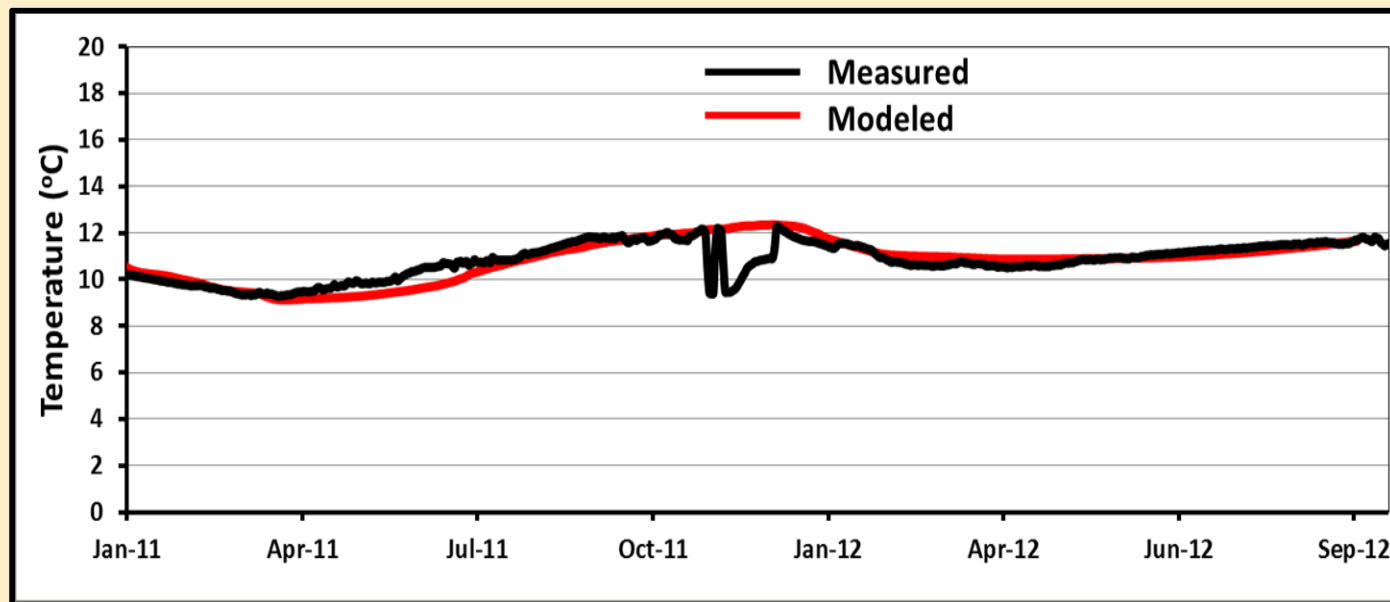


Model Updates

- Between 2012 (when the model was developed) and 2016, DHI made a change to the model temperature inputs
 - In the 2012 version the user had to provide the solar radiation data
 - In the 2016 version DHI computes the solar radiation internally
- The calibration period was rerun and it was noted the calibration had changed

2016 Recalibration

- Some of the temperature parameters were adjusted and the model was rerun
- The 2016 calibration is shown below



Don Pedro Reservoir Temperature Model

Questions?

Updates to the Tuolumne River Chinook Salmon and *O. Mykiss* Population Models

Overview

Introductions and Background

1. Model Development Background
2. Overview of Model Changes

Model Updates

1. TRCh and TROm Model Overview
2. Relationship to External Models
3. Model Calibration and Validation

Base Case Model Scenario Results

Introduction/Background

Initial Model Development (2012-2013)

- Information Review and Conceptual Model Development (Workshops in 2012 and Synthesis Study Report in 2013)
- Modeling Approach to Address Key Resource Issues Affecting Tuolumne River Salmonids (joint Workshop No. 1 in 2012)
- Model Development (Separate W&AR-06 and W&AR-10 Workshops in 2013)
- TRCh (W&AR-06) and TROm (W&AR-10) Study Reports in 2013

Introduction/Background

TRCh Model Updates (2017)

- Incorporation of W&AR-21 Floodplain Study (TUFLOW) results
- Refinements in reach-specific predation mortality
- Refinements in flow interactions with predation mortality
- Calibration to annual smolt passage at Grayson RST (WY 2010-2012)
- Validation to weekly fry/juvenile and annual smolt passage at Waterford (WY 2006-2013) and Grayson (WY 1999-2013) RSTs

Introduction/Background

TROm Model Updates (2017)

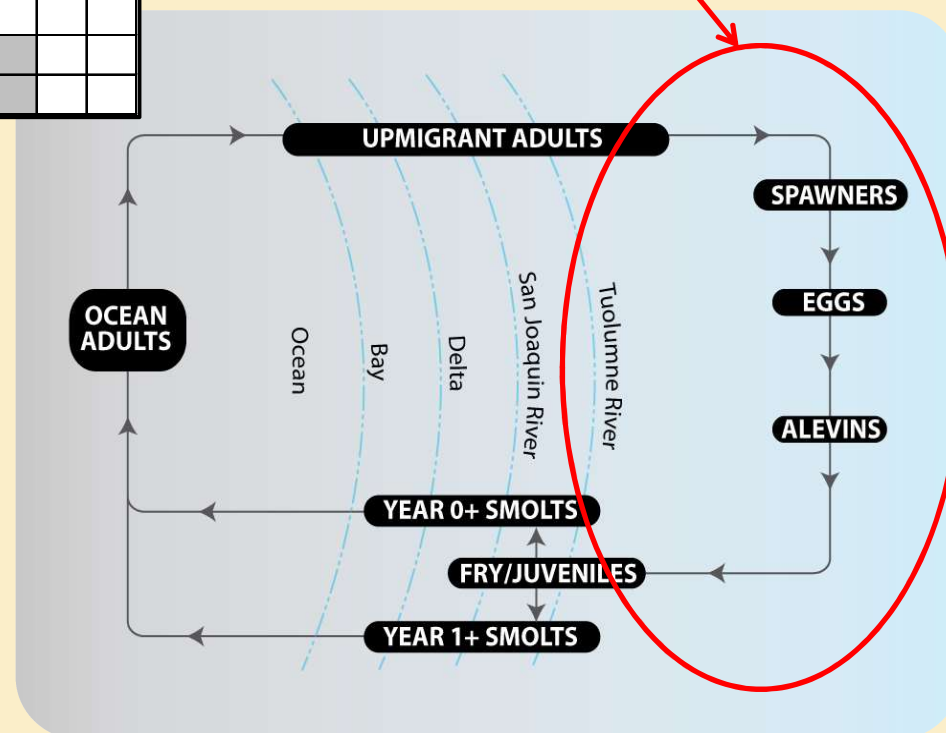
- Incorporation of W&AR-21 Floodplain Study (TUFLOW) results
- Refinements in reach-specific predation mortality
- Refinements in flow interactions with predation mortality
- Calibration of growth rates to W&AR-14 Swim Tunnel Study results and size-at-age data from W&AR-20 Scale Collection and Age Determination Study
- Calibration of mortality rates for long-term stable population size
- Validation to observed age structure and summer-rearing population size estimates (WY 2008–2011)

TRCh Model Overview

Modeled Life Stages for Tuolumne River Chinook Salmon

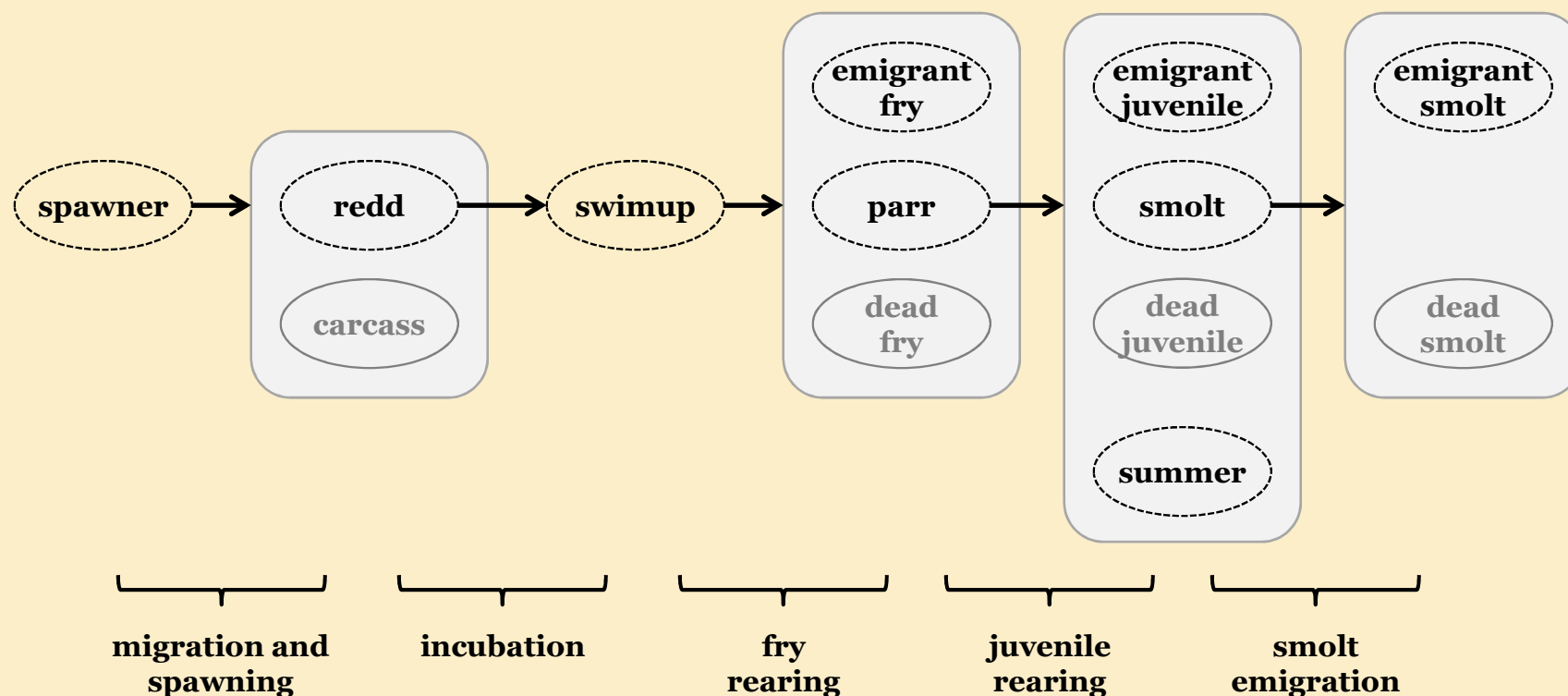
Life Stage	Fall	Winter	Spring	Summer
	(Sep-Nov)	(Dec-Feb)	(Mar-May)	(Jun-Aug)
Adult Upstream Migration				
Adult Spawning				
Egg Incubation and Fry Emergence				
In-river Rearing				
Smolt Outmigration				

In-River Life Stages



TRCh Model Overview

TRCh Model Structure - Independent habitat-based sub-models separate life-history transitions

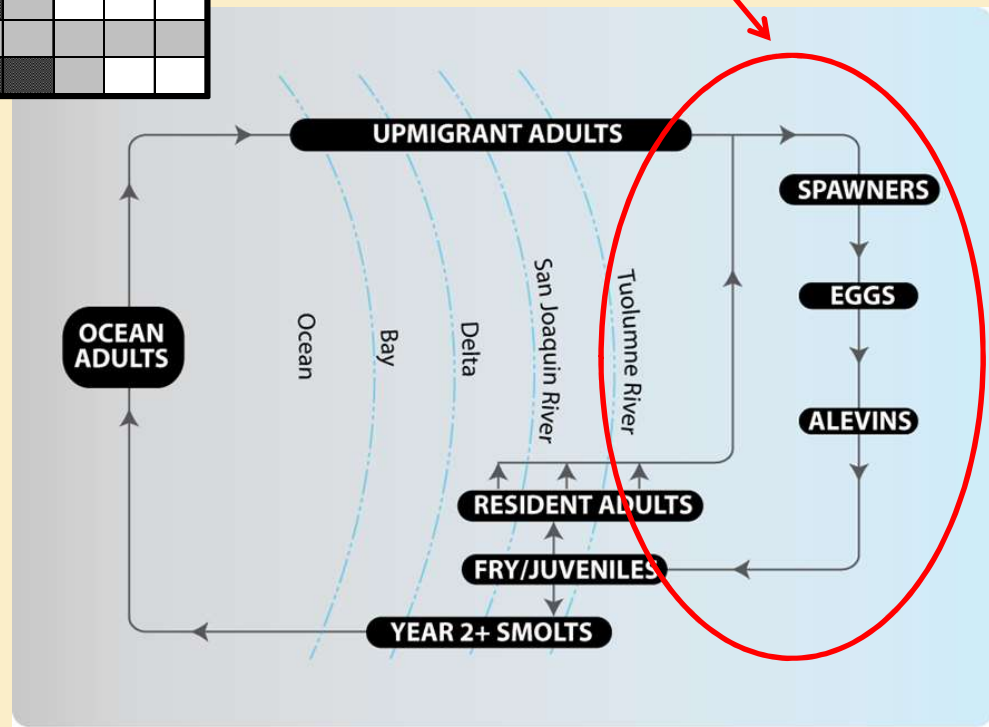


TROm Model Overview

Modeled Life Stages for Tuolumne River *O. mykiss*/Steelhead

Life Stage	Fall (Sep-Nov)			Winter (Dec-Feb)			Spring (Mar-May)			Summer (Jun-Aug)		
Adult Upstream Migration												
Adult Spawning												
Egg Incubation and Fry Emergence												
Rearing (Age 0+, 1+, and older)												
Smolt Outmigration												

**In-River
Life Stages**



TROm Model Overview

TROm Model Structure - Consideration of resident and anadromous *O. Mykiss* life history

```

graph TD
    swimup((swimup)) -- "fry rearing" --> parr_box
    subgraph parr_box [ ]
        parr((parr))
        dead_fry((dead fry))
    end
    parr_box -- "juvenile rearing" --> age0_box
    subgraph age0_box [ ]
        age0_resident((age 0 resident))
        dead_juvenile((dead juvenile))
    end
    age0_resident -- "assembly" --> next_year((resident next year))
    next_year -- "spawning" --> anadromous_return_box
    subgraph anadromous_return_box [ ]
        anadromous_return((anadromous return))
        redd((redd))
    end
    anadromous_return_box -- "incubation" --> swimup
    anadromous_return -- "spawning" --> anadromous_spawner((anadromous spawner))
    resident((resident)) -- "resident rearing (includes maturation and smoltification)" --> resident_box
    subgraph resident_box [ ]
        resident_spawner((resident spawner))
        dead_resident((dead resident))
        adult_resident((adult resident))
        smolt((smolt))
    end
    resident_spawner -- "spawning" --> anadromous_return_box
    adult_resident --> next_year
    smolt -- "emigration" --> emigrant_smolt((emigrant smolt))
  
```

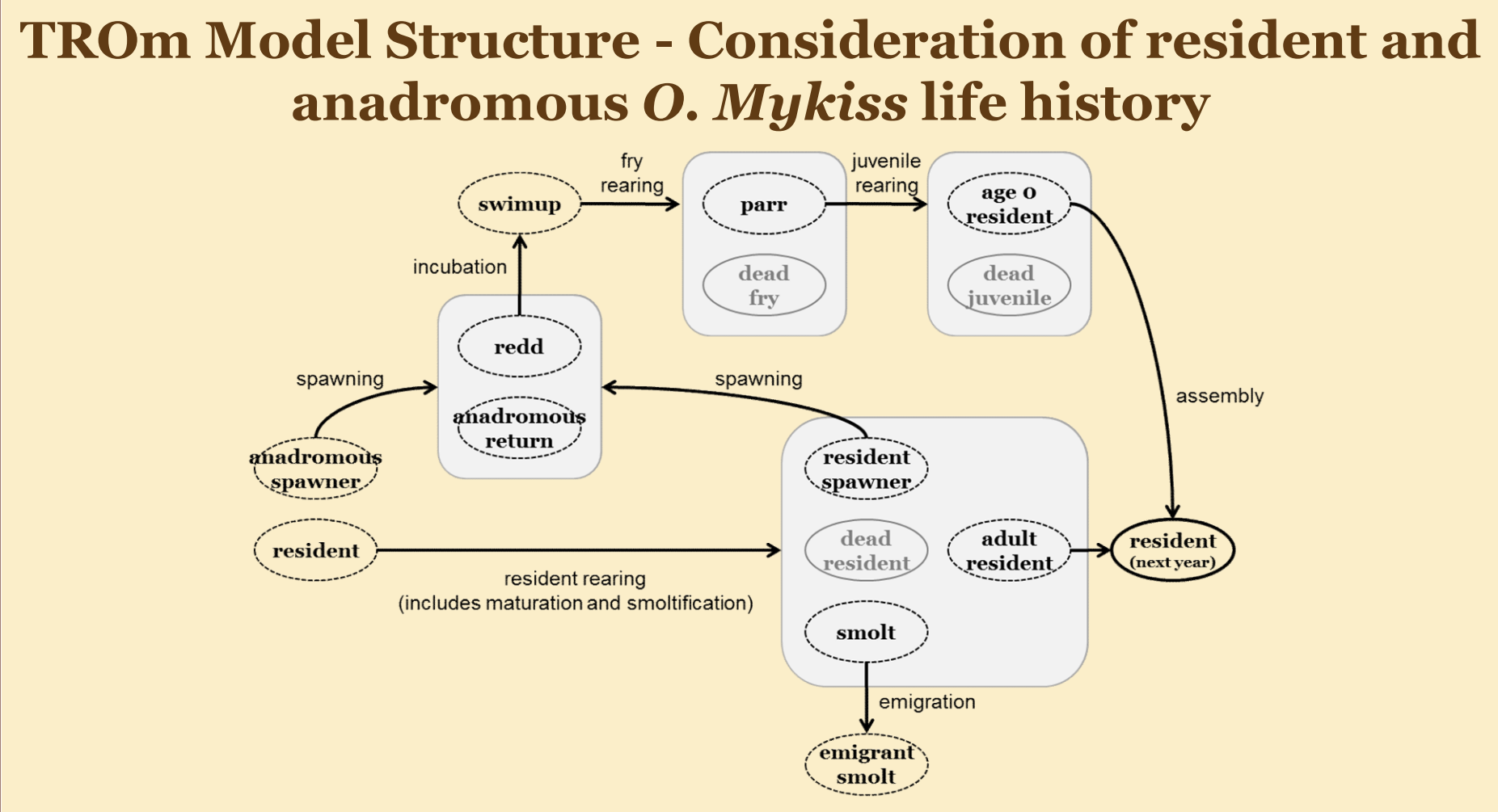
The diagram illustrates the life history of *O. Mykiss* within the TROm model structure, showing transitions between various life stages and their associated mortality and spawning events.

Life Stages and Transitions:

- swimup** (oval) transitions to **parr** (oval) via **fry rearing**.
- parr** (oval) transitions to **age 0 resident** (oval) via **juvenile rearing**.
- age 0 resident** (oval) transitions to **resident (next year)** (oval) via **assembly**.
- resident (next year)** (oval) transitions to **anadromous return** (oval) via **spawning**.
- anadromous return** (oval) transitions to **swimup** (oval) via **incubation**.
- anadromous return** (oval) transitions to **anadromous spawner** (oval) via **spawning**.
- resident** (oval) transitions to **resident spawner** (oval) via **resident rearing (includes maturation and smoltification)**.
- resident spawner** (oval) transitions to **anadromous return** (oval) via **spawning**.
- resident spawner** (oval) transitions to **adult resident** (oval) via **resident rearing (includes maturation and smoltification)**.
- adult resident** (oval) transitions to **resident (next year)** (oval) via **resident rearing (includes maturation and smoltification)**.
- adult resident** (oval) transitions to **smolt** (oval) via **resident rearing (includes maturation and smoltification)**.
- smolt** (oval) transitions to **emigrant smolt** (oval) via **emigration**.

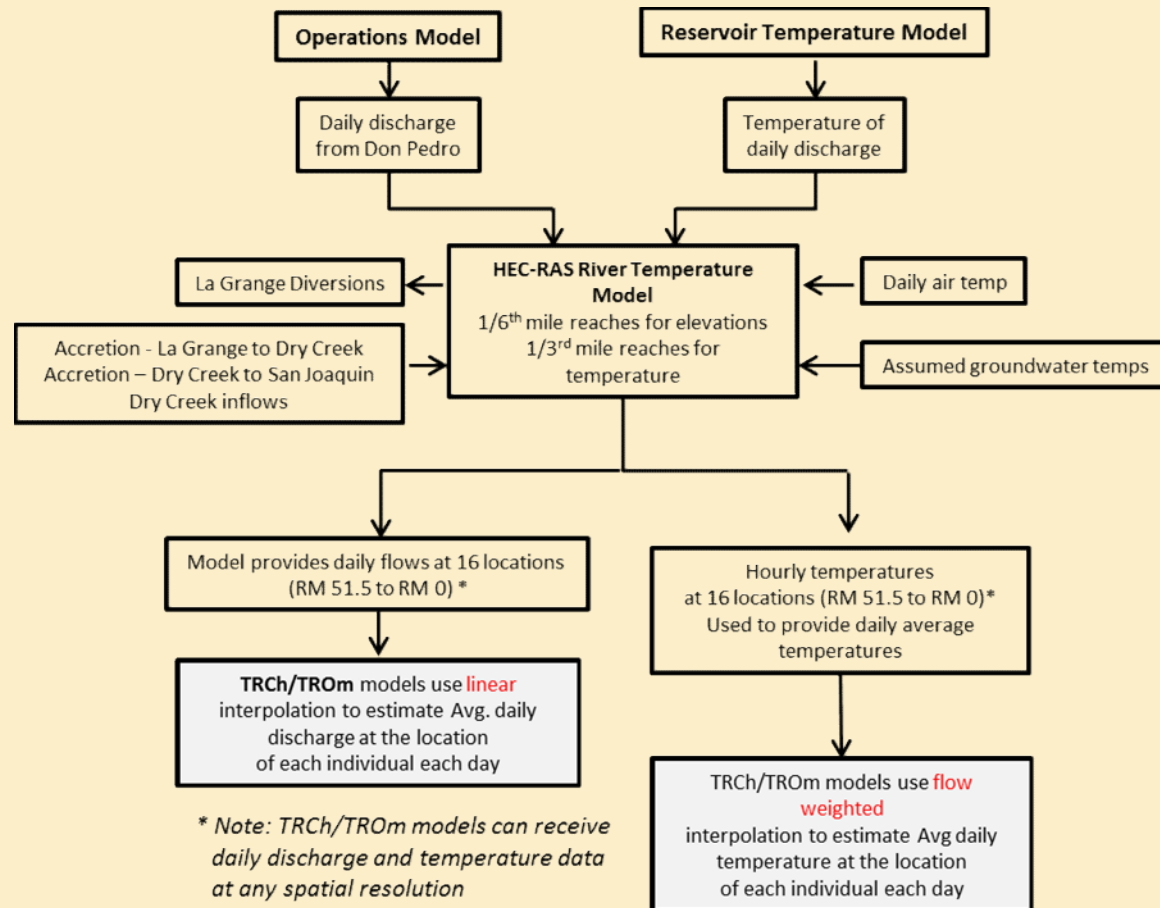
Life Stages and Associated Mortality:

- parr** (oval) is associated with **dead fry** (oval).
- age 0 resident** (oval) is associated with **dead juvenile** (oval).
- resident spawner** (oval) is associated with **dead resident** (oval).



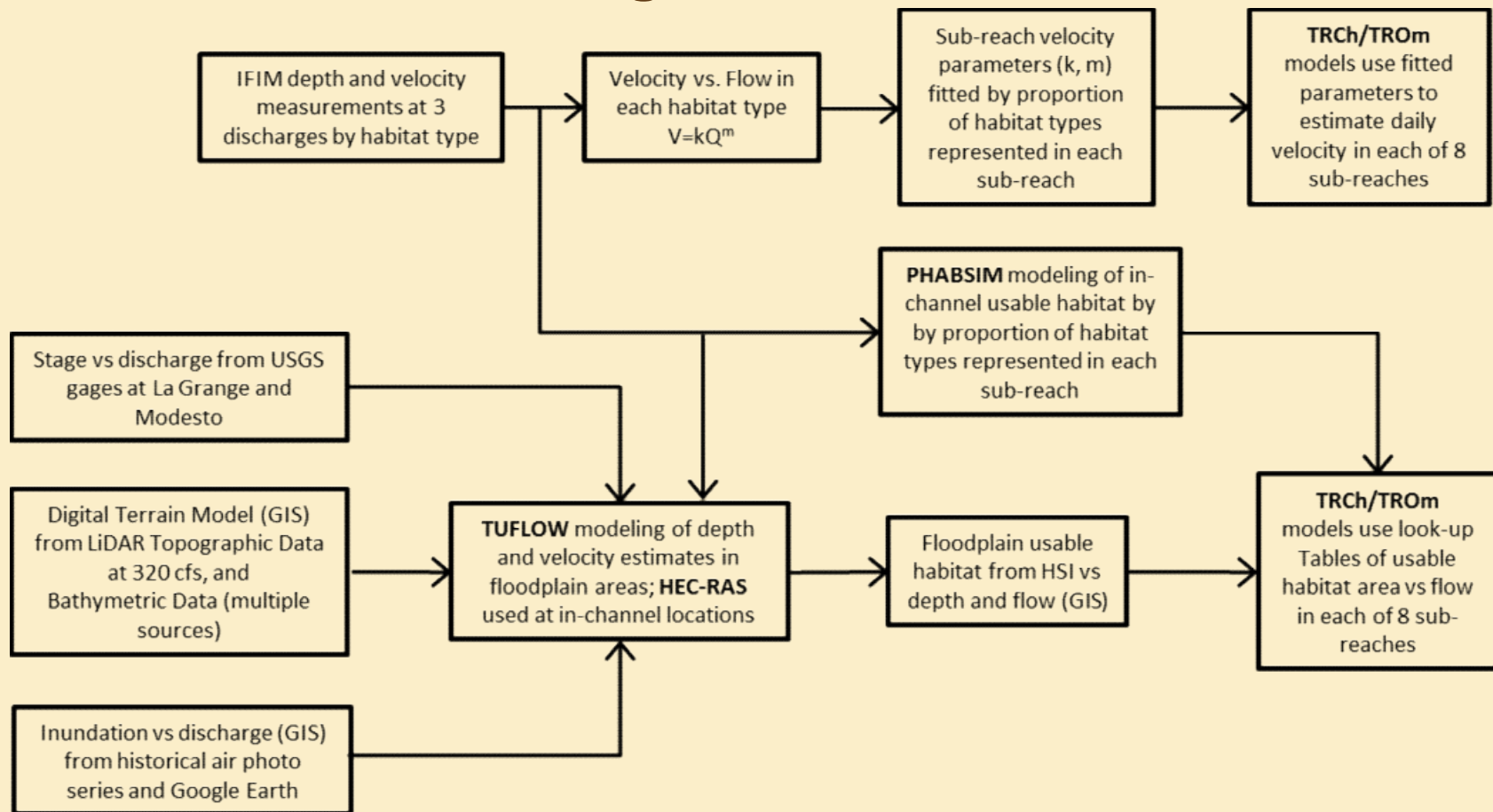
Use of External Models

Operations and Temperature Model Outputs to TRCh and TROm models



Use of External Models

PHABSIM and 2D Modeling of in-channel and overbank habitat

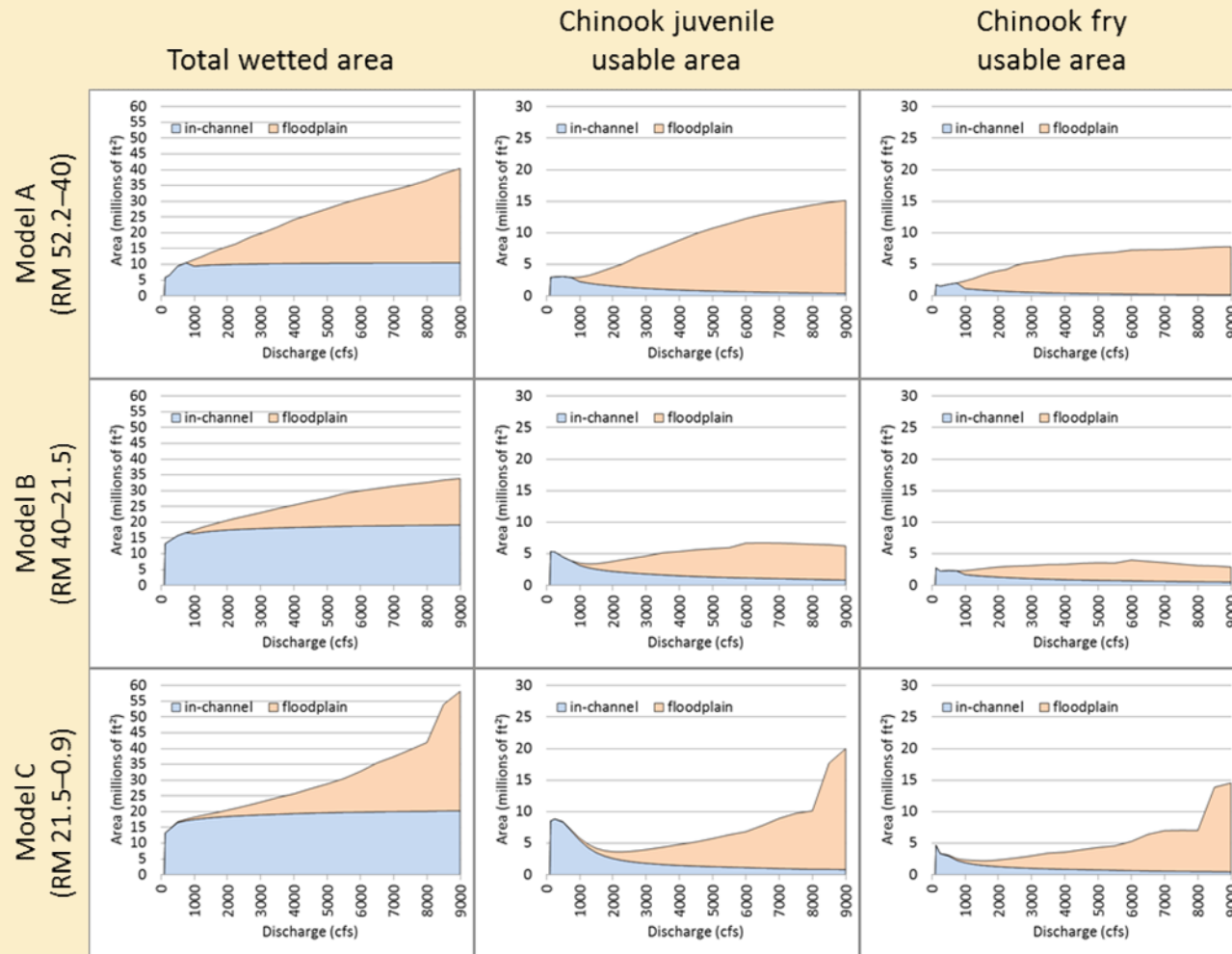


TRCh / TROm Model Update

Changes in the TRCh Model

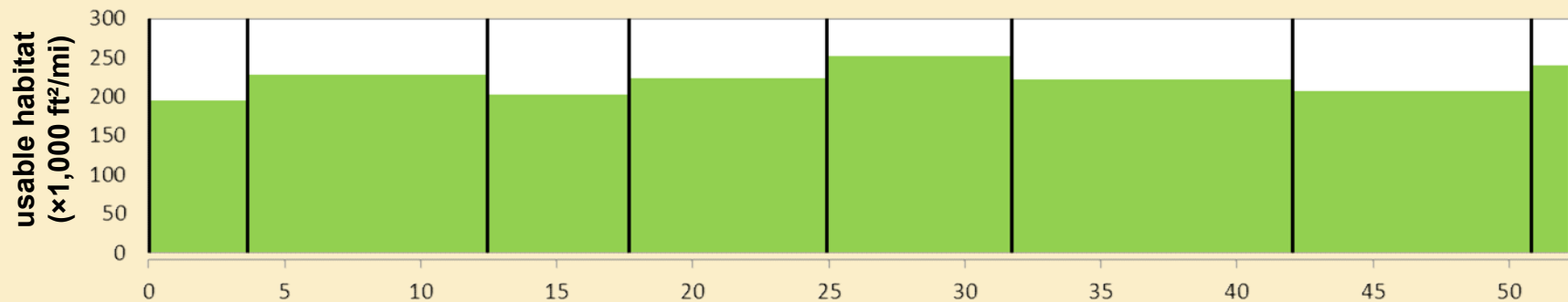
- Updated usable habitat estimates (Floodplain Study)
 - <1,000 cfs based on PHABSIM modeling
 - >1,000 cfs based upon HEC-RAS/TUFLOW modeling
- Weighting of predation risk by reach
 - Based on historical snorkel/seine data
- Weighting of movement-related predation risk by flow
 - <1,000 cfs no adjustment
 - >1,000 cfs based upon wetted width estimates to account for floodplain inundation area expansion

Updated Usable Habitat Estimates



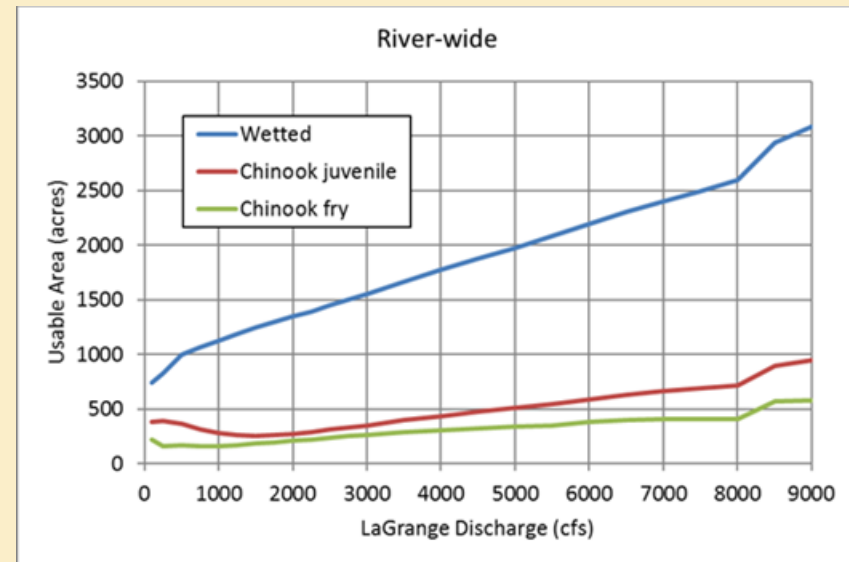
Updated Usable Habitat Estimates

Usable habitat estimated within each sub-reach



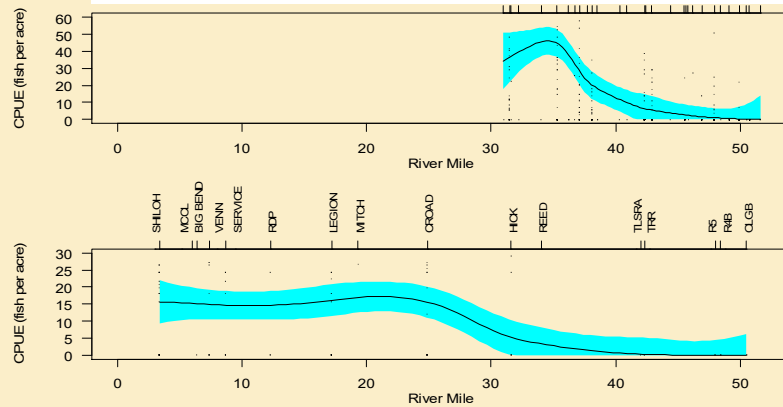
Sub-reach divisions/resolution may be modified by sub-model

La Grange dam to OLGB	52.0-50.7
OLGB to TLSRA	50.7-42.0
TLSRA to Hickman Bridge	42.0-31.6
Hickman Bridge to Charles Road	31.6-24.8
Charles Road to Legion Park	24.8-17.6
Legion Park to Riverdale Park	17.6-12.4
Riverdale Park to Shiloh Bridge	12.4-3.5
Shiloh Bridge to mouth	3.5-0.0

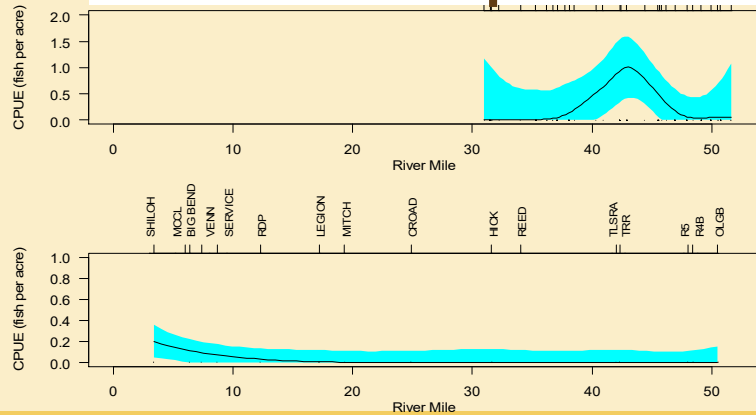


Predation Risk by Reach

Black Bass



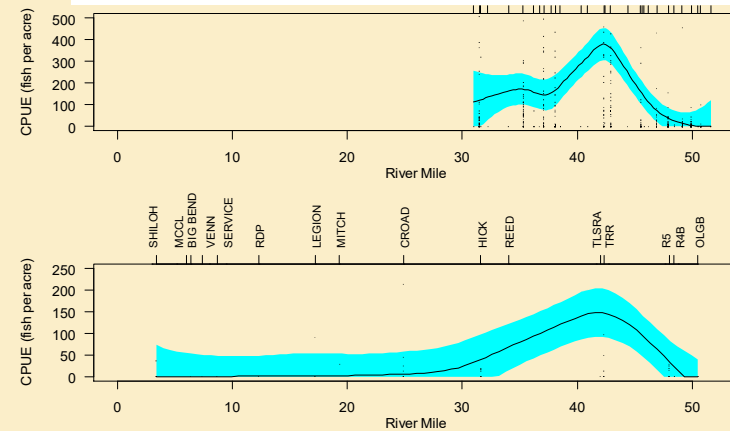
Striped Bass



1997-2014 relative abundance of primary predator species in:

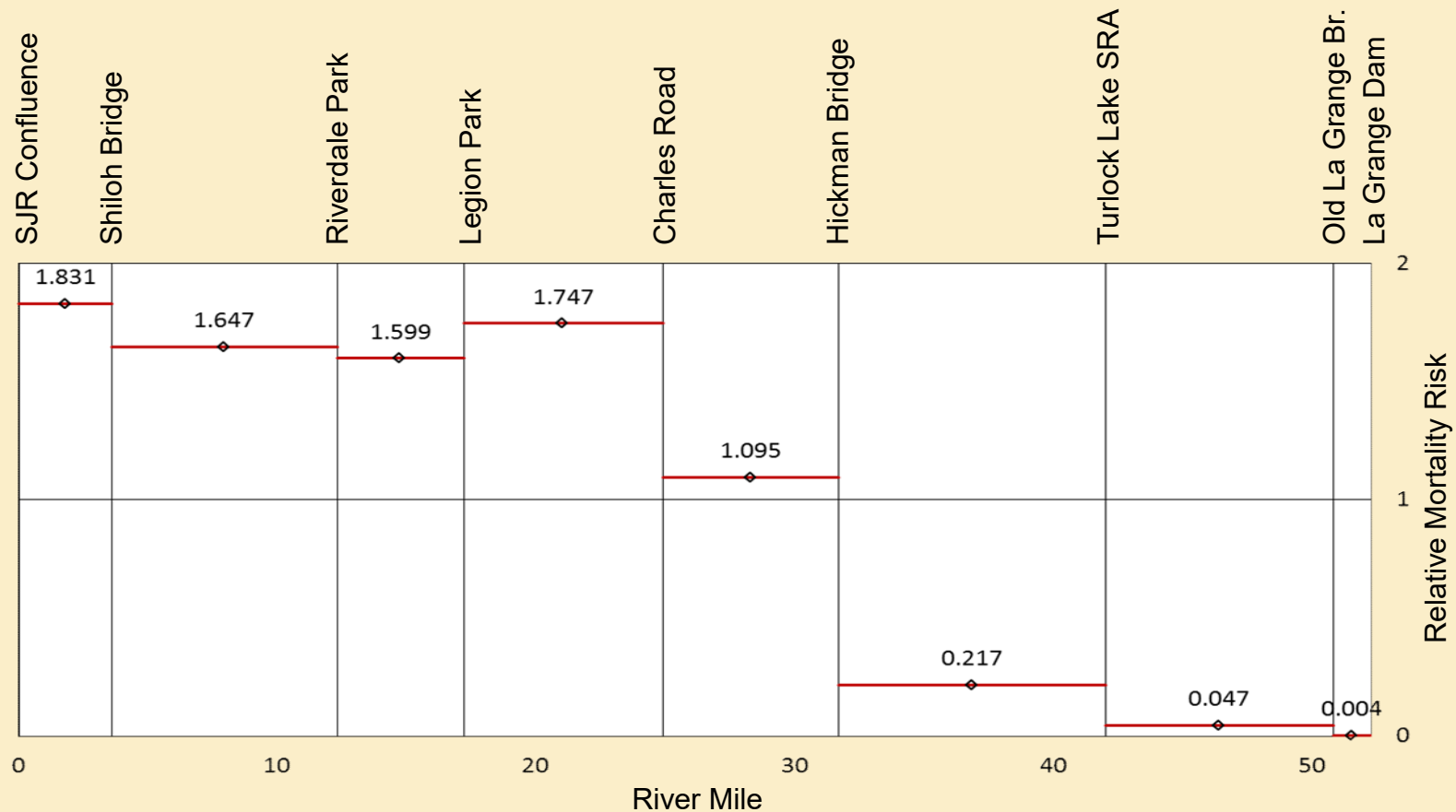
- Snorkel surveys (Top)
- Seine Surveys (Bottom)

Sacramento Pikeminnow



Predation Risk by Reach

Based on abundance of salmon predators from 1997-2014 snorkel and seining surveys, and predation rates from 1990 and 2012 predation studies.



TRCh Model Calibration/Validation

Spawning (not used for calibration)

1. Empirical data: Weir arrival timing, age, sex ratios, redd sizes, egg fecundity
2. Fitted data: Spawning timing (compare distributions of weir arrival and redd construction)

Egg Incubation (not used for calibration)

1. Empirical data: Egg development vs temperature, egg survival to emergence

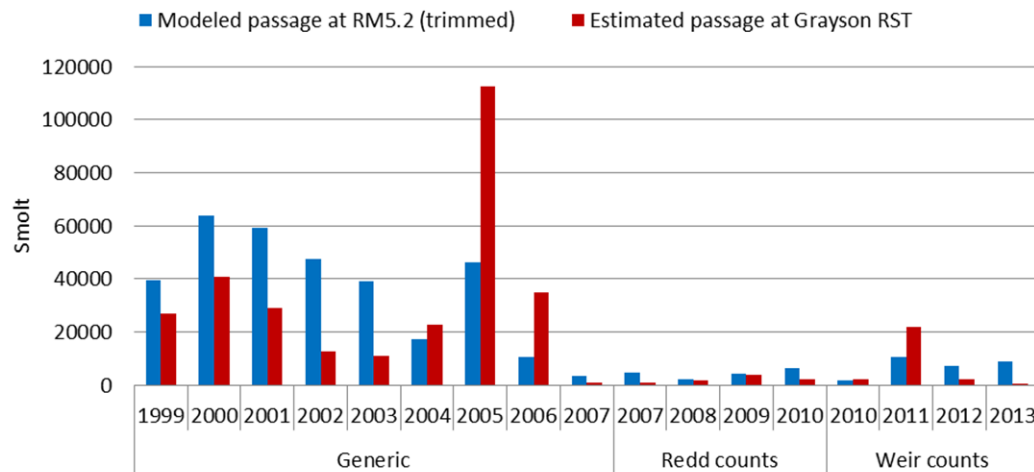
Fry and Juvenile Rearing

1. Empirical data: Seine data (relative abundance [density], location, size, timing), RST data (abundance, location, size, timing)
2. Calibrated parameters: movement, predation mortality
3. Metrics: smolt production, fry and juvenile passage

Smolt Production

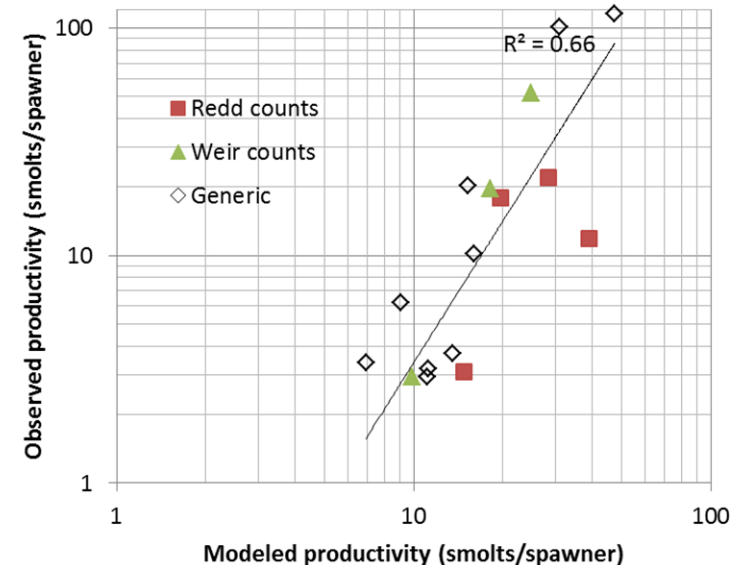
1. Empirical data: RST data (abundance, location, size, timing)
2. Calibrated parameters: predation mortality
3. Metrics: smolt production

Model Calibration/Validation



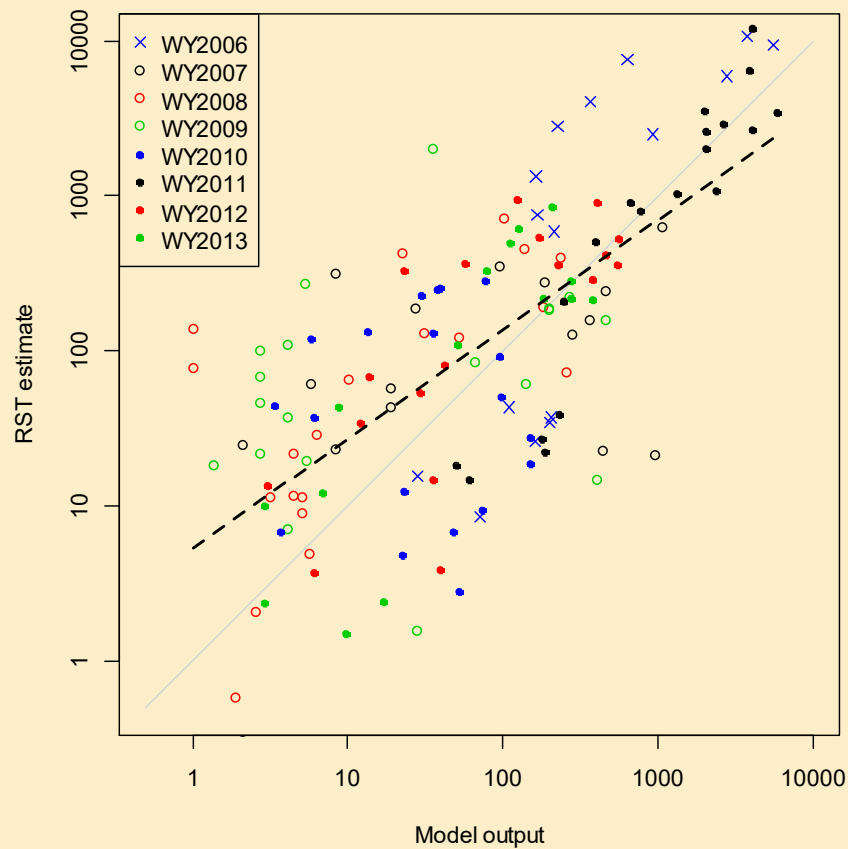
**Calibration: 2009-2012
weir data to estimate
2010-2013 RST passage**

**Validation: 1999-2009
spawning survey data to
estimate RST passage**

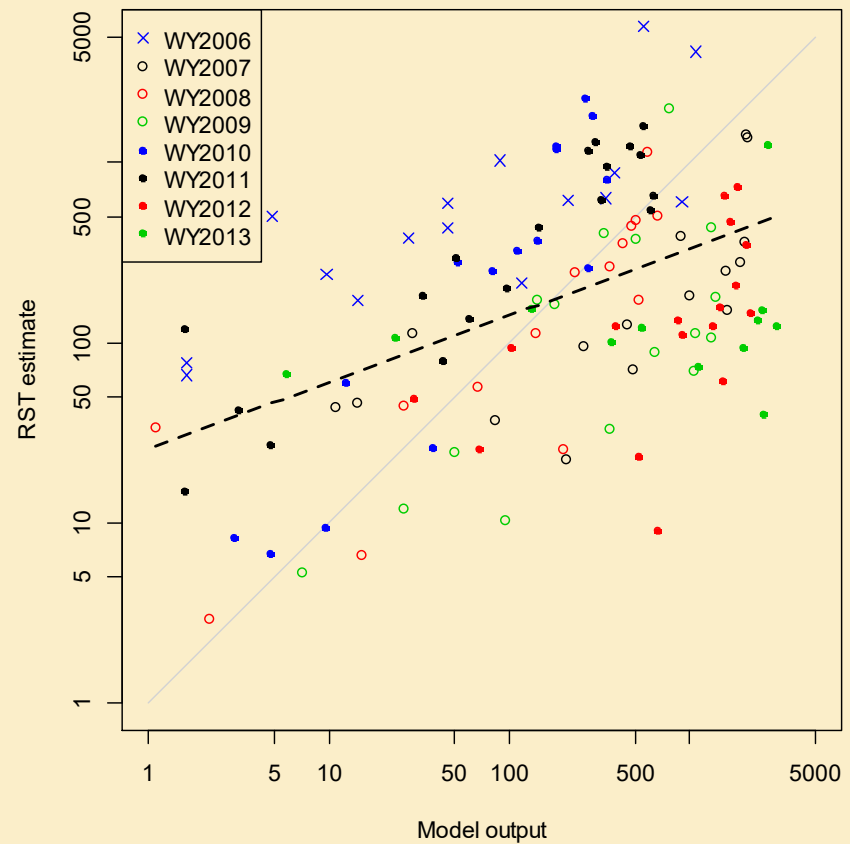


Model Validation

Weekly Fry/juvenile passage at Waterford (RM 29.8) RST

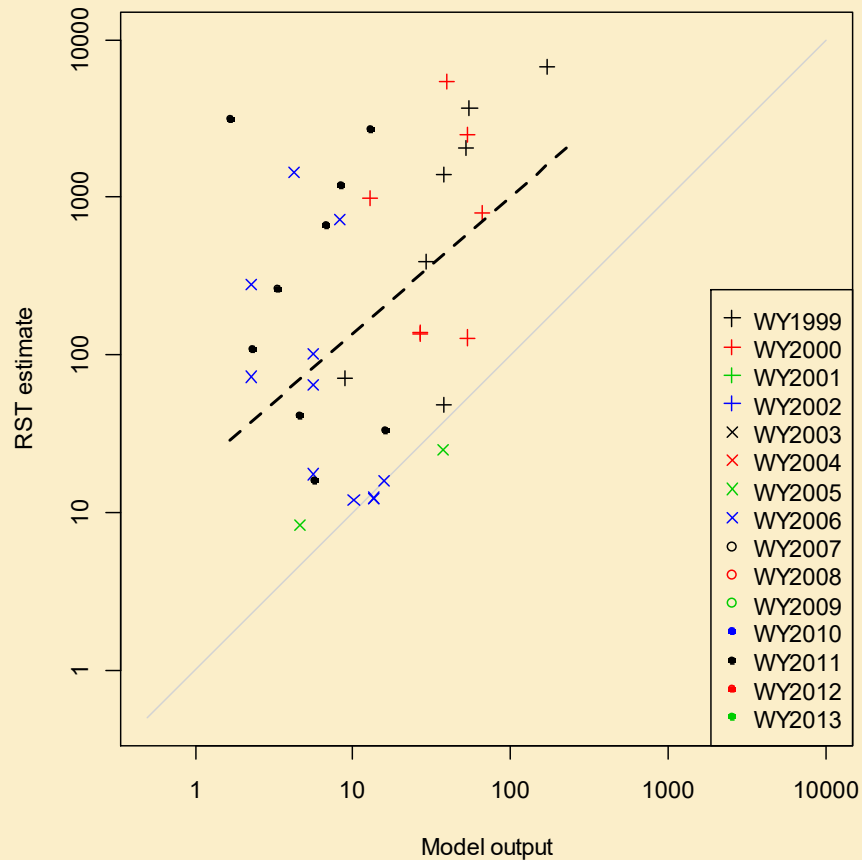


Weekly Smolt passage at Waterford (RM 29.8) RST

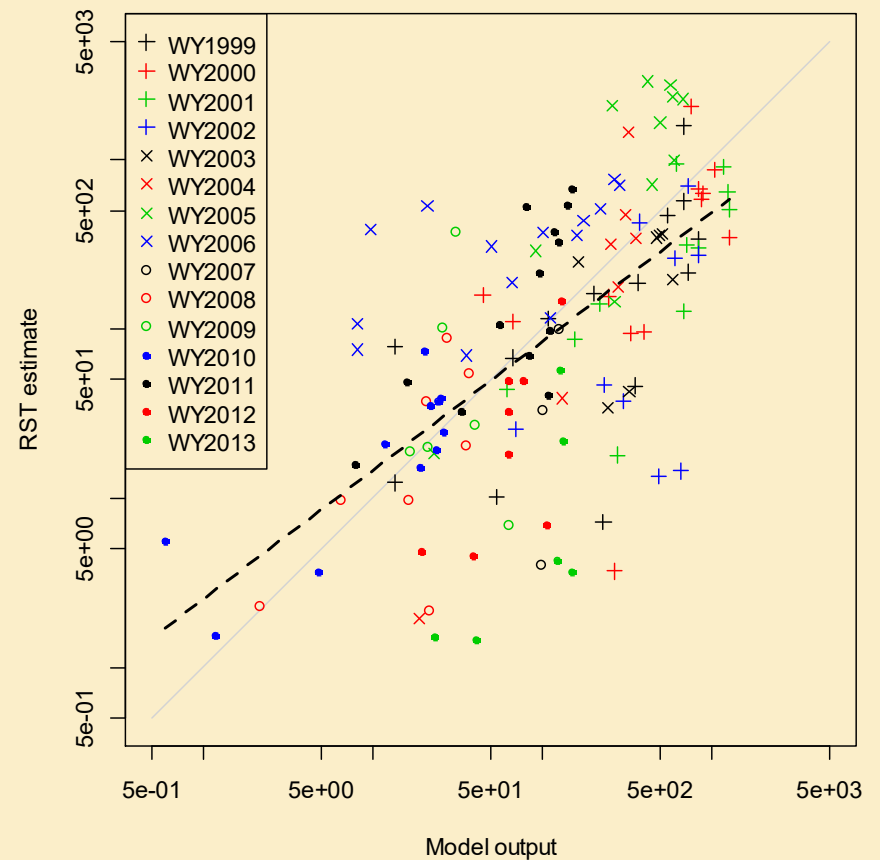


Model Validation

Weekly Fry/juvenile passage at Grayson (RM 5.2) RST



Weekly Smolt passage at Grayson (RM 5.2) RST



TROm Model Calibration/Validation

Spawning and Egg Incubation (not used for calibration)

1. Empirical data: timing (from Stanislaus River), redd location, redd size
2. Empirical data: Egg development vs temperature, egg survival-to-emergence

Fry and Juvenile Rearing

1. Empirical data: snorkel (location, size, timing, abundance), scale (size-at-age)
2. Calibrated parameters: growth, predation mortality
3. Calibration metrics: size at age, fry/juvenile ratios, stable population size
4. Validation: 2009-2011 end-of-summer juvenile population size

Adult Rearing

1. Empirical data: snorkel (location, size, timing, abundance), scale (size-at-age)
2. Calibrated parameters: growth, predation mortality
3. Calibration metrics: size at age, stable population size (2007-2012)
4. Validation: 2009-2011 end-of-summer population size and age-class composition

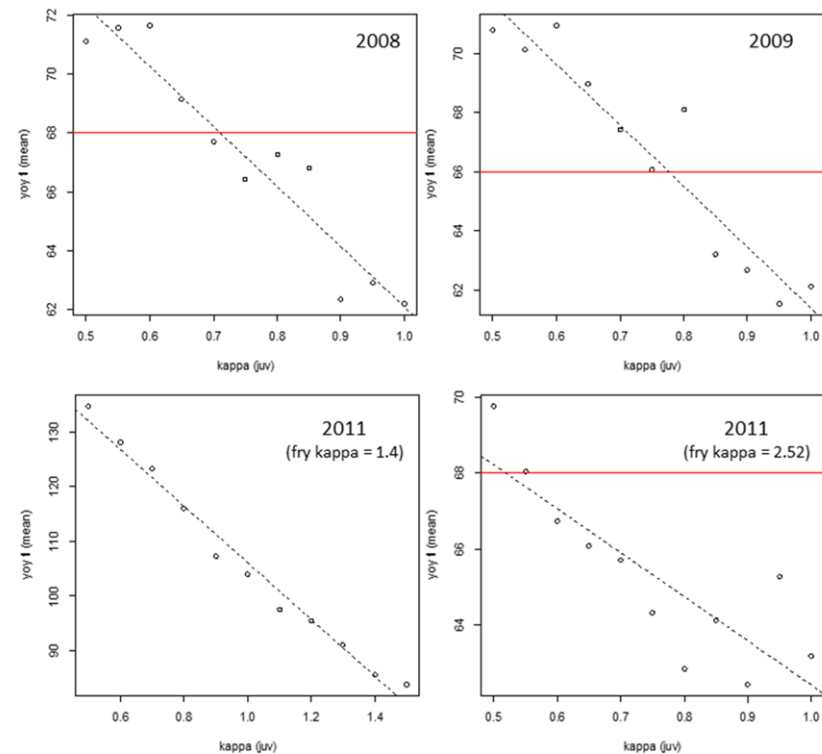
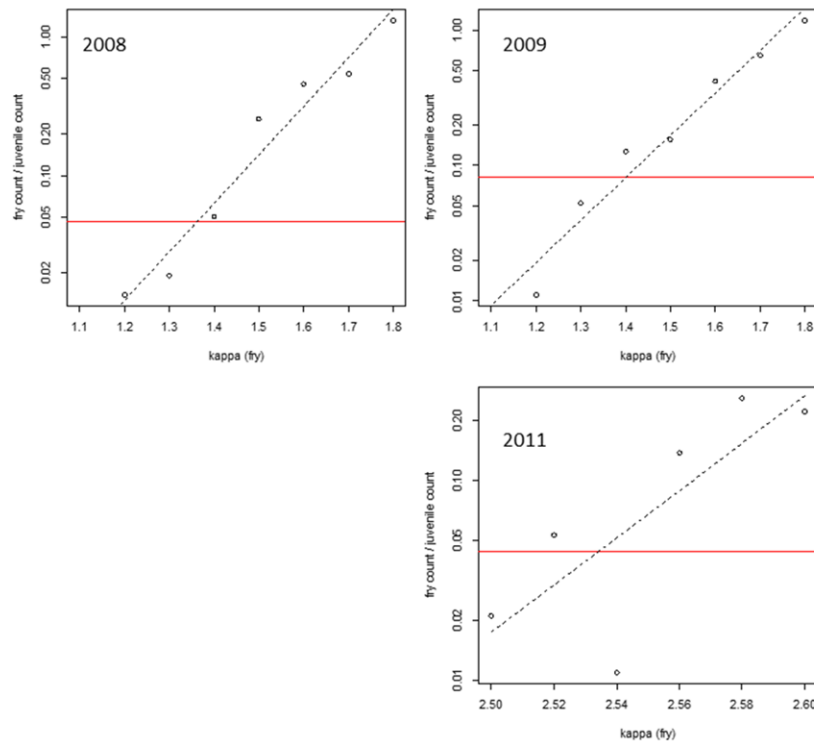
Smolt Production (not used for calibration)

1. Empirical data: smolt probability based upon parental anadromy, timing from Stanislaus River

TR0m Model Calibration

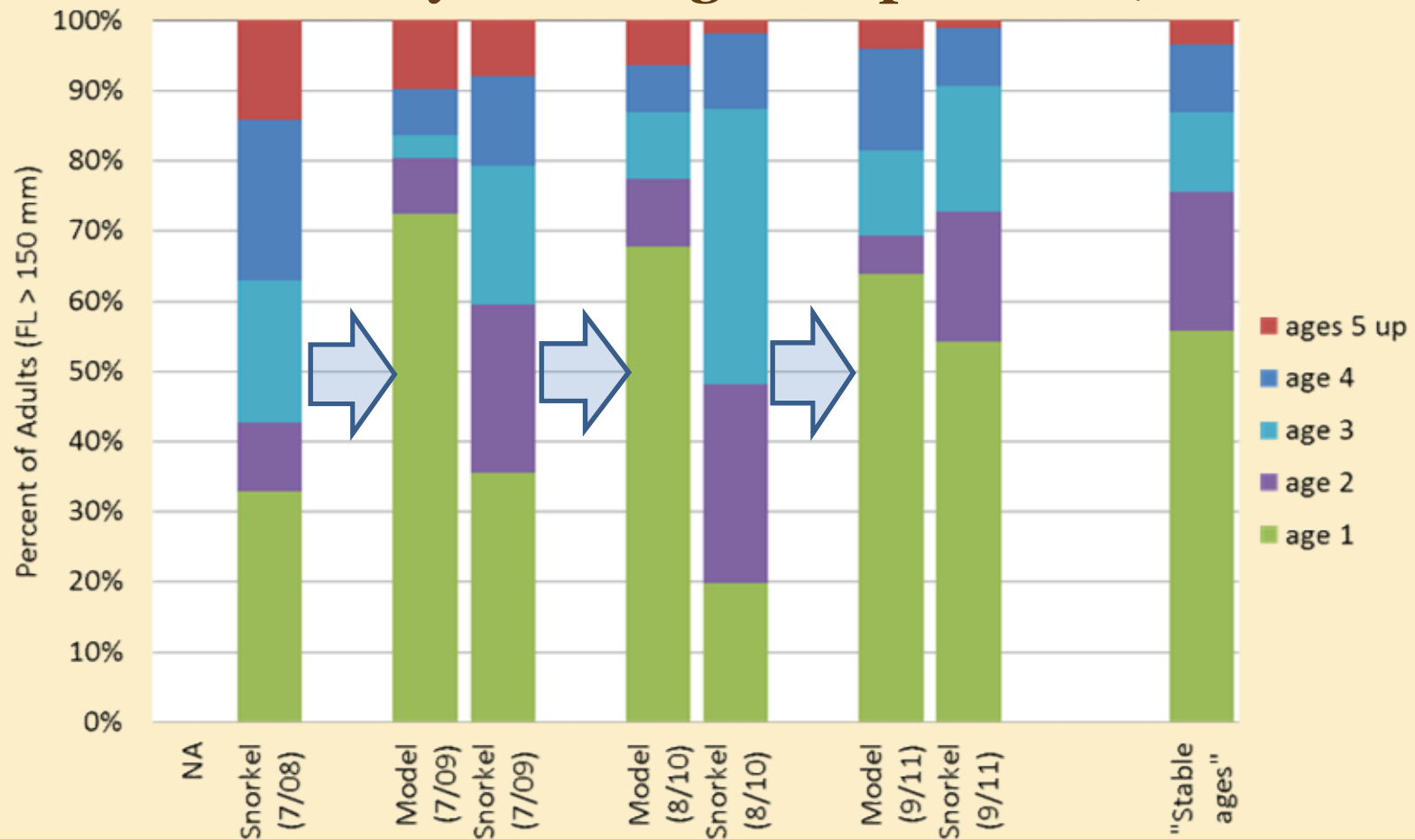
Juvenile Growth

- Growth parameters for Satterthwaite et al. (2010) adjusted to match fry:juvenile abundance ratios (left) as well as juvenile size-at-age (right) found in 2008-2011 snorkel surveys



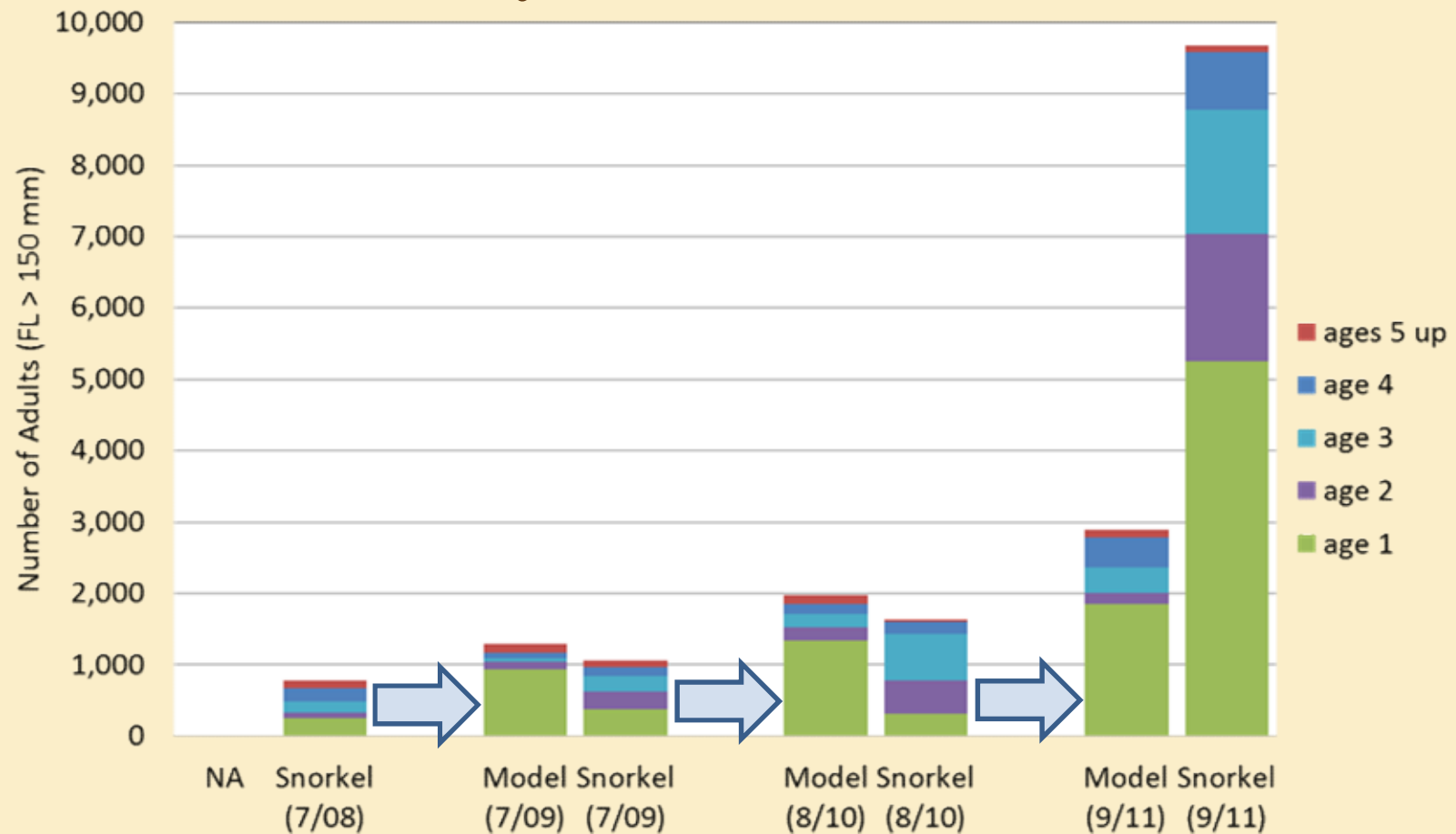
Model Validation

Model- and Survey-based Age composition (2008-2011)



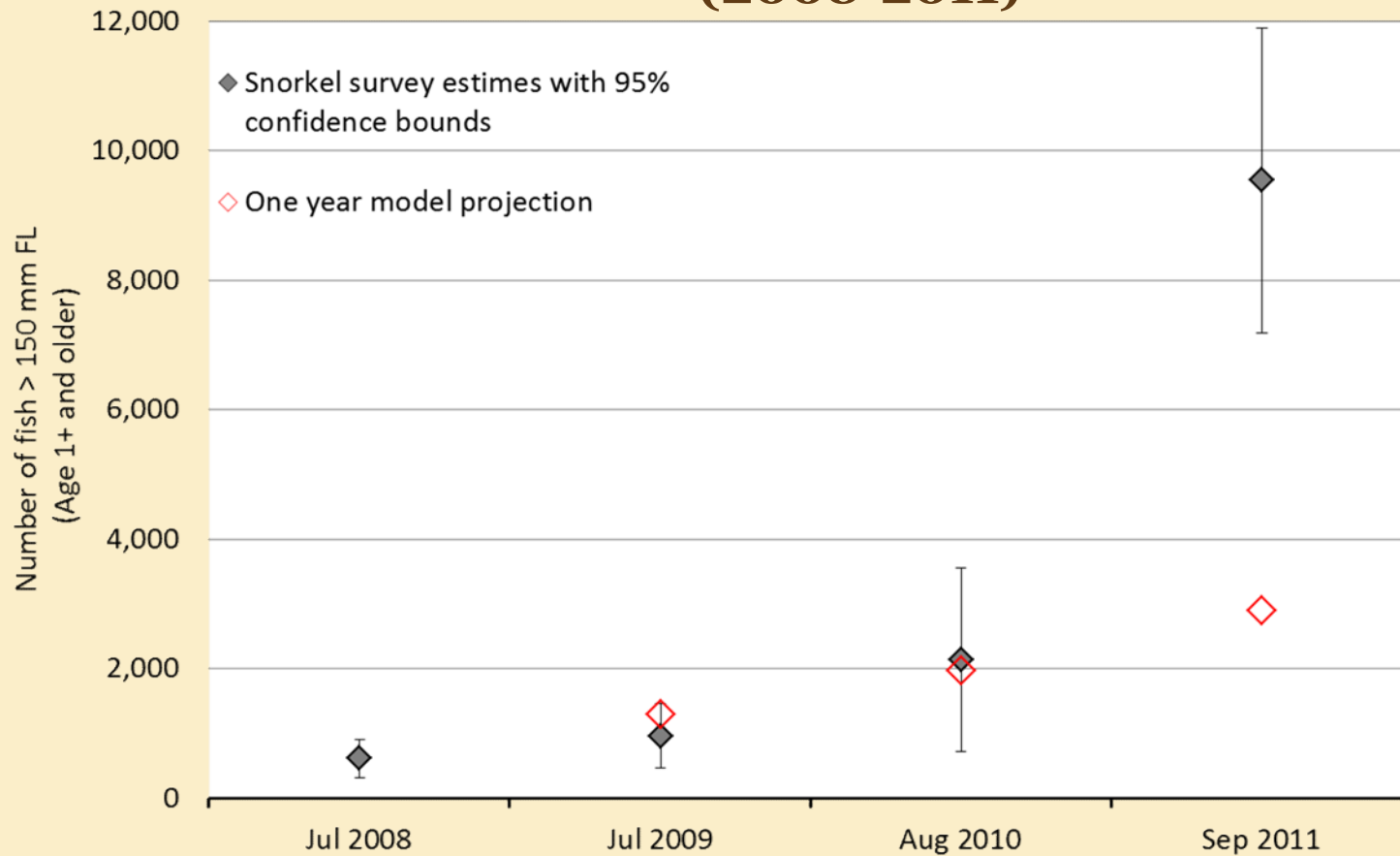
Model Validation

Model- and Survey-based Abundance (2008-2011)



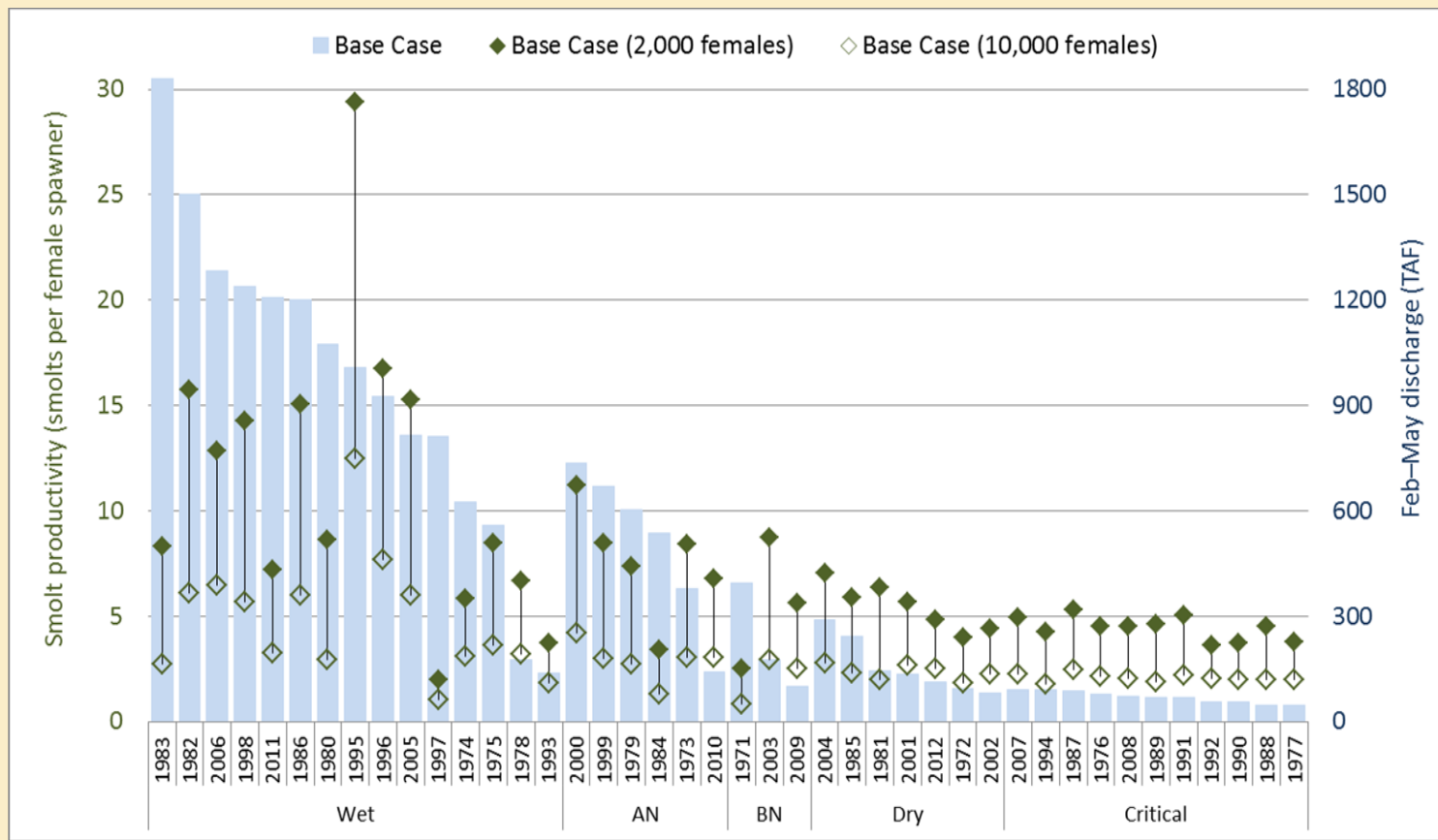
Model Validation

Model- and Survey-based Abundance Ests. > 150 mm FL (2008-2011)



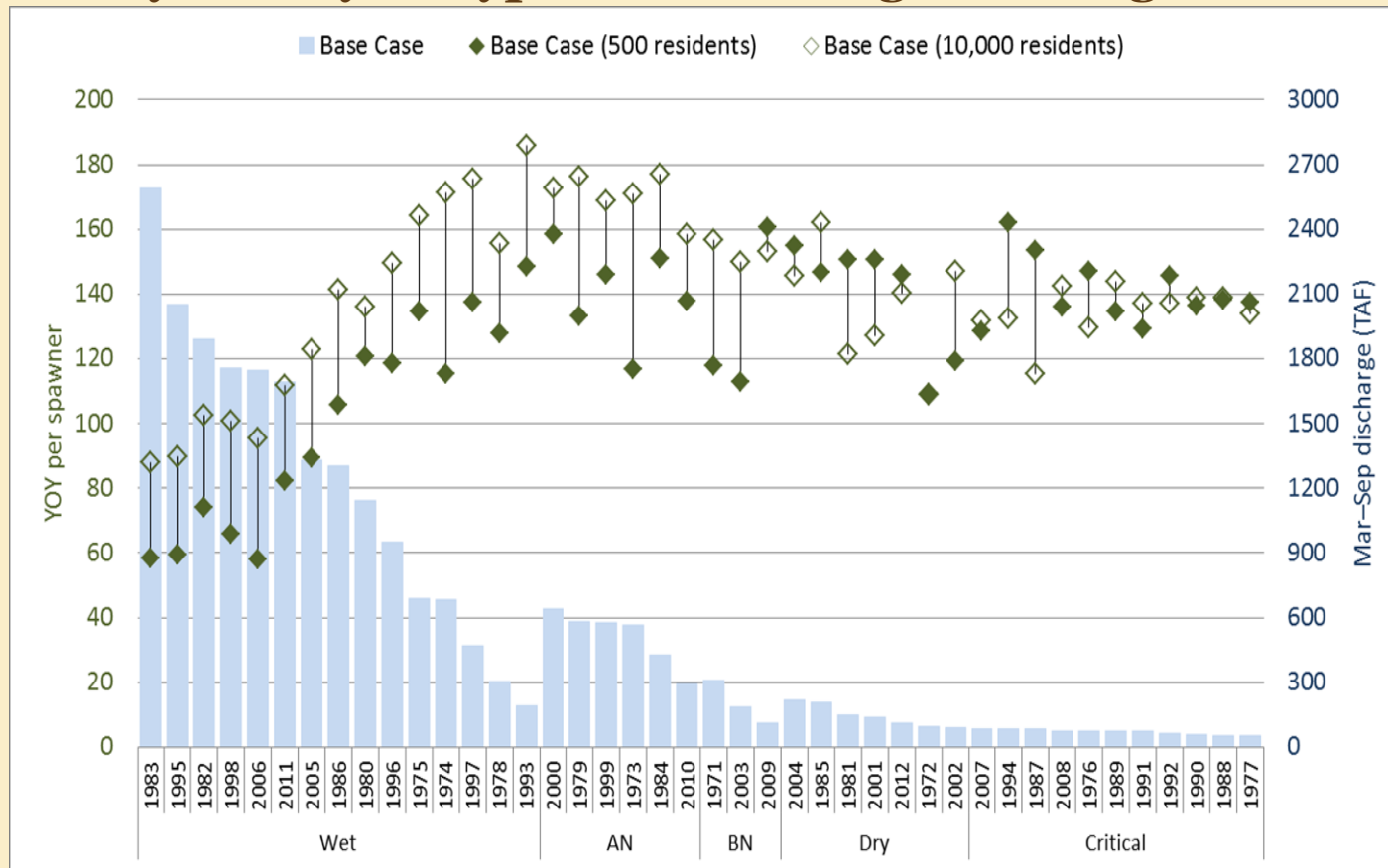
Base Case Scenario Results

TRCh Modeled yearly (1971–2012) Chinook salmon smolt productivity for the base case sorted by La Grange discharge (Feb-May)



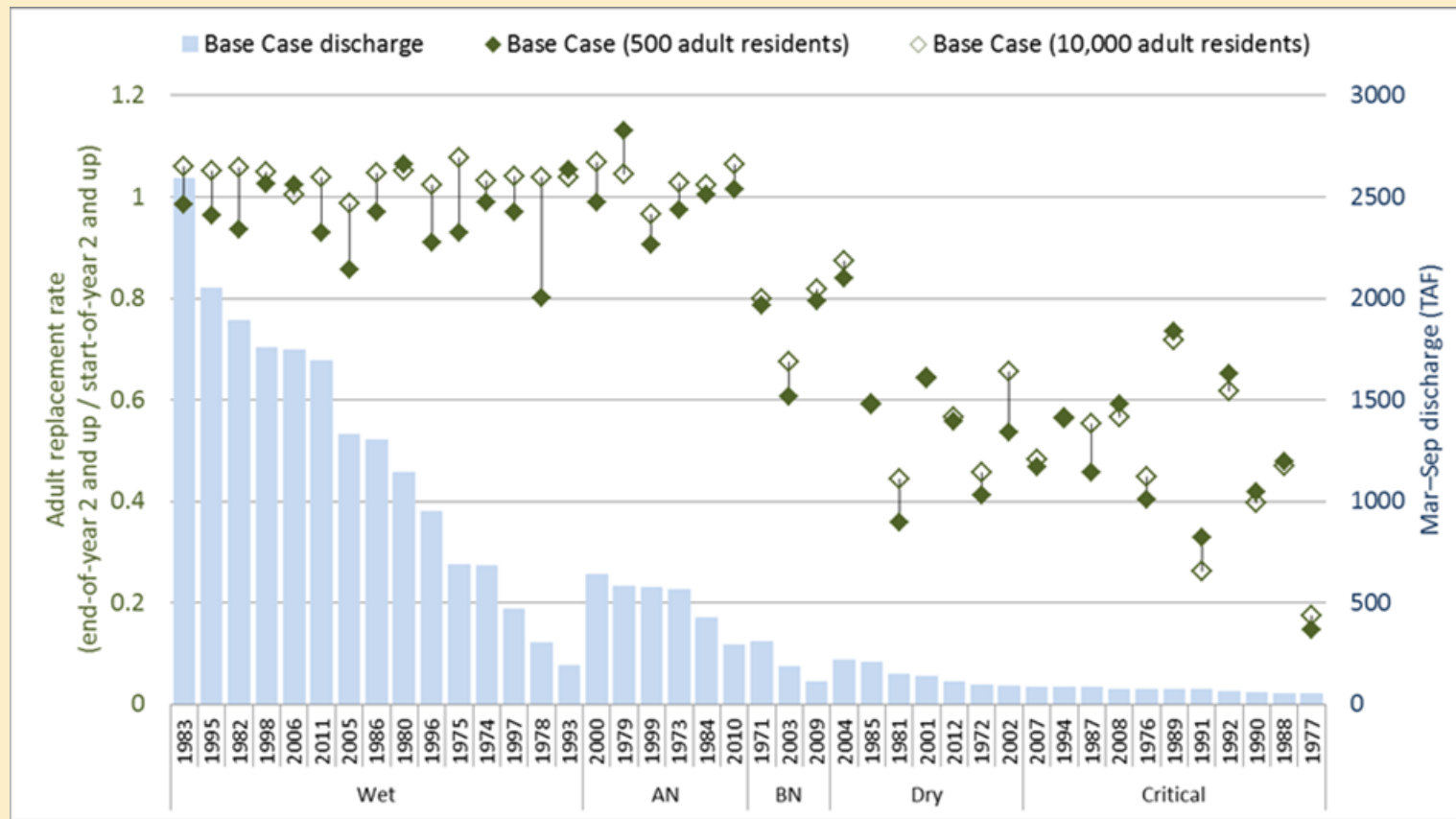
Base Case Scenario Results

TROm v3.2 modeled juvenile *O. mykiss* productivity for the Base Case sorted by water year type and La Grange discharge (Mar–Sep)



Base Case Scenario Results

TR0m modeled adult *O. mykiss* replacement for the Base Case sorted water year type and La Grange discharge (Mar–Sep)



Summary

- **TRCh/TROm Models updated to include**
 - Updated floodplain habitat estimates
 - More detailed information on predator distribution and survival
 - Use of additional RST data for TRCh calibration/validation
 - Incorporation of Swim Tunnel report into TROm growth rate calibration
- **Updated models consistent with 2013 Study Reports**
 - Identified spawning habitat limitation for Chinook salmon
 - Modeled factors affecting Chinook smolt survival (predation, flow) exert greatest influence on production
 - Increased displacement of *O. mykiss* fry with flow results in lower rearing densities and increased mortality
 - Increased extent of thermally suitable habitat with flow in summer for resident *O. mykiss* (Age 1+ and older)

Questions?

Lower Tuolumne River Temperature Model

Lower Tuolumne River Temperature HEC-RAS Model

- Model purpose:
 - Provide simulated temperatures adequate to compute 7DADM
 - Model river temperature to compare results to MWAT standard
 - Provide daily average temperatures for Tuolumne River O. Mykiss model, Tuolumne River Chinook model, and other models and studies

Background

W&AR-16 Lower Tuolumne River Temperature Model Workshops

<u>Date</u>	<u>Title</u>
October 26, 2012	River Temperature Model Overview, Description, Calculations, Data Sources, Calibration, and Validation
January 24, 2013	Don Pedro Reservoir Temp-River Temp Models Training Session
June 4, 2013	River Temperature Model Overview, Calculations, Base Case Results

Lower Tuolumne River Temperature HEC-RAS Model

- 1-D Temperature model
- Hourly output from WY 1971-2012
- Calibrated to observed 2011 data, 23 locations
- Validated with observed 2012 data, 23 locations
- Meteorological data from Crocker Ranch station and Turlock Denair II station
- Inputs: Modeled storage, outflow, and diversion from TR daily Operations model. Dry Creek time series from USGS gage summation, input at RM 16. Accretion time series from USGS gage summation, input between RM 51.8 and 16.2. Reservoir release temperature from MIKE3 model.

Lower Tuolumne River Temperature HEC-RAS Model Updates

Dry Creek Inflows and Modesto Accretions

- LTR Temperature Model includes separate assumptions for Dry Creek and Accretion flows
- Original input series were reversed in the 2013 Base Case due to a labeling error. As a result, the river between RM 51.8 and 16 had incorrect spatial flow distribution.
- Labeling error and spatial flow distribution is updated in the latest temperature model Base Case version

Reservoir Release Temperature

- Upstream boundary condition was updated to reflect updated MIKE3 reservoir model outputs

Lower Tuolumne River Temperature HEC-RAS Model Updates

Questions?

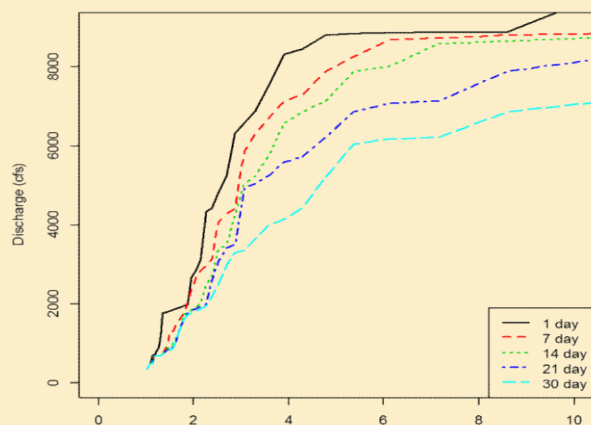
Lower Tuolumne River Floodplain Model

Lower Tuolumne River Floodplain Model

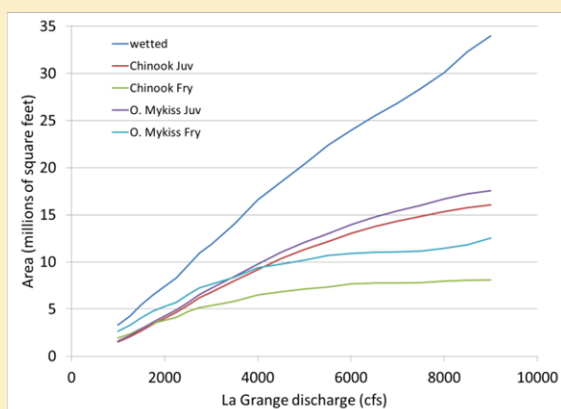
- 1D HEC-RAS and 2D TUFLOW model implemented in 3 reaches (RM 52.2 to 0) to:
 - Analyze the amount of floodplain inundated at flows between approximately 1,000 cfs and 9,000 cfs
 - Assess the suitability of inundated floodplain habitat for juvenile salmon rearing
 - Evaluate the frequency and period of inundation over a range of flows for the base case (WY 1971-2012) hydrology

Area-Duration Frequency Curves to Show Useable Habitat Area

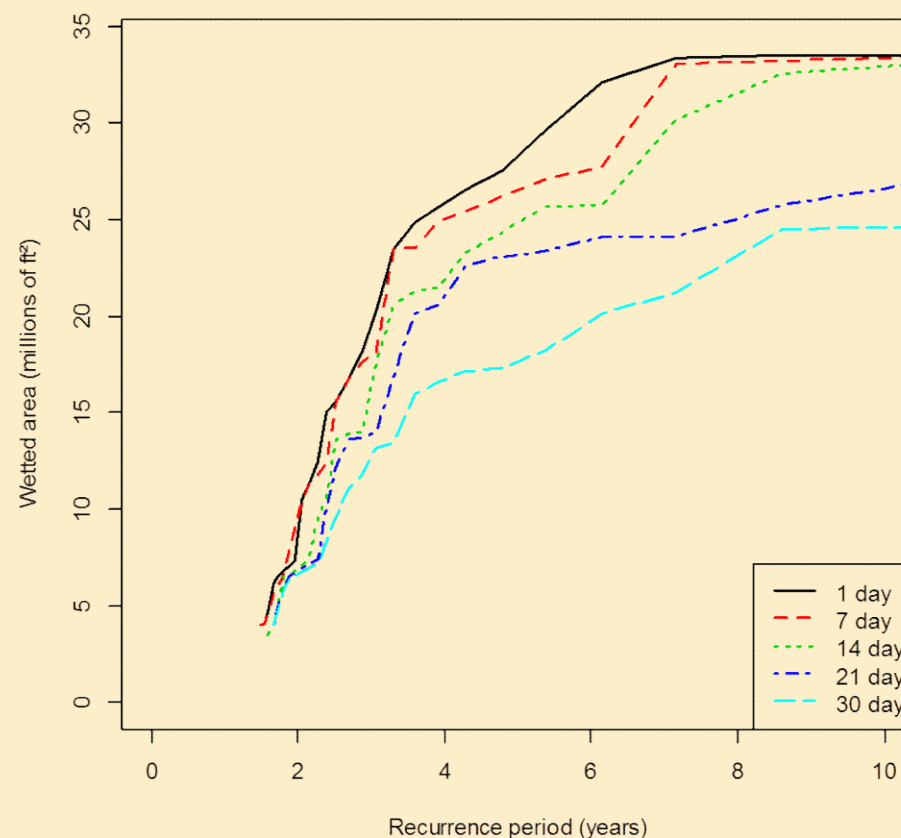
Discharge Frequency



Usable habitat area curve



Area-Duration Frequency



Lower Tuolumne River Floodplain Model

- Workshops (February and December 2014)
- Draft Study Report (September 2015)
 - Comments on suitability of off-channel ponds
- Final Study Report (to be filed with AFLA)
 - No changes in model calibration
 - Small changes in total and usable area estimates

Lower Tuolumne River Floodplain Model

Questions?

From: Staples, Rose
Sent: Monday, June 12, 2017 4:06 PM
To: 'John Buckley' <johnb@cserc.org>
Subject: RE: question about dates of any upcoming Don Pedro-LaGrange meetings

My apologies for taking so long to respond to your request. I have checked in with the Districts and no firm dates have been set yet for any upcoming meetings. I will let you know as soon as possible once I've been advised of any. Thank you.

Rose Staples, CAP-OM, MOS
D 207-239-3857

hdrinc.com/follow-us

-----Original Message-----

From: John Buckley [mailto:johnb@cserc.org]
Sent: Monday, June 5, 2017 11:40 AM
To: Staples, Rose <Rose.Staples@hdrinc.com>
Subject: Re: question about dates of any upcoming Don Pedro-LaGrange meetings

Hi, Rose:

I am trying to plan ahead to schedule items on my calendar. Do you have any dates of planned meetings for the Don Pedro-LaGrange relicensing process? I would be grateful to get them so I can try to avoid conflicts with other commitments.

Thank you,

John Buckley
CSERC
johnb@cserc.org

From: Staples, Rose

BCC To: Don Pedro Relicensing Participants Email Group

Sent: Thursday, June 22, 2017 10:28 AM

Subject: Don Pedro May 18 Modeling Tools Update Meeting Notes for Review and Comment

Don Pedro Relicensing Participants,

The DRAFT NOTES from the May 18, 2017 Modeling Tool Updates Meeting have been uploaded to the Don Pedro Project Relicensing Website <http://www.donpedro-relicensing.com> as an attachment to the CALENDAR May 18 meeting date. Please provide any comments on the meeting notes to me at Rose.Staples@hdrinc.com by Friday, July 21, 2017. The Districts will address any comments received and produce a final version of the meeting notes, which will be posted to the Don Pedro Project Relicensing Website.

If you have any difficulties locating and/or accessing the document, please let me know. Thank you.

Rose Staples, CAP-OM, MOS

Senior Administrative Assistant



HDR

970 Baxter Boulevard Suite 301

Portland ME 04103

D 207-239-3857

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**Don Pedro Hydroelectric Project
Modeling Tool Updates Meeting
1:00 pm to 3:00 pm on Thursday, May 18, 2017
C.C. Wright Hall, 247 E Canal Drive, Turlock CA**

Draft Meeting Notes

Meeting Attendees		
No.	Name	Organization
1	Jesse Deason	HDR
2	Bao Le	HDR
3	Jenna Borovansky	HDR
4	Laura Johnson	HDR
5	Rob Sherrick	HDR
6	John Devine	HDR
7	Dan Steiner	Consultant to the Districts
8	Noah Hume	Stillwater Sciences
9	Chase Hildeburn	State Water Resources Control Board
10	Patrick Koepele	Tuolumne River Trust
11	Peter Drekmeier	Tuolumne River Trust
12	Anna Brathwaite	Modesto Irrigation District
13	Gordon Enas	Modesto Irrigation District
14	Bill Paris	Modesto Irrigation District
15	Steve Boyd	Turlock Irrigation District
16	Jim McCoy	Turlock Irrigation District
17	Art Godwin	Turlock Irrigation District
18	Chris Shutes	California Sportfishing Protection Alliance
19	Meg Layhee	Central Sierra Environmental Resource Center
20	John Buckley	Central Sierra Environmental Resource Center
21	Bill Foster	National Marine Fisheries Service
22	Dale Stanton	California Department of Fish and Wildlife
23	Allison Boucher	Tuolumne River Conservancy
24	Dave Boucher	Tuolumne River Conservancy
25	Ron Yoshiyama	City and County of San Francisco
26	Scott Lowe*	HDR
27	Peter Baker *	Stillwater Sciences
28	Bill Sears*	City and County of San Francisco
29	Nicola Ulibarri*	UC-Irvine

* Attended by phone.

On May 18, 2017, Turlock Irrigation District and Modesto Irrigation District (collectively, the Districts) hosted a Modeling Tools Update Meeting for the Don Pedro Hydroelectric Project (Don Pedro Project). This document summarizes discussions during the meeting. It is not intended to be a transcript of the meeting. Attachment A to this document provides meeting materials, including the meeting agenda and PowerPoint presentations shown at the meeting for each of the Don Pedro Project models addressed during the meeting.

Mr. John Devine (HDR) provided a brief overview of the status of Don Pedro Hydroelectric Project relicensing activities. Mr. Devine stated that the purpose of this meeting was to report to Relicensing Participants on several models that were developed to support the Don Pedro Project relicensing that have

been updated, in advance of the Districts filing the Don Pedro Project Amended Final License Application (AFLA) in September 2017.

Project Operations Water Balance Model (W&AR-02)

Mr. Dan Steiner (Consultant to the Districts) presented the history of the Project Operations Water Balance Model, followed by an overview of the modifications and changes made to the model. Modifications have been made to San Francisco Operations and Don Pedro/District Operations model inputs in order to correct minor errors in the model and refine the model (see Attachment A).

Mr. Chris Shutes (California Sportfishing Protection Alliance) asked Mr. Steiner if the model updates the year type in February, March, and May or if the model only updates the water year type in April and Mr. Steiner confirmed that the revised model incorporates the mid-April water year type designation based on the FERC requirements.

Mr. Peter Drekmeier (Tuolumne River Trust) asked if the model could quantify groundwater recharge. Mr. Steiner responded that this model does not estimate groundwater recharge.

Mr. Dale Stanton (California Department of Fish and Wildlife) asked if the revised model would be made available to others. Mr. Devine responded that the Districts would provide a copy of the latest version of the model. A sign-up sheet was circulated for meeting participants to indicate if they would like to receive a copy of available models. Participants on the phone were instructed to send an email to Ms. Rose Staples (HDR) (Rose.Staples@hdrinc.com) indicating that they would like a copy of the model. The Districts will distribute the model to Relicensing Participants that request a copy of the model.

Don Pedro Reservoir Temperature Model (W&AR-03)

Dr. Scott Lowe (HDR) provided an update on the Don Pedro Reservoir Temperature Model. Dr. Lowe provided an overview of the model, and described why the MIKE3 numerical model was selected for modeling the thermal structure of Don Pedro Reservoir. Dr. Lowe provided an overview of the five model workshops that occurred between April 2012 and February 2014. Dr. Lowe described the changes made to the model by DHI (the creators of the model) since 2012, and the re-calibration that has occurred as a result of model revisions, which was limited to the model determining solar radiation by user-input of longitude and latitude.

There were no questions or comments from meeting attendees about the Don Pedro Reservoir Temperature Model.

Lower Tuolumne River Temperature Model (W&AR-16)

Mr. Rob Sherrick (HDR) provided an overview of the Lower Tuolumne River Temperature Model. The model was originally released to Relicensing Participants in 2012, and three model workshops have occurred between October 2012 and June 2013. Mr. Sherrick provided an overview of the parameters and inputs of the HEC-RAS model. The model was calibrated to water year 2011 (a wet year) data and validated with water year 2012 data. In one version of the model previously distributed to Relicensing Participants (2/21/14 version), the Dry Creek and accretion input series were reversed in the 2013 Base Case due to a labeling error. This has been corrected in the latest version of the model.

Mr. Bill Foster (National Marine Fisheries Service) asked Mr. Sherrick to provide the name of the current model version. Mr. Sherrick responded that the current model will be a date-stamped version of the same

model number used previously. Mr. Devine added that any Relicensing Participants that indicate they would like a copy of the updated model may receive one from the Districts.

Tuolumne River Chinook Salmon (W&AR-06) and *O. Mykiss* Population Models (W&AR-10)

Mr. Noah Hume (Stillwater Sciences) presented an overview of the Tuolumne River Chinook Salmon (TRCh) and *O. mykiss* (TROm) population models. Mr. Hume stated that the Don Pedro Project Operations Model and Reservoir Temperature Model are inputs into the HEC-RAS River Temperature Model, and the outputs from the HEC-RAS River Temperature Model are subsequent inputs into the TROm and TRCh models. Mr. Hume presented the modeled life stage and model structure for each population model and described the changes to the TRCh and TROm models in the updated version. The primary updates to the TRCh and TROm models included refined usable habitat estimates following completion of the Floodplain Hydraulic Analysis Study (W&AR-21) in 2014/2015. The models were also updated to incorporate reach-specific predation risk estimates based upon long-term seine and snorkel data showing riverwide distribution of predatory fish species. These changes necessitated a recalibration of both the TRCh and TROm models.

Additional rotary screw trap (RST) data was used for TRCh model calibration and validation. TROm model calibration approach was changed to adjustment of growth parameters to match size-at-age data as well as adjustment of mortality parameters to achieve a stable long-term population size of *O. mykiss*. TROm model validation was based upon comparisons to 2008–2011 snorkel-based population estimates.

Mr. Shutes asked if the predation data includes detailed information based on sampling. Mr. Hume stated that the predation data is based on snorkeling and seining observations of predatory species and the 2013 Predation Study. Predation risk was based on an analysis of predatory species' stomach contents during the 2012 Predation Study as well as a more extensive study conducted in 1988-1989.

Mr. Patrick Koepele (Tuolumne River Trust) asked whether the predator abundance estimates represent an average for the time period from 1997 to 2014. Mr. Hume responded that although survey data represents average relative predator abundance, they were used to indicate predation risk based on the frequency of presence/absence as weighed by documented predation rates for each species.

Mr. Drekmeier asked if the native salmonid species have a better chance of survival in high flow years. Mr. Hume stated that the model accounts for hydraulics in the river, and that higher flows do produce somewhat greater smolt survival when timed to coincide with smolt outmigration. However, the RST data indicate fry survival is extremely low and relative low fry passage has been documented even in wet years.

Mr. John Buckley (Central Sierra Environmental Resource Center) asked if all mortality was presumed to be predation mortality (as opposed to temperature mortality), and whether the model distinguishes between piscivorous and avian predation. Mr. Hume said that the model assumes most predation is due to piscivorous predation rather than avian and that most mortality in the model is due to predation. He noted that while the model accounts for temperature mortality, fall-run Chinook juvenile fish are typically out of the river before temperatures reach a level where mortality would occur. This also is supported by the Districts' RST data.

Mr. Stanton asked Mr. Hume how the model would represent a year like the current water year with respect to cold temperatures and high flows. Mr. Hume responded that the model would show this year as a good survival year in terms of Chinook salmon.

Ms. Meg Layhee (Central Sierra Environmental Resource Center) asked if the model overestimated smolt passage in most years. Mr. Hume stated that like all models, the modeled mean annual smolt passage is better reproduced than the variability and so maximum and minimum smolt passage may be under- or over-estimated, respectively. No bias related to water year was identified in the calibration or validation process, however.

Mr. Hume described model calibration and validation results, and showed Base Case scenario results. He concluded his presentation with a summary of model updates, refinements, and results.

Mr. Shutes asked about a statement Mr. Hume made saying that there is less floodplain in the middle reach of the Tuolumne River, and requested an explanation of why this would be. Mr. Hume responded that there is some floodplain near La Grange Bridge, but the middle “gravel mining” reach of the river is characterized by levees on both sides of the river. Because the lower “sand bedded” reach is characterized by levees and channel incision, flows must reach upwards of 7,000 cubic feet per second (cfs) in order to create significant floodplain area. Mr. Devine added that there is a San Joaquin River backwater effect that contributes to increased floodplain inundation in the lower reach of the Tuolumne River during high flow years.

Mr. Koepele asked if the lack of floodplain in the middle reach creates a limiting factor for salmonids. Mr. Hume responded that he interpreted the model results as showing that there is enough in-river habitat to support progeny of up to 40,000 spawners and floodplain area does not appear to constitute a habitat limitation.

Mr. Drekmeier asked whether the model provides a way to measure whether the drop in flow observed during snorkeling surveys encouraged anadromy in *O. mykiss*. Mr. Hume responded that because almost no data on anadromous *O. mykiss* exists, the TROM model predicts anadromy as a probability based upon the anadromy of female and male spawners.

Mr. Drekmeier asked if flows are a limiting factor, since it is assumed that this year, given the high flows in the system, will be beneficial for salmonid outmigration and returns. Mr. Devine responded that early high flow, when redds are in place, mobilize gravel and may negatively impact outmigration and returns. Mr. Hume stated that there was also some scour in 1997 and there is some evidence there were lower returns following this event.

Mr. Foster asked if the population models could use spawning gravel as an input. Mr. Hume responded that spawning gravel area is a model input in the form of habitat patches of specific sizes and locations.

Mr. Buckley asked if upstream passage is another alternative to improve spawning habitat since spawning gravel is a limiting factor. Mr. Hume replied that spawning habitat is not limiting until fairly high escapements are reached. Mr. Devine added that the subject of this Workshop is model updates and the Districts are not prepared today to discuss “limiting factors”.

Mr. Koepele asked if the Tuolumne River Chinook Salmon and *O. mykiss* population model study reports will be updated as a result of model revisions. Mr. Hume stated that the report updates will be filed with the Don Pedro AFLA in September 2017.

Lower Tuolumne River Floodplain Model (W&AR-21)

Mr. Hume provided an overview of recent updates to the Lower Tuolumne River Floodplain Model. The changes include small revisions to the post-processing done to exclude some off-channel pond areas but

that the total and usable area estimates were not substantially different to those presented in the Draft report. No changes to model calibration were necessary.

Mr. Buckley asked if the model considers smolts. Mr. Hume said the model considers potential rearing habitats for fry and juvenile fish. Smolts are actively outmigrating and do not use floodplains.

Ms. Allison Boucher (Tuolumne River Conservancy) asked if a one-day floodplain event was useful to fry/juvenile fish. Mr. Hume responded that based upon recent literature and inundation event would likely need to be two or more weeks in duration in order to have a measurable impact on relative growth of rearing juveniles.

Ms. Boucher asked Mr. Steve Boyd (Turlock Irrigation District) if TID would be willing to provide an additional model run for a restoration proposal. Mr. Devine said that due to the time-consuming effort to prepare the Districts' response to the State Water Resources Control Board's Supplemental Environmental Document (SED), and given the upcoming FERC filing deadlines for the Don Pedro Hydroelectric Project AFLA and La Grange Hydroelectric Project Final License Application (FLA), the Districts are focused on the latter two efforts at this time.

Meeting Conclusion and Model Requests

A sign-up sheet was circulated for Relicensing Participants to request copies of the models. The following model requests were submitted:

1. Patrick Koepele (Tuolumne River Trust): Water Balance Model; Patrick later requested the Lower Tuolumne River Floodplain Model (TUFLOW), Tuolumne River Chinook Salmon (TRCh) and *O. mykiss* (TROm) population models via email on May 26, 2017.
2. Dale Stanton (California Department of Fish and Wildlife): any and all models available
3. Chris Shutes (California Sportfishing Protection Alliance): Water Balance Model



Don Pedro Relicensing Modeling Tool Updates Meeting Agenda

Thursday, May 18, 2017, 1:00 pm to 3:00 pm

C.C. Wright Hall (formerly the War Memorial Building)

247 East Canal Drive, Turlock, California

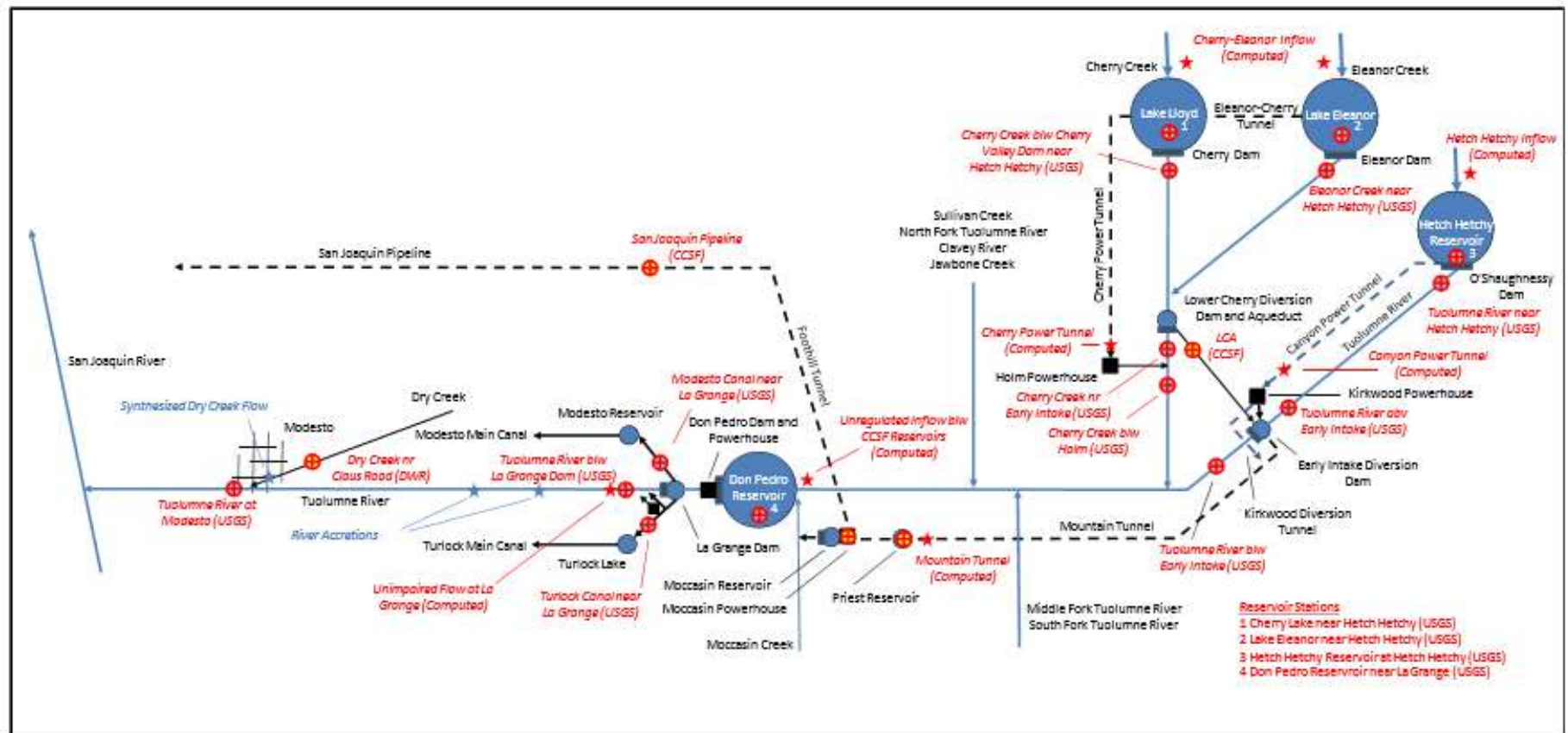
Conference Line: 1-866-583-7984, Passcode: 230-0743

Join Lync Meeting <https://meet.hdrinc.com/jenna.borovansky/3D64F0F5>

TIME	TOPIC
1:00 pm - 1:10pm	Introduction of Participants and Goals of Meeting
1:10 pm – 1:40 pm	Project Operations - Water Balance Model (W&AR-02)
1:40 pm – 2:00 pm	Don Pedro Reservoir Temperature Model (W&AR-03)
2:00 pm – 2:10 pm	Lower Tuolumne Temperature Model (W&AR-16)
2:10 pm – 2:50 pm	Chinook Salmon Population Model (W&AR-06)
	<i>Oncorhynchus Mykiss</i> Population Model (W&AR-10)
2:50 pm - 3:00 pm	Floodplain Hydraulic Analysis (W&AR-21)

Project Operations Water Balance Model

Operations Model used to simulate current Don Pedro Project Operations and alternative scenarios for future operations of the Project



Tuolumne River Basin hydrologic measurement and computation points

Operations Model Version History

- Version 1.0 – Test Case used for training relicensing participants on model (October 2012)
 - Draft Report was filed in the ISR (January 2013)
 - ✦ Model Hydrology Report
 - ✦ Model Description and User's Guide
 - ✦ Model Validation Report
- Requests for study report changes and other study activities
 - Refinement of Tuolumne River Basin unimpaired hydrology (March 2013)
 - Completed field accretion measurements in February 2013, filed results with FERC (June 2013)
- Version 2.0 - Base Case added to model (May 2013)
- Version 3.0 – Base Case model updated with hydrology through WY2012 (December 2013), filed with Updated Study Report (January 2014)

RP Modeling Interaction History

- Consultation Workshop No. 1 – Focusing on the development of the hydrology of the model (April 9, 2012)
- Consultation Workshop No. 2 – Discussion of accretion flows in the lower Tuolumne River, node locations, and results of field measurements (September 21, 2012)
- Consultation Workshop No. 3 – Discussion of operations model's architecture and computational methods, and review of the User's Guide (October 23, 2012)
- Consultation Workshop No. 4 – Discussion of model validation, and hands-on training session (December 7, 2012)
- Consultation Workshop No. 5 – Model modifications and Base Case presentation, Model Version 2.0 training (May 30, 2013)
- Updated Study Report Meeting - Model and hydrology extension, Model Version 3.00 with extended hydrology for a study period of WY 1971-2012 (January 2014)
- May 18, 2017 – Model Version 3.1 update/revision discussion

The Operations Model has been used to test alternative scenarios of flow management, supporting the investigation of fisheries and water supplies

During the course of these investigations several revisions to Version 3.0 have been identified to either correct oversights and errors, or to improve the depiction of operations

- San Francisco Operations
 - Hetch Hetchy Reservoir - Fixed August/September minimum flow schedules; Refined flow schedule for mid-month change; Refined year-type lookup trigger
 - Lake Eleanor – Refined flow schedules for mid-month change
- Don Pedro Project/District Operations
 - La Grange (Base Case) – Minimum flow schedule logic refined to provide mid-month change during October and April; Minimum flow requirement year type modified to occur on April 15; Corrected flow requirement for leap year February
 - Districts' Canals – Corrected day-of-month diversion factors to sum to 1.0000 for every month

Effects of changes

San Francisco Operation Changes

- Hetch Hetchy Reservoir minimum release schedule corrections affect several years adding additional water immediately below the reservoir, affecting timing and volume of other reservoir releases during a year. Net sum zero difference over the hydrologic study period.
- Lake Eleanor schedule refinement refines the daily distribution of minimum releases during April and September.
- Don Pedro Reservoir inflows follow changes in San Francisco releases, affecting timing of inflow. However, there is a net sum zero difference in inflow over the hydrologic study period.

Effects of changes

Don Pedro Project/District Changes

- La Grange current FERC schedule better represented during October with mid-month refinement – same monthly volume; Mid-month April year type change better represents current operations; Leap year correction better reflects current FERC schedule.
- District Diversions – Correction of daily factors better translates monthly water demands, results in a modeled decrease in water demand of approximately 6,600 acre-feet per year.

Illustration of Changes

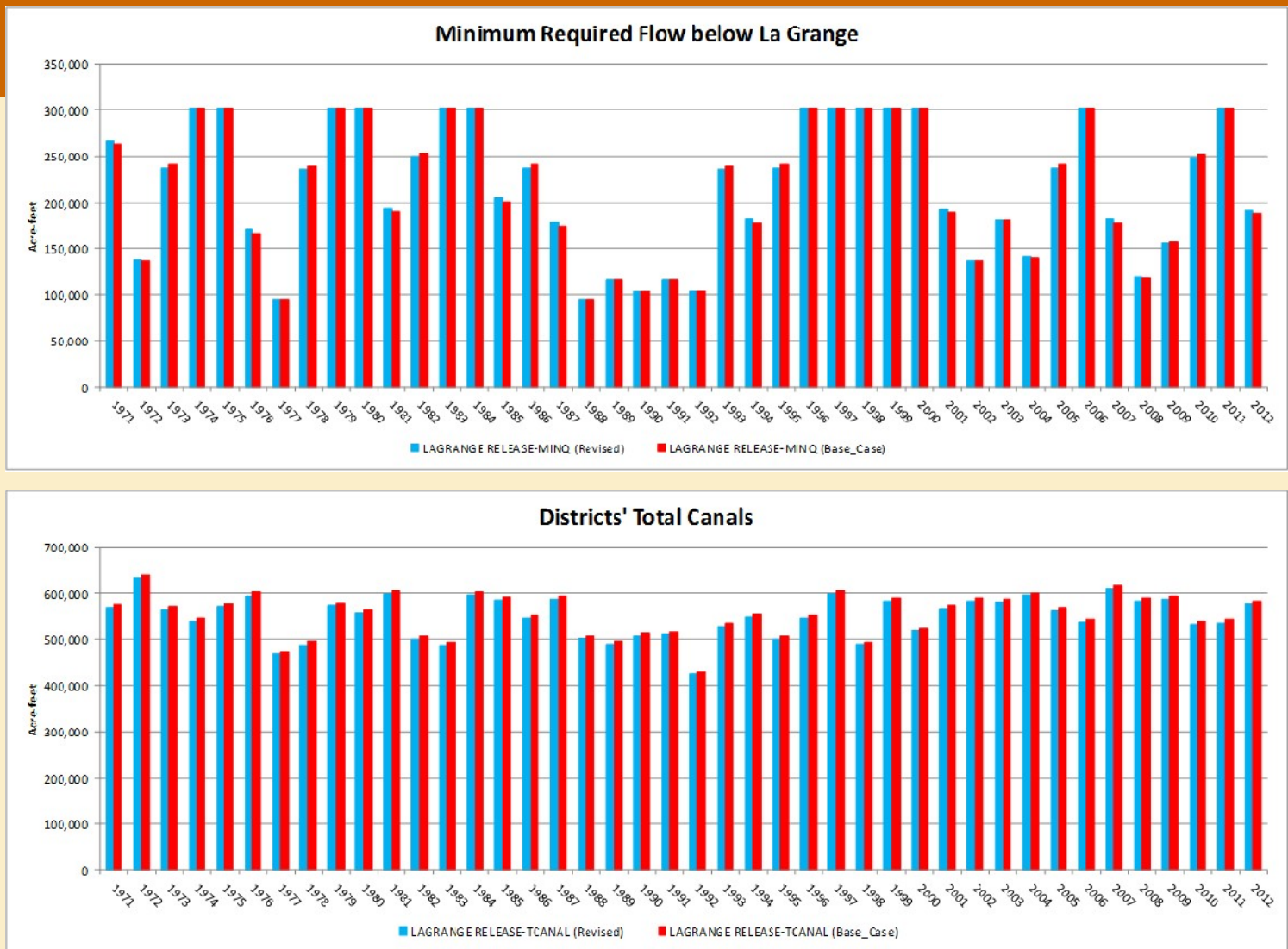
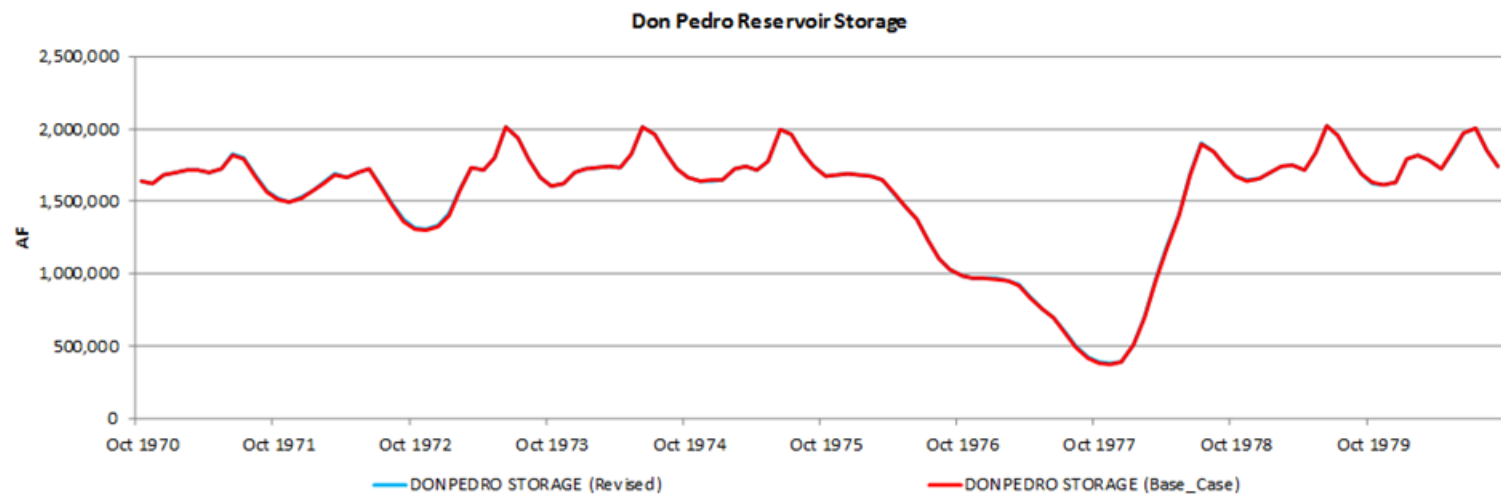


Illustration of Changes

WY 1971-1980



WY 1981 - 1990

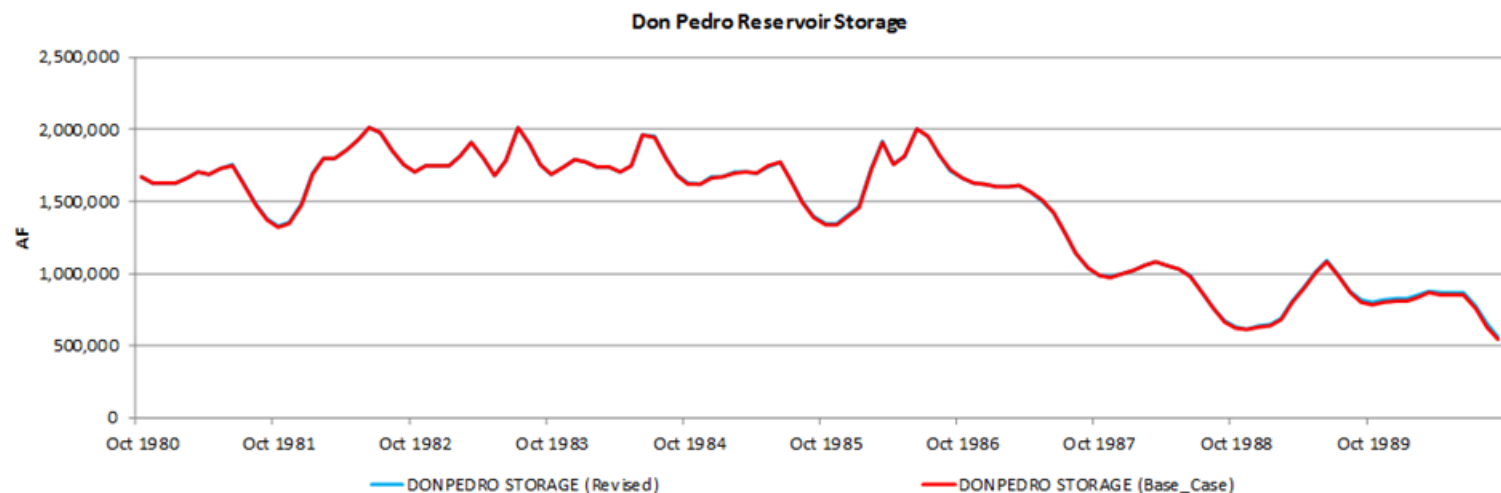
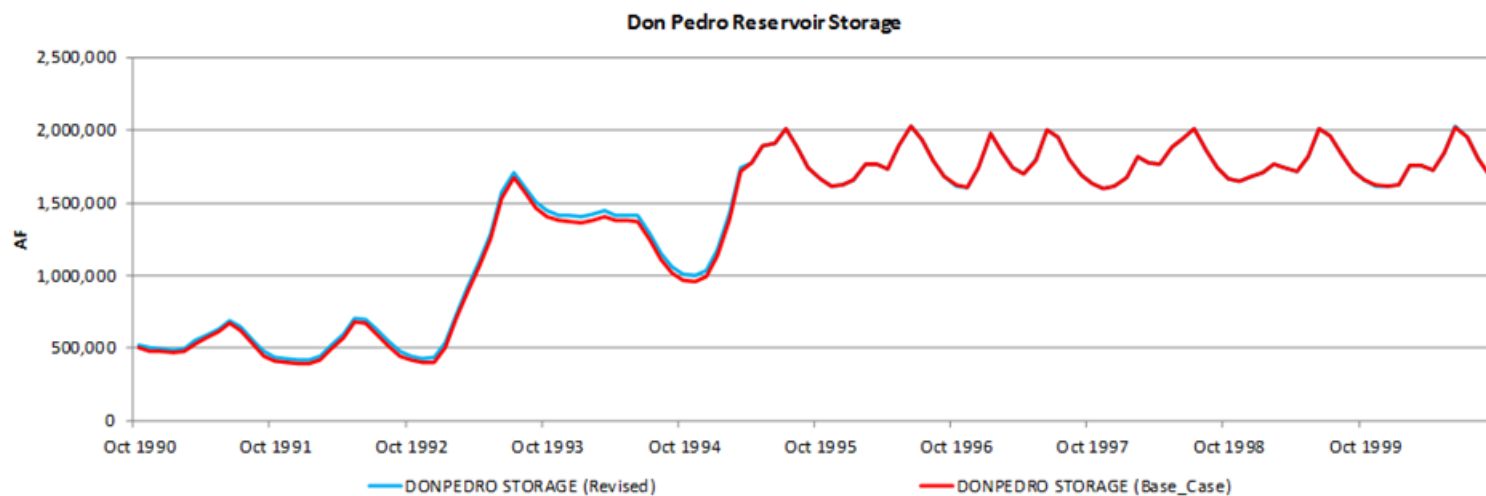
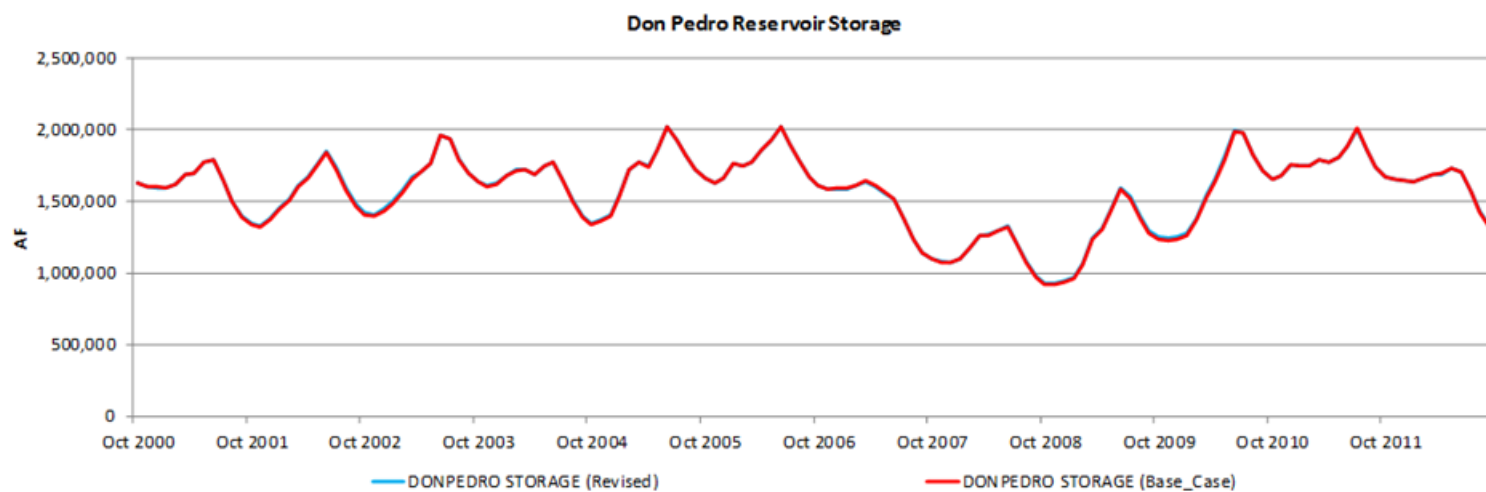


Illustration of Changes

WY 1991 - 2000



WY 2001 - 2012



Project Operations Water Balance Model

Questions?

Don Pedro Reservoir Temperature Model

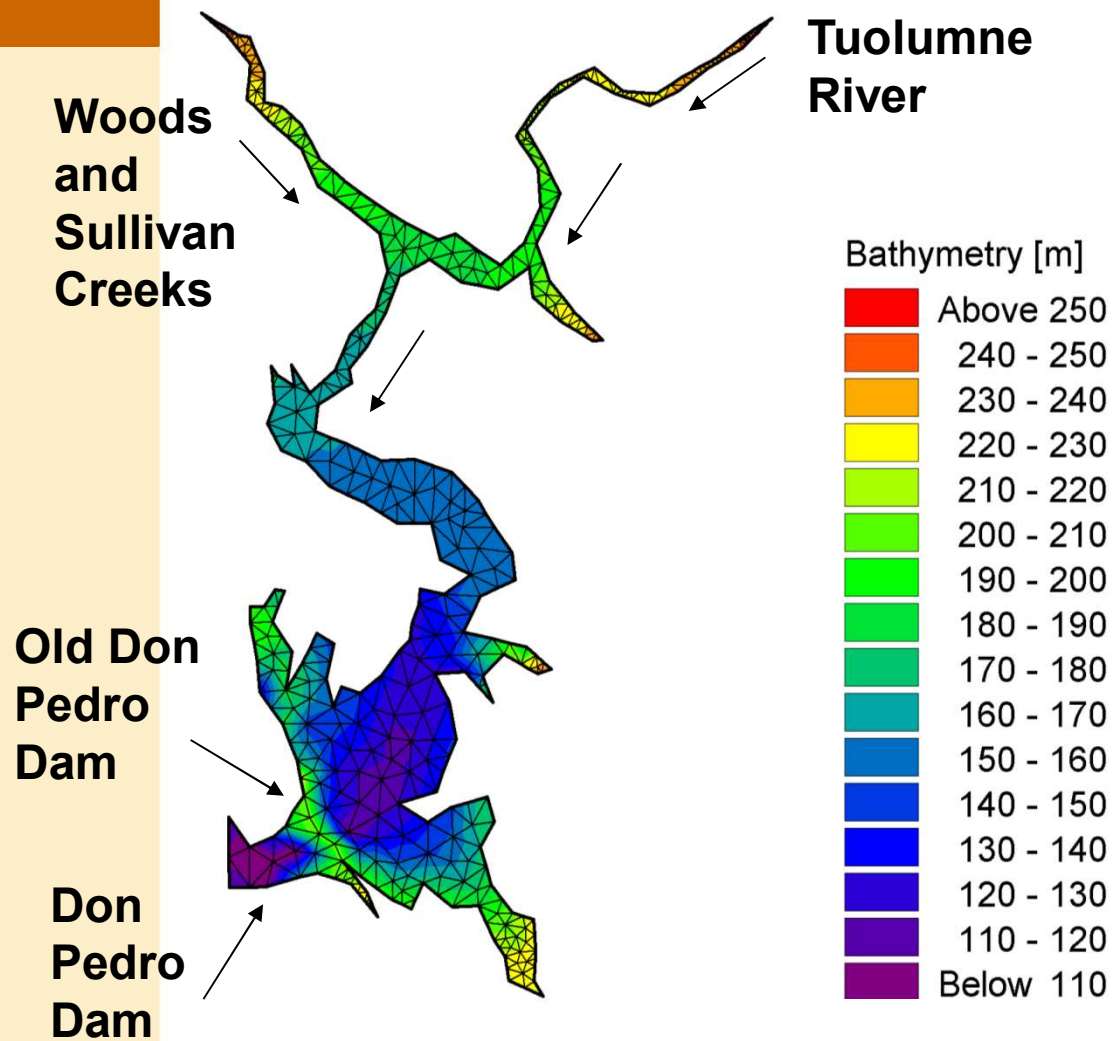
Background

- A numerical model was required that could model temperature in the reservoir and the temperature of water being released
- 1d, 2d and 3d modeling options were reviewed
- The complex geometry of the reservoir made a 3d model the preferred option
- The DHI MIKE model was chosen
 - It has a long development history and track record
 - It is widely used throughout the world
 - It has extensive scientific and software documentation
 - It has a user friendly interface

Relicensing Participant Workshops

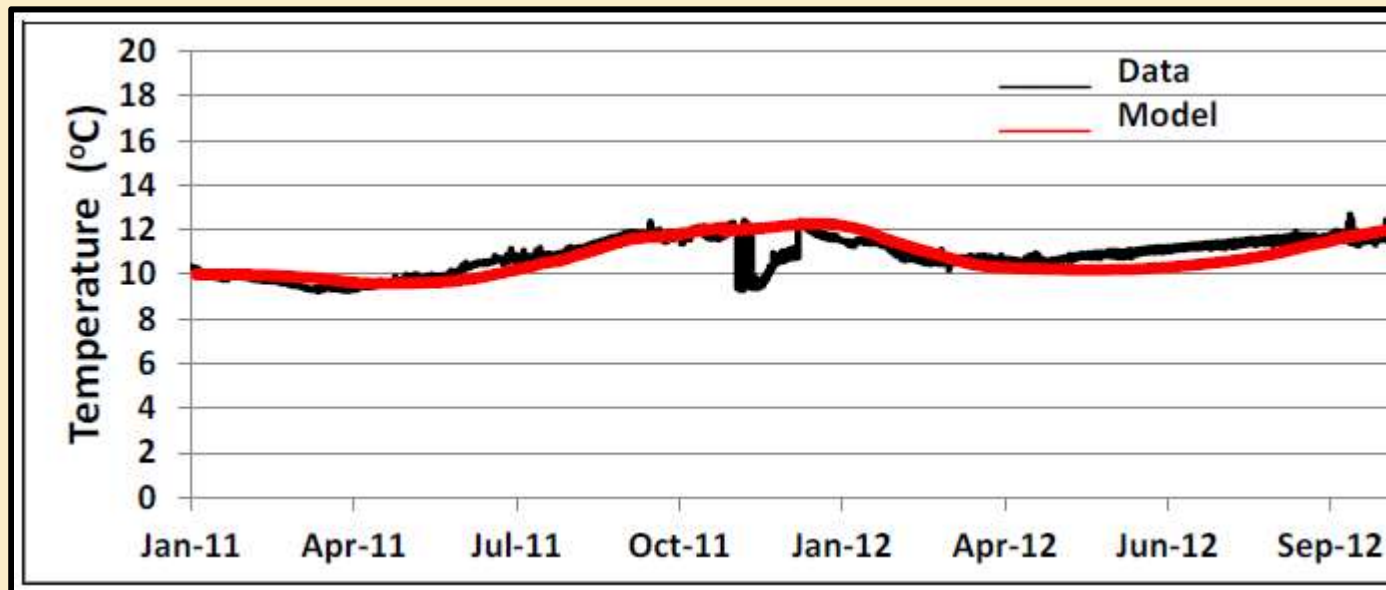
W&AR-03 Reservoir Temperature Model Workshops	
<u>Date</u>	<u>Title</u>
April 10, 2012	Reservoir Temperature Model Overview, Input, and Output
October 26, 2012	Reservoir Temperature Model Update
January 24, 2013	Don Pedro Reservoir Temp-River Temp Models Training Session
June 4, 2013	Don Pedro Reservoir Temp-River Temp Models 2 nd Training Session
February 13, 2014	Reservoir Temperature Model 3 rd Training Session

Don Pedro Reservoir Model



Background

- The model was calibrated to the temperature of releases from the powerhouse
- The original calibration is shown below

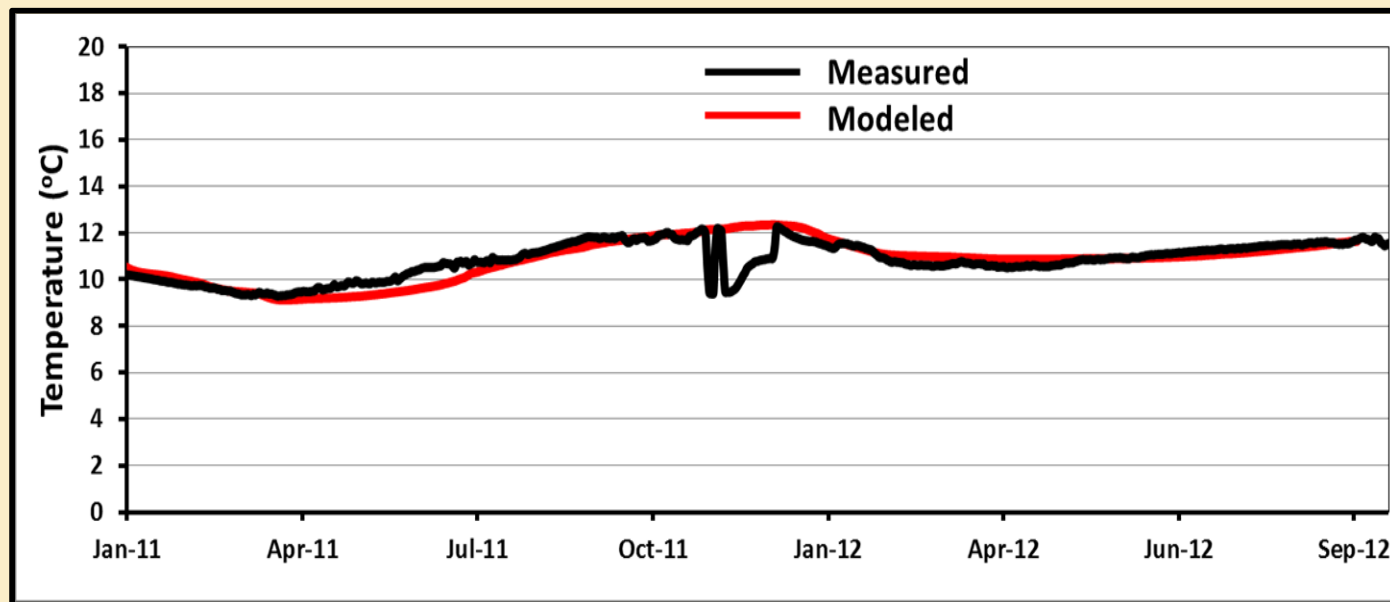


Model Updates

- Between 2012 (when the model was developed) and 2016, DHI made a change to the model temperature inputs
 - In the 2012 version the user had to provide the solar radiation data
 - In the 2016 version DHI computes the solar radiation internally
- The calibration period was rerun and it was noted the calibration had changed

2016 Recalibration

- Some of the temperature parameters were adjusted and the model was rerun
- The 2016 calibration is shown below



Don Pedro Reservoir Temperature Model

Questions?

Lower Tuolumne River Temperature Model

Lower Tuolumne River Temperature HEC-RAS Model

- Model purpose:
 - Provide simulated temperatures adequate to compute 7DADM
 - Model river temperature to compare results to MWAT standard
 - Provide daily average temperatures for Tuolumne River O. Mykiss model, Tuolumne River Chinook model, and other models and studies

Background

W&AR-16 Lower Tuolumne River Temperature Model Workshops

<u>Date</u>	<u>Title</u>
October 26, 2012	River Temperature Model Overview, Description, Calculations, Data Sources, Calibration, and Validation
January 24, 2013	Don Pedro Reservoir Temp-River Temp Models Training Session
June 4, 2013	River Temperature Model Overview, Calculations, Base Case Results

Lower Tuolumne River Temperature HEC-RAS Model

- 1-D Temperature model
- Hourly output from WY 1971-2012
- Calibrated to observed 2011 data, 23 locations
- Validated with observed 2012 data, 23 locations
- Meteorological data from Crocker Ranch station and Turlock Denair II station
- Inputs: Modeled storage, outflow, and diversion from TR daily Operations model. Dry Creek time series from USGS gage summation, input at RM 16. Accretion time series from USGS gage summation, input between RM 51.8 and 16.2. Reservoir release temperature from MIKE3 model.

Lower Tuolumne River Temperature HEC-RAS Model Updates

Dry Creek Inflows and Modesto Accretions

- LTR Temperature Model includes separate assumptions for Dry Creek and Accretion flows
- Original input series were reversed in the 2013 Base Case due to a labeling error. As a result, the river between RM 51.8 and 16 had incorrect spatial flow distribution.
- Labeling error and spatial flow distribution is updated in the latest temperature model Base Case version

Reservoir Release Temperature

- Upstream boundary condition was updated to reflect updated MIKE3 reservoir model outputs

Lower Tuolumne River Temperature HEC-RAS Model Updates

Questions?

Updates to the Tuolumne River Chinook Salmon and *O. Mykiss* Population Models

Overview

Introductions and Background

1. Model Development Background
2. Overview of Model Changes

Model Updates

1. TRCh and TROm Model Overview
2. Relationship to External Models
3. Model Calibration and Validation

Base Case Model Scenario Results

Introduction/Background

Initial Model Development (2012-2013)

- Information Review and Conceptual Model Development (Workshops in 2012 and Synthesis Study Report in 2013)
- Modeling Approach to Address Key Resource Issues Affecting Tuolumne River Salmonids (joint Workshop No. 1 in 2012)
- Model Development (Separate W&AR-06 and W&AR-10 Workshops in 2013)
- TRCh (W&AR-06) and TROm (W&AR-10) Study Reports in 2013

Introduction/Background

TRCh Model Updates (2017)

- Incorporation of W&AR-21 Floodplain Study (TUFLOW) results
- Refinements in reach-specific predation mortality
- Refinements in flow interactions with predation mortality
- Calibration to annual smolt passage at Grayson RST (WY 2010-2012)
- Validation to weekly fry/juvenile and annual smolt passage at Waterford (WY 2006-2013) and Grayson (WY 1999-2013) RSTs

Introduction/Background

TROm Model Updates (2017)

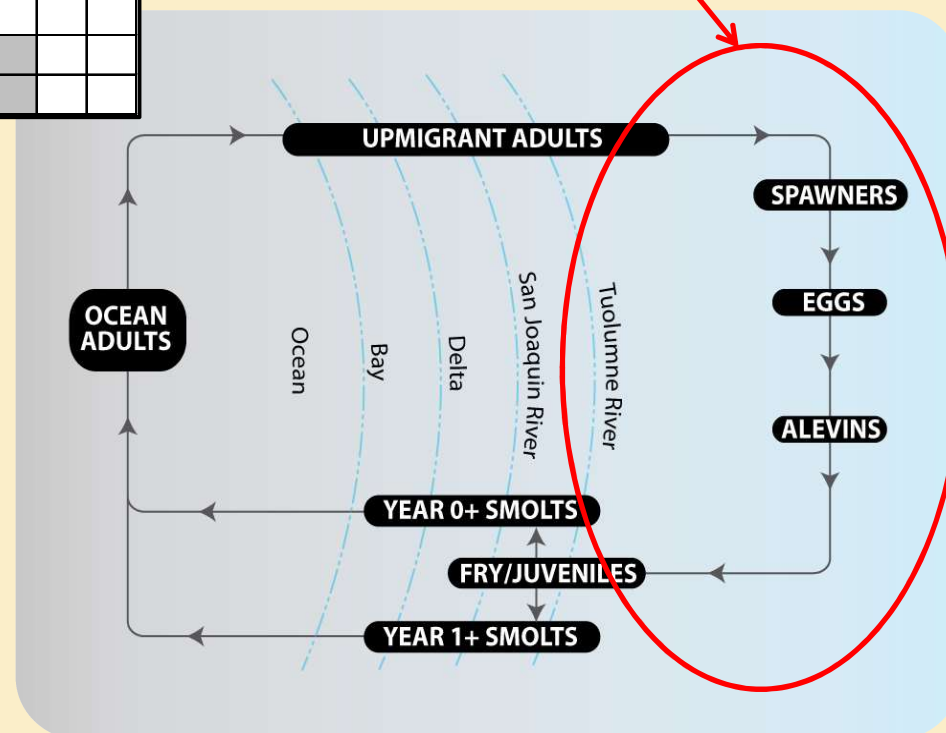
- Incorporation of W&AR-21 Floodplain Study (TUFLOW) results
- Refinements in reach-specific predation mortality
- Refinements in flow interactions with predation mortality
- Calibration of growth rates to W&AR-14 Swim Tunnel Study results and size-at-age data from W&AR-20 Scale Collection and Age Determination Study
- Calibration of mortality rates for long-term stable population size
- Validation to observed age structure and summer-rearing population size estimates (WY 2008–2011)

TRCh Model Overview

Modeled Life Stages for Tuolumne River Chinook Salmon

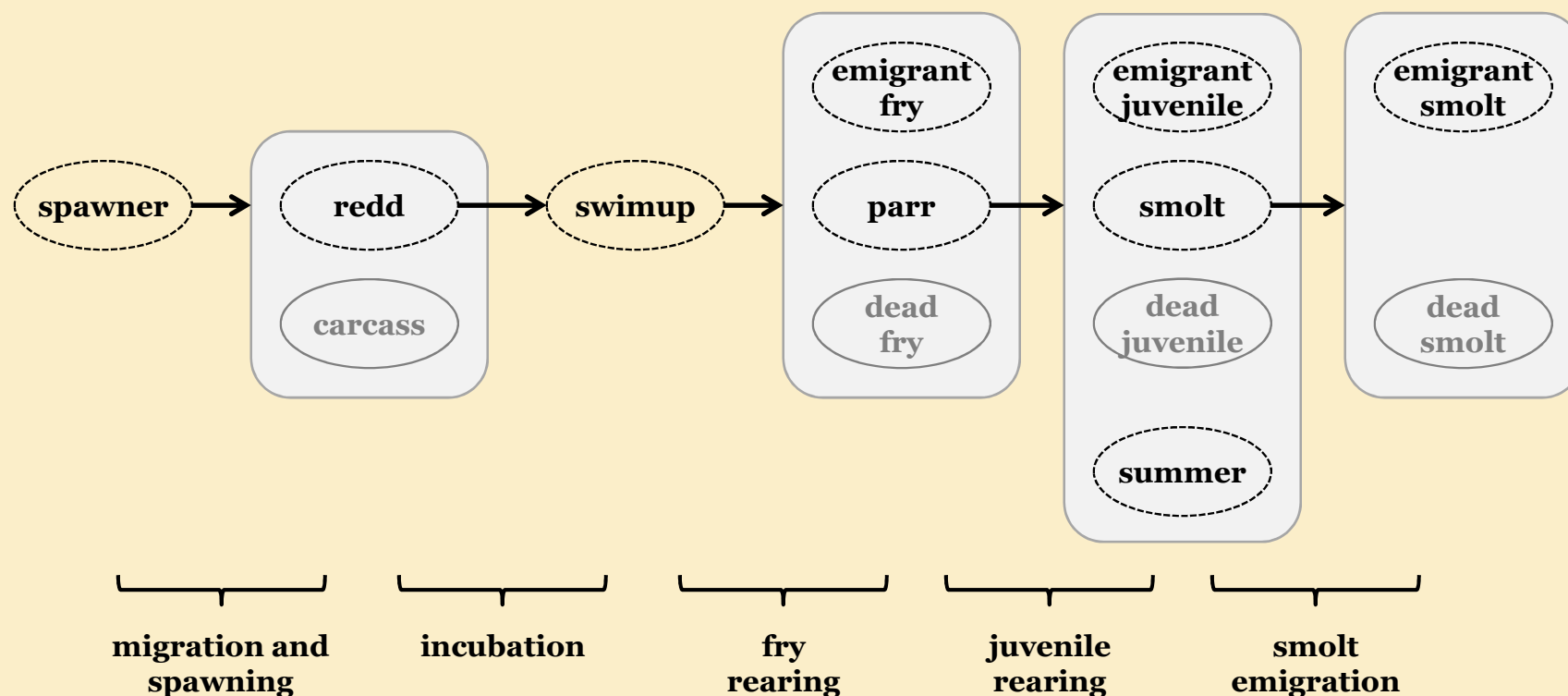
Life Stage	Fall	Winter	Spring	Summer
	(Sep-Nov)	(Dec-Feb)	(Mar-May)	(Jun-Aug)
Adult Upstream Migration				
Adult Spawning				
Egg Incubation and Fry Emergence				
In-river Rearing				
Smolt Outmigration				

In-River Life Stages



TRCh Model Overview

TRCh Model Structure - Independent habitat-based sub-models separate life-history transitions

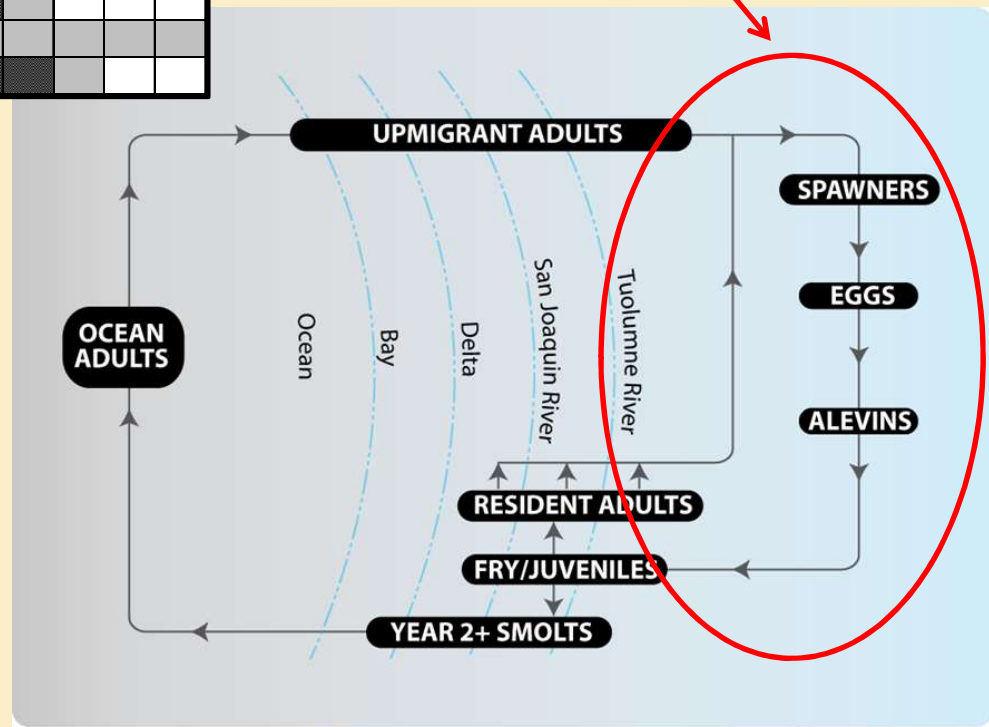


TROm Model Overview

Modeled Life Stages for Tuolumne River *O. mykiss*/Steelhead

Life Stage	Fall (Sep-Nov)			Winter (Dec-Feb)			Spring (Mar-May)			Summer (Jun-Aug)		
Adult Upstream Migration												
Adult Spawning												
Egg Incubation and Fry Emergence												
Rearing (Age 0+, 1+, and older)												
Smolt Outmigration												

**In-River
Life Stages**



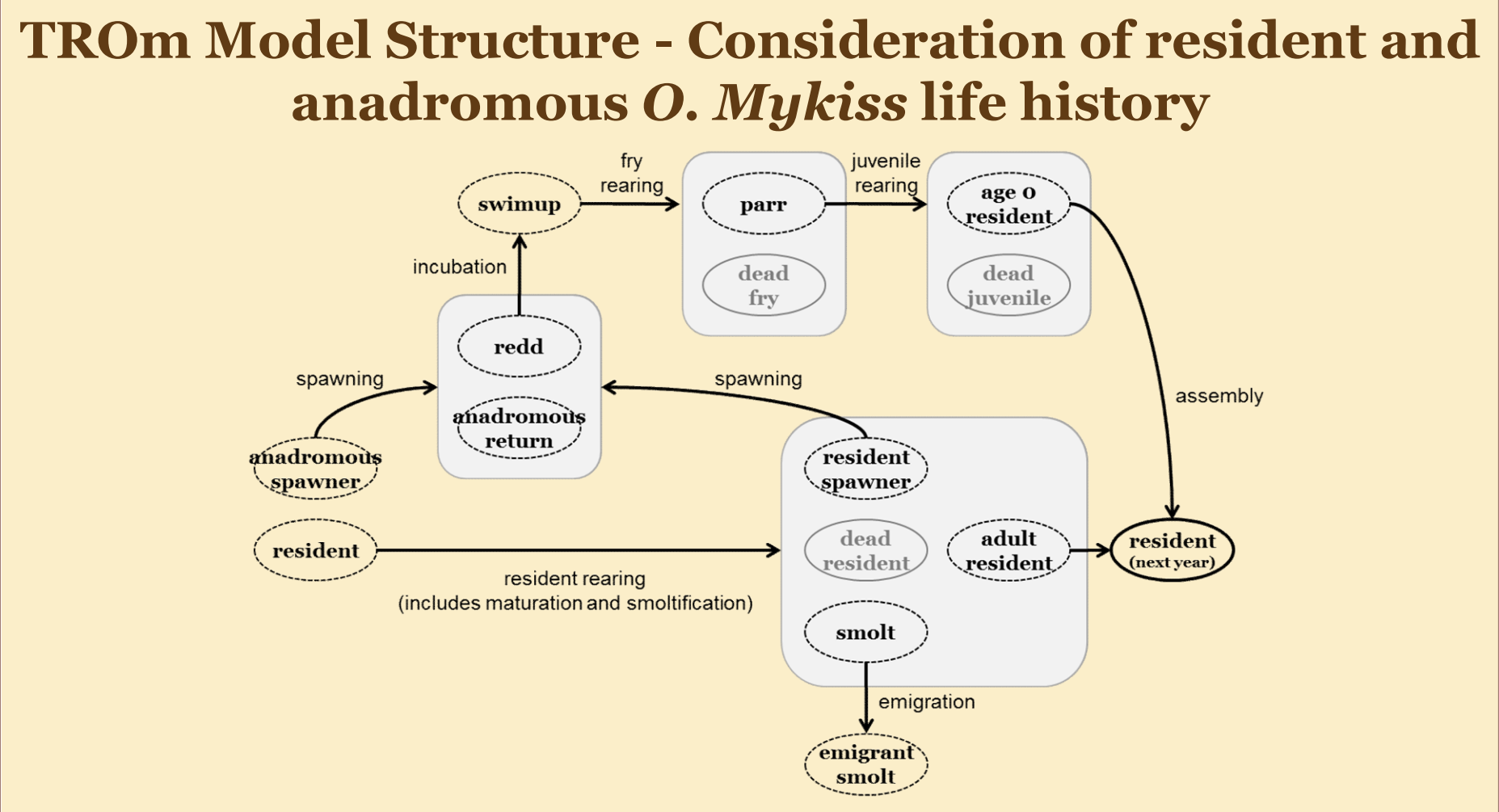
TROm Model Overview

TROm Model Structure - Consideration of resident and anadromous *O. Mykiss* life history

```

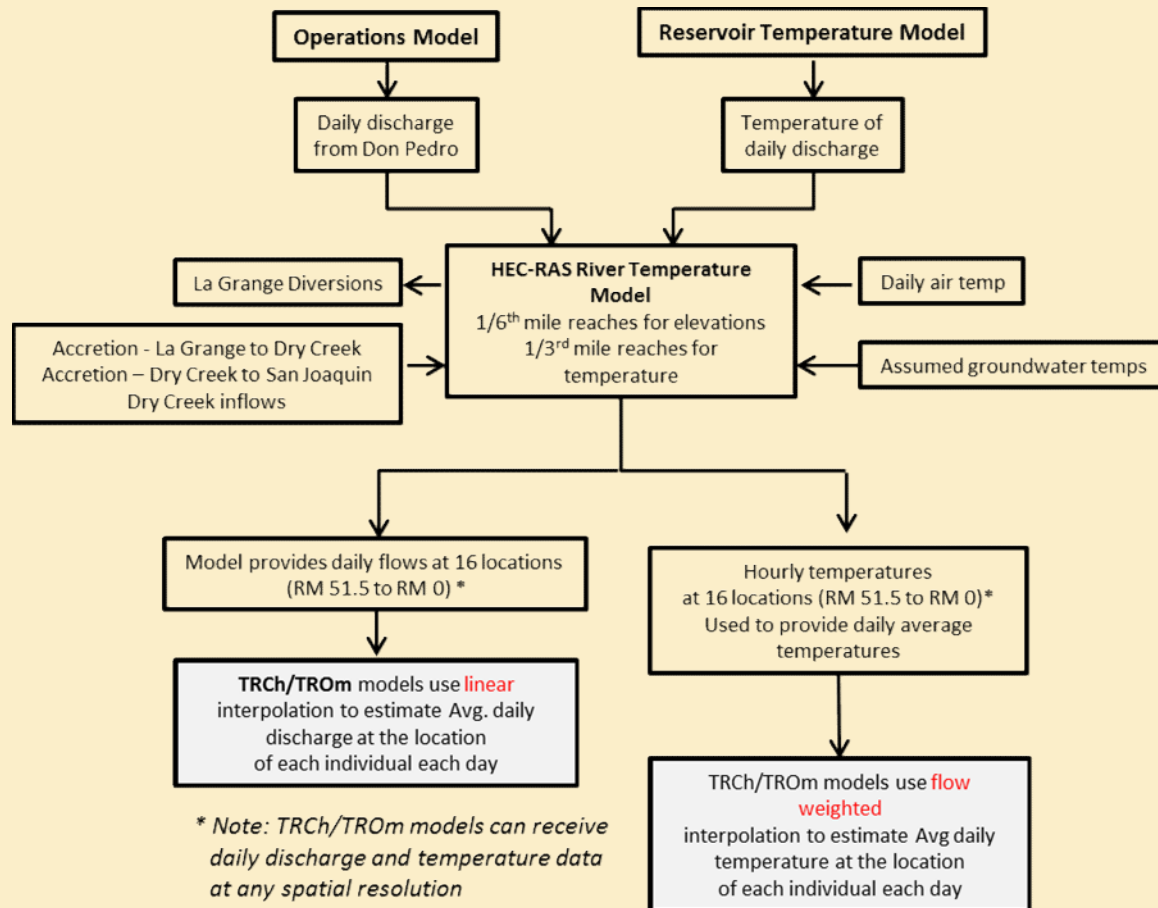
graph TD
    swimup((swimup)) -- "fry rearing" --> parr_box
    subgraph parr_box [ ]
        parr((parr))
        dead_fry((dead fry))
    end
    parr_box -- "juvenile rearing" --> age0_resident_box
    subgraph age0_resident_box [ ]
        age0_resident((age 0 resident))
        dead_juvenile((dead juvenile))
    end
    age0_resident_box -- "assembly" --> resident_next_year((resident next year))
    resident_next_year -- "resident rearing" --> resident_box
    subgraph resident_box [ ]
        resident((resident))
        dead_resident((dead resident))
        smolt((smolt))
        adult_resident((adult resident))
    end
    resident_box -- "emigration" --> emigrant_smolt((emigrant smolt))
    resident_box -- "spawning" --> anadromous_return_box
    subgraph anadromous_return_box [ ]
        anadromous_return((anadromous return))
        redd((redd))
    end
    anadromous_return_box -- "incubation" --> swimup
    anadromous_return_box -- "spawning" --> anadromous_spawner((anadromous spawner))
    anadromous_spawner -- "spawning" --> resident_box
    resident((resident)) -- "resident rearing" --> resident_box
  
```

The diagram illustrates the life history of *O. Mykiss* within the TROm model structure. It shows the progression from early life stages (swimup, parr, age 0 resident) through various rearing and spawning phases to the adult stage (adult resident) and finally to the next year's resident population. The model also accounts for anadromous migration, where residents can become smolts and emigrate, or return to the river to spawn and rear fry.



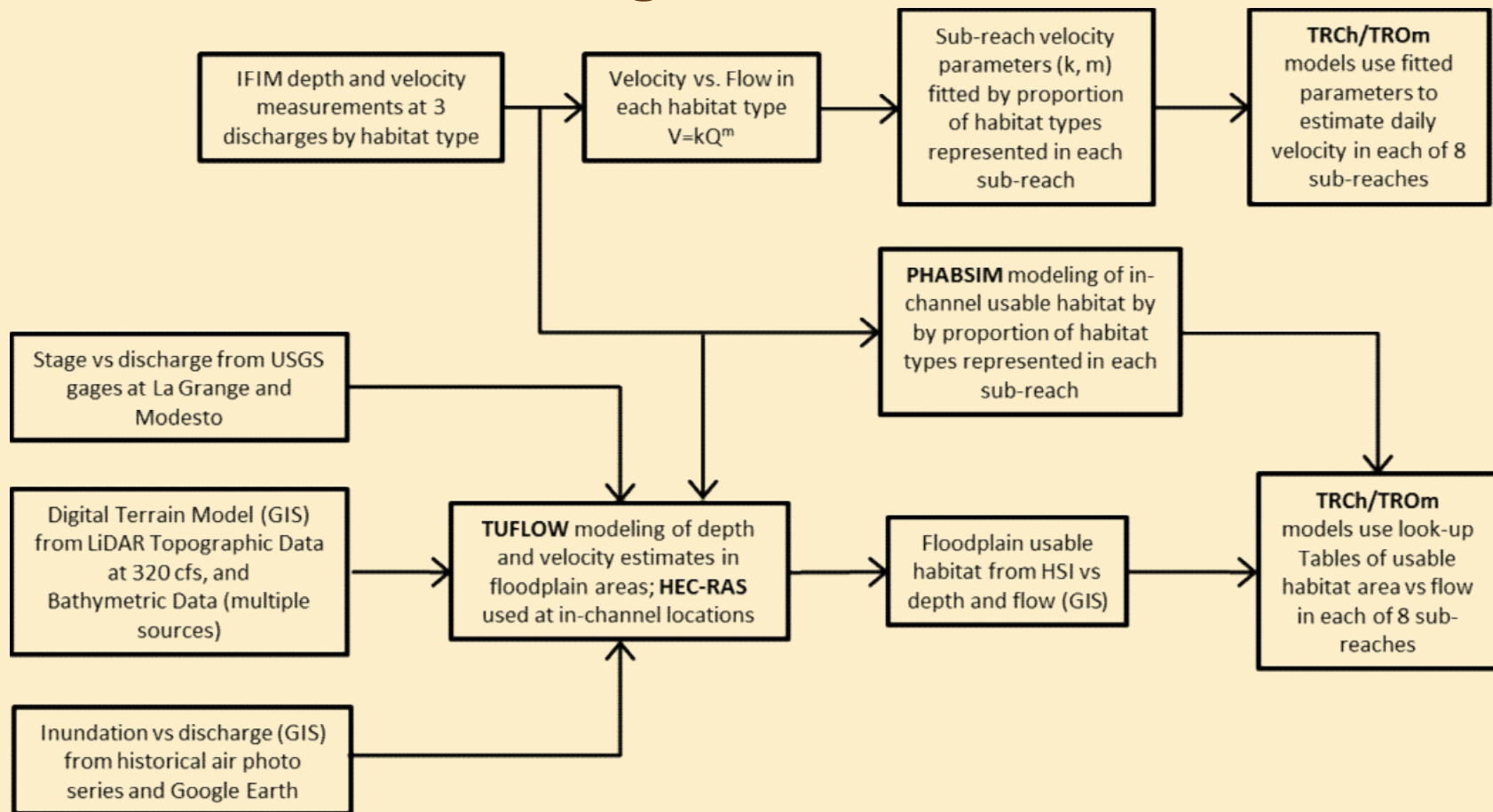
Use of External Models

Operations and Temperature Model Outputs to TRCh and TROm models



Use of External Models

PHABSIM and 2D Modeling of in-channel and overbank habitat

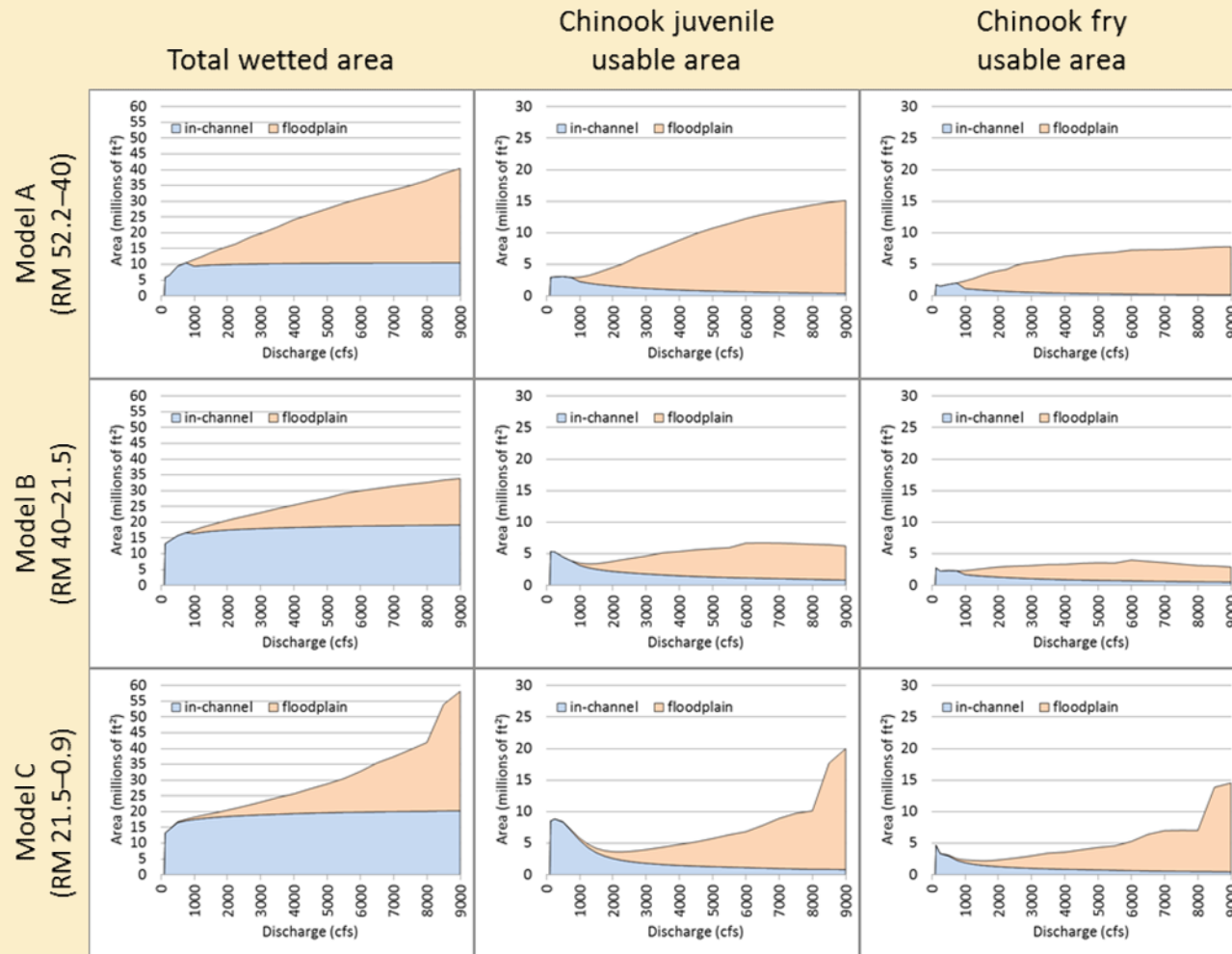


TRCh / TROm Model Update

Changes in the TRCh Model

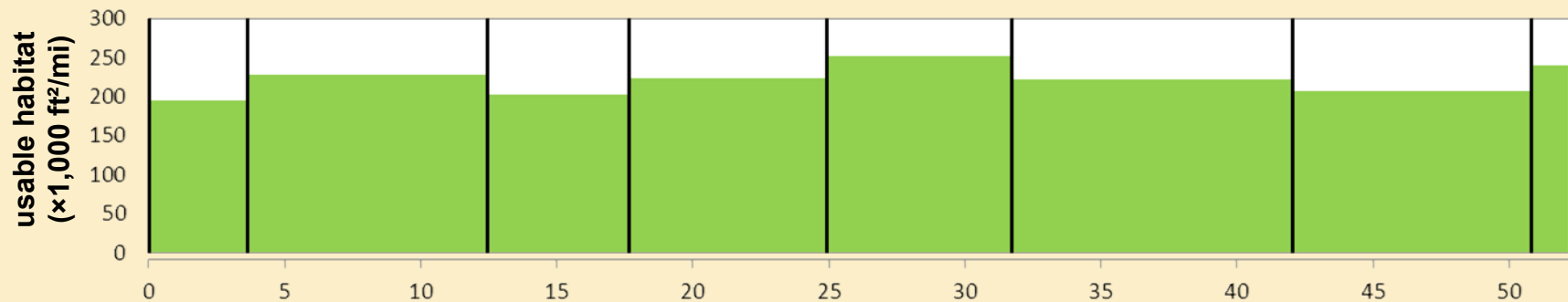
- Updated usable habitat estimates (Floodplain Study)
 - <1,000 cfs based on PHABSIM modeling
 - >1,000 cfs based upon HEC-RAS/TUFLOW modeling
- Weighting of predation risk by reach
 - Based on historical snorkel/seine data
- Weighting of movement-related predation risk by flow
 - <1,000 cfs no adjustment
 - >1,000 cfs based upon wetted width estimates to account for floodplain inundation area expansion

Updated Usable Habitat Estimates



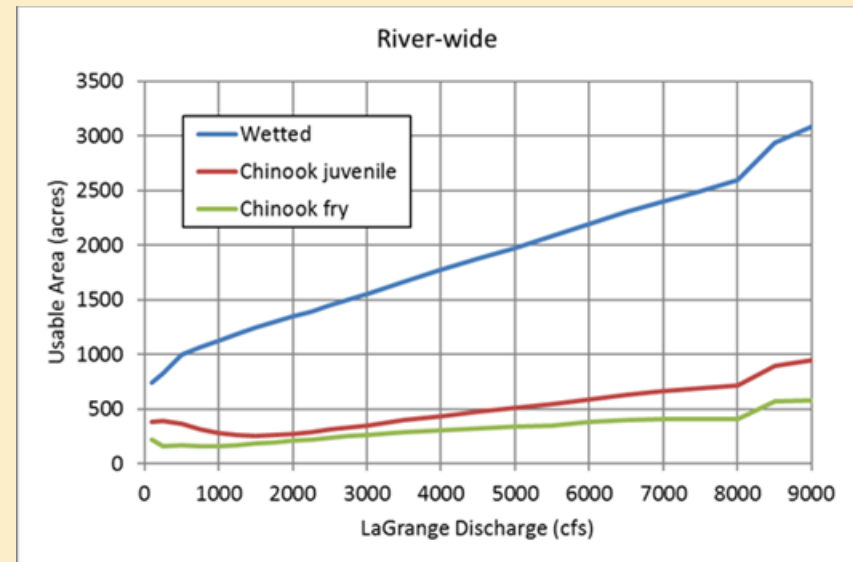
Updated Usable Habitat Estimates

Usable habitat estimated within each sub-reach



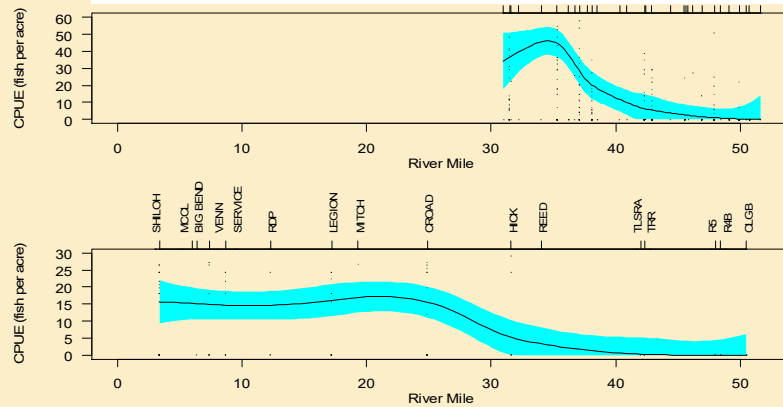
Sub-reach divisions/resolution may be modified by sub-model

La Grange dam to OLGB	52.0-50.7
OLGB to TLSRA	50.7-42.0
TLSRA to Hickman Bridge	42.0-31.6
Hickman Bridge to Charles Road	31.6-24.8
Charles Road to Legion Park	24.8-17.6
Legion Park to Riverdale Park	17.6-12.4
Riverdale Park to Shiloh Bridge	12.4-3.5
Shiloh Bridge to mouth	3.5-0.0

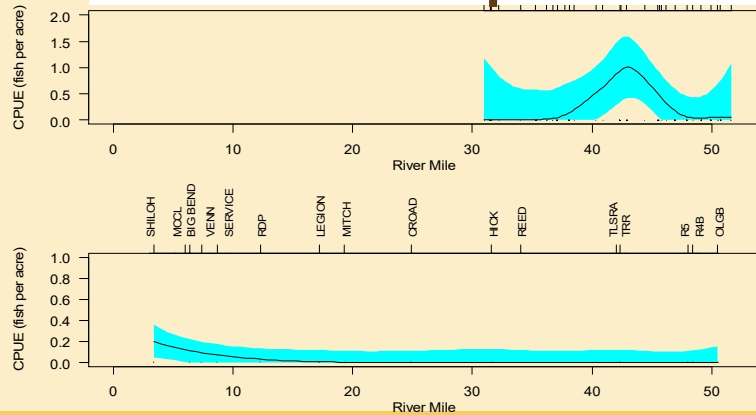


Predation Risk by Reach

Black Bass



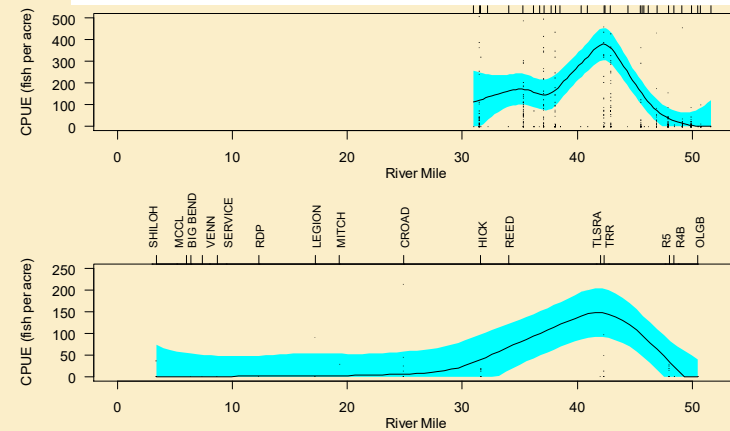
Striped Bass



1997-2014 relative abundance of primary predator species in:

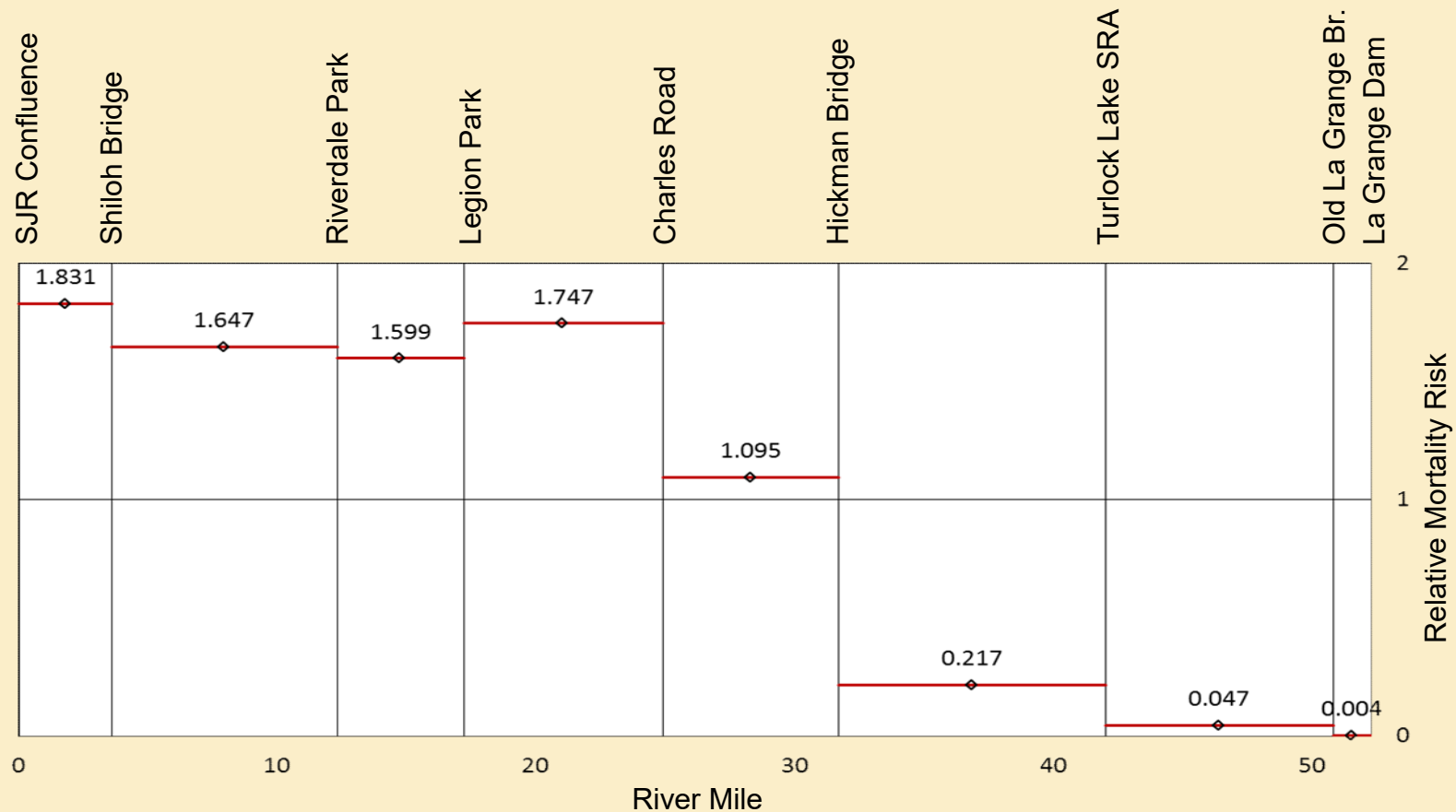
- Snorkel surveys (Top)
- Seine Surveys (Bottom)

Sacramento Pikeminnow



Predation Risk by Reach

Based on abundance of salmon predators from 1997-2014 snorkel and seining surveys, and predation rates from 1990 and 2012 predation studies.



TRCh Model Calibration/Validation

Spawning (not used for calibration)

1. Empirical data: Weir arrival timing, age, sex ratios, redd sizes, egg fecundity
2. Fitted data: Spawning timing (compare distributions of weir arrival and redd construction)

Egg Incubation (not used for calibration)

1. Empirical data: Egg development vs temperature, egg survival to emergence

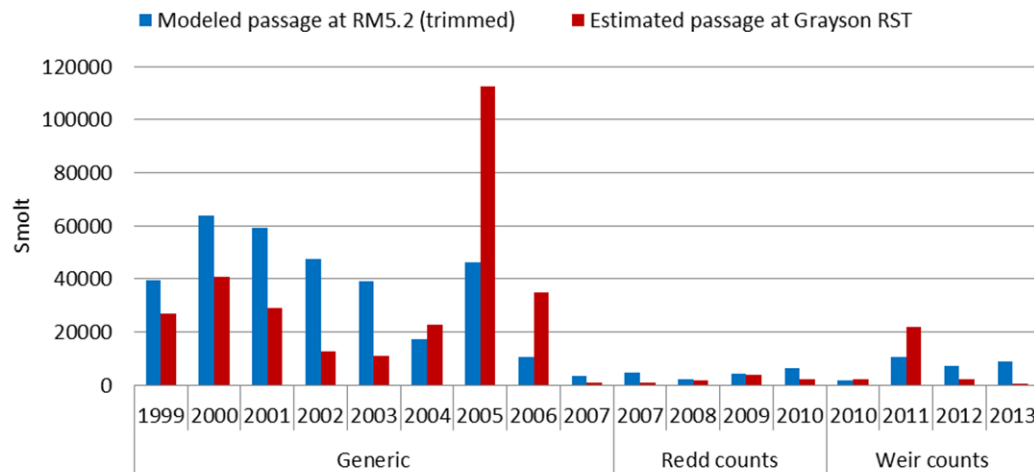
Fry and Juvenile Rearing

1. Empirical data: Seine data (relative abundance [density], location, size, timing), RST data (abundance, location, size, timing)
2. Calibrated parameters: movement, predation mortality
3. Metrics: smolt production, fry and juvenile passage

Smolt Production

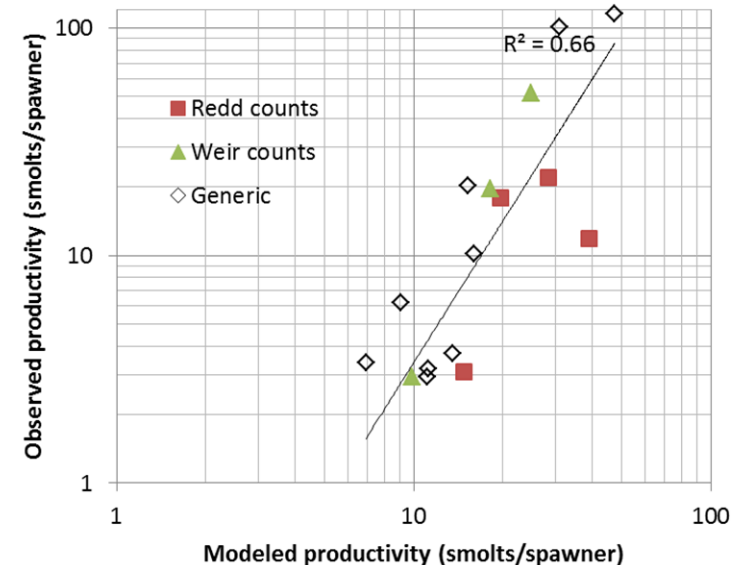
1. Empirical data: RST data (abundance, location, size, timing)
2. Calibrated parameters: predation mortality
3. Metrics: smolt production

Model Calibration/Validation



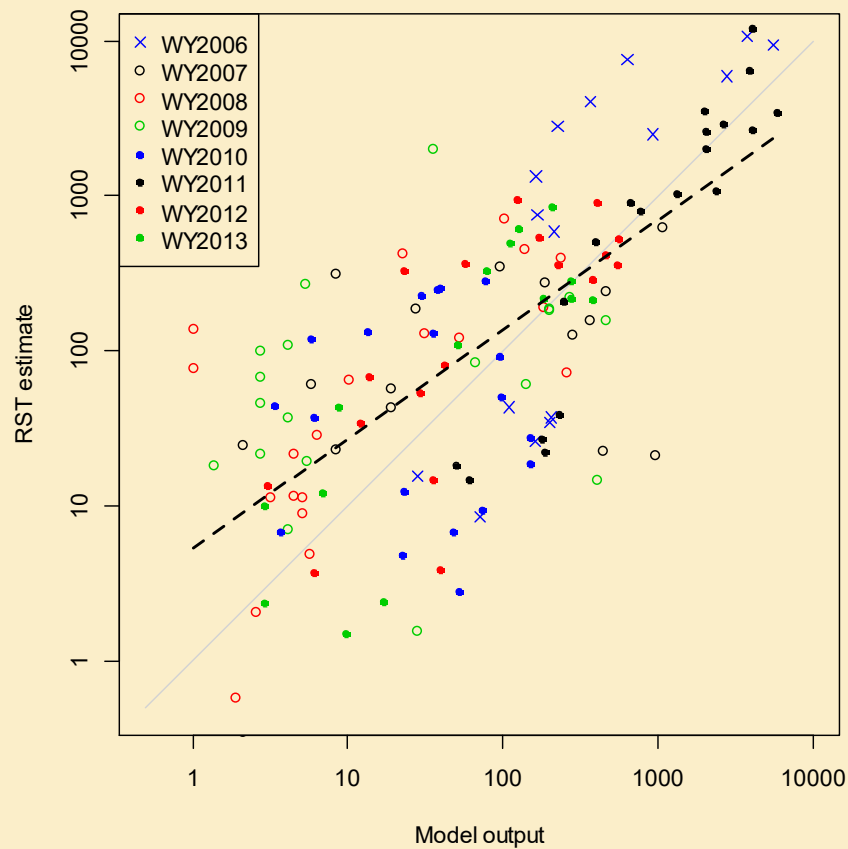
**Calibration: 2009-2012
weir data to estimate
2010-2013 RST passage**

**Validation: 1999-2009
spawning survey data to
estimate RST passage**

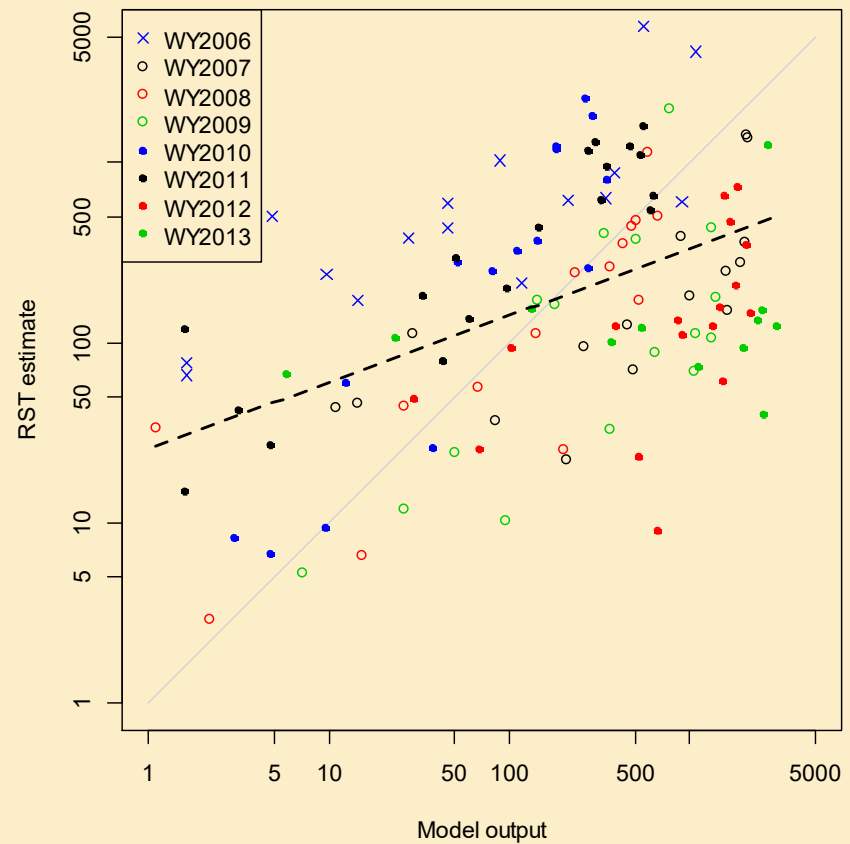


Model Validation

Weekly Fry/juvenile passage at Waterford (RM 29.8) RST

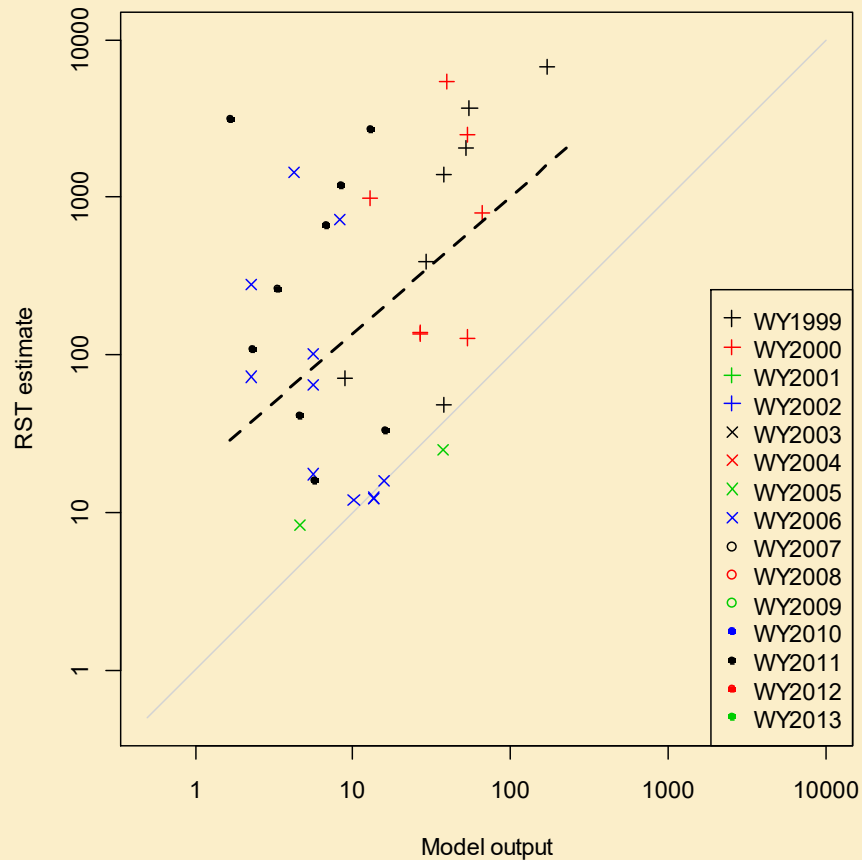


Weekly Smolt passage at Waterford (RM 29.8) RST

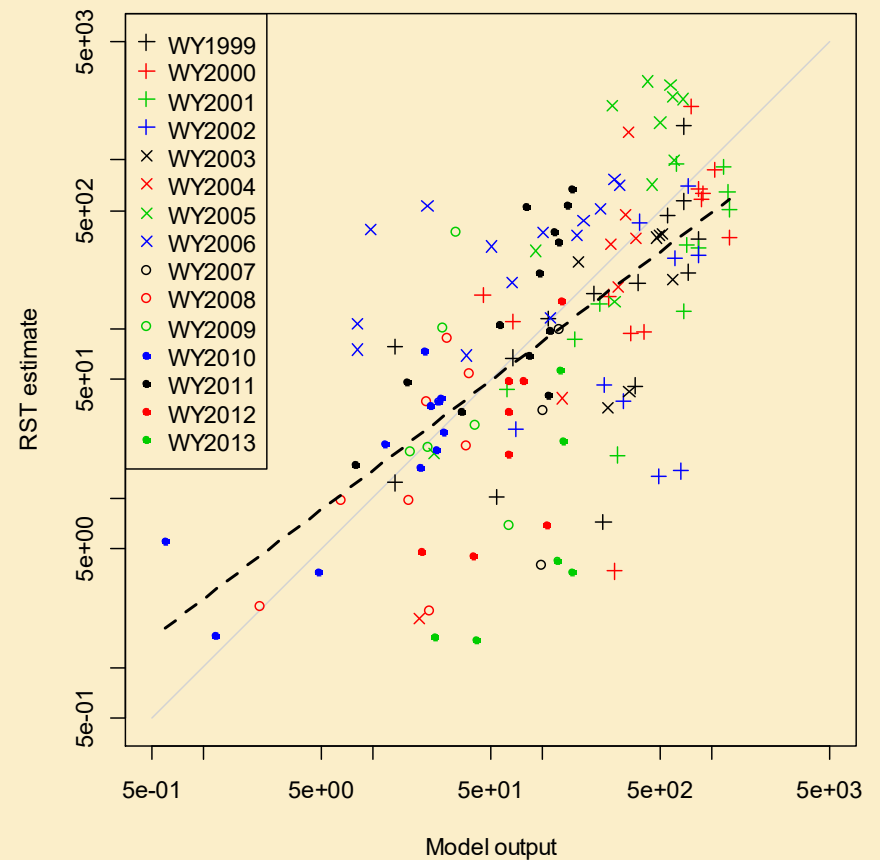


Model Validation

Weekly Fry/juvenile passage at Grayson (RM 5.2) RST



Weekly Smolt passage at Grayson (RM 5.2) RST



TROm Model Calibration/Validation

Spawning and Egg Incubation (not used for calibration)

1. Empirical data: timing (from Stanislaus River), redd location, redd size
2. Empirical data: Egg development vs temperature, egg survival-to-emergence

Fry and Juvenile Rearing

1. Empirical data: snorkel (location, size, timing, abundance), scale (size-at-age)
2. Calibrated parameters: growth, predation mortality
3. Calibration metrics: size at age, fry/juvenile ratios, stable population size
4. Validation: 2009-2011 end-of-summer juvenile population size

Adult Rearing

1. Empirical data: snorkel (location, size, timing, abundance), scale (size-at-age)
2. Calibrated parameters: growth, predation mortality
3. Calibration metrics: size at age, stable population size (2007-2012)
4. Validation: 2009-2011 end-of-summer population size and age-class composition

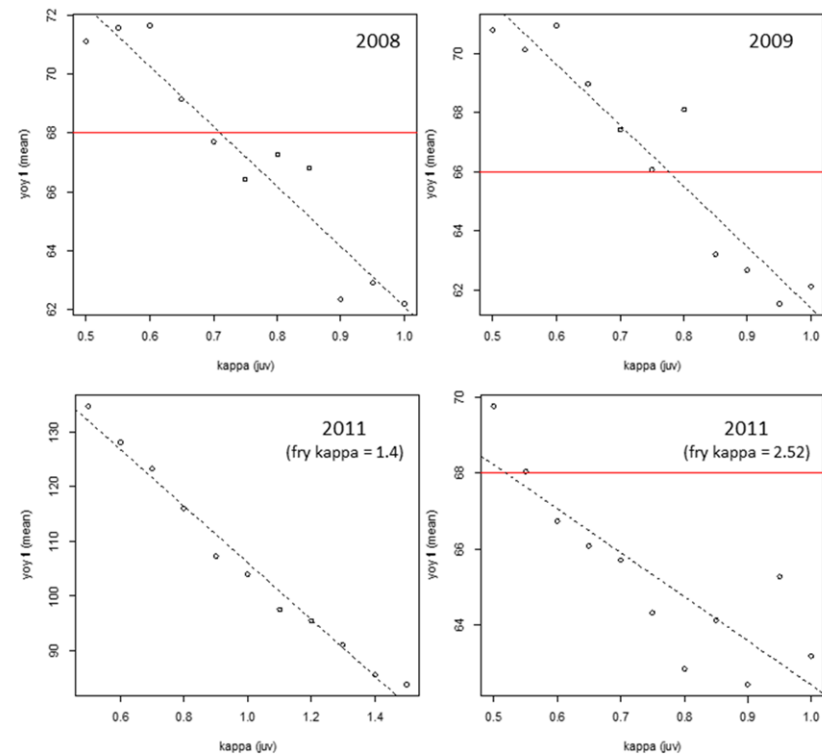
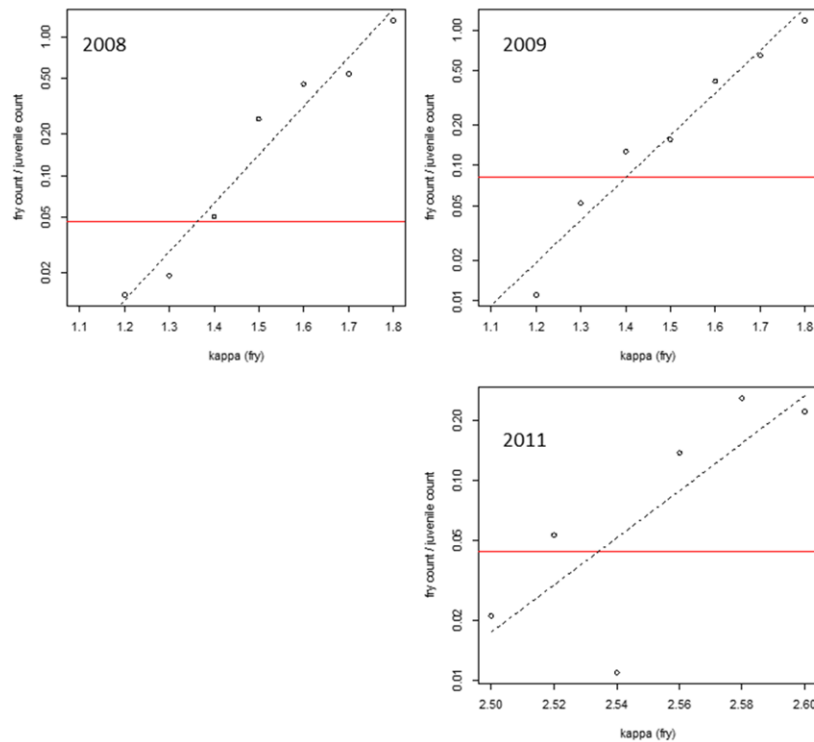
Smolt Production (not used for calibration)

1. Empirical data: smolt probability based upon parental anadromy, timing from Stanislaus River

TR0m Model Calibration

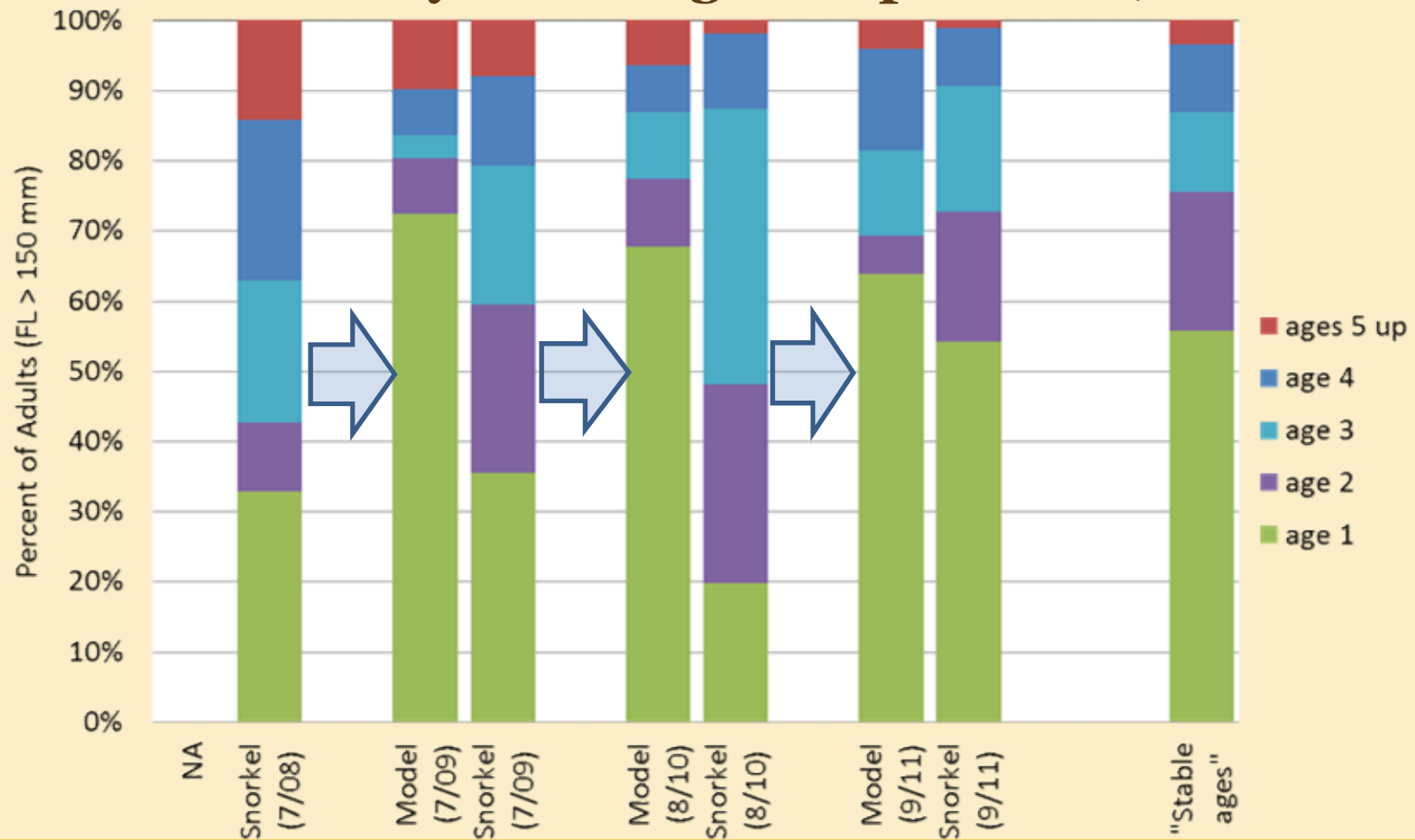
Juvenile Growth

- Growth parameters for Satterthwaite et al. (2010) adjusted to match fry:juvenile abundance ratios (left) as well as juvenile size-at-age (right) found in 2008-2011 snorkel surveys



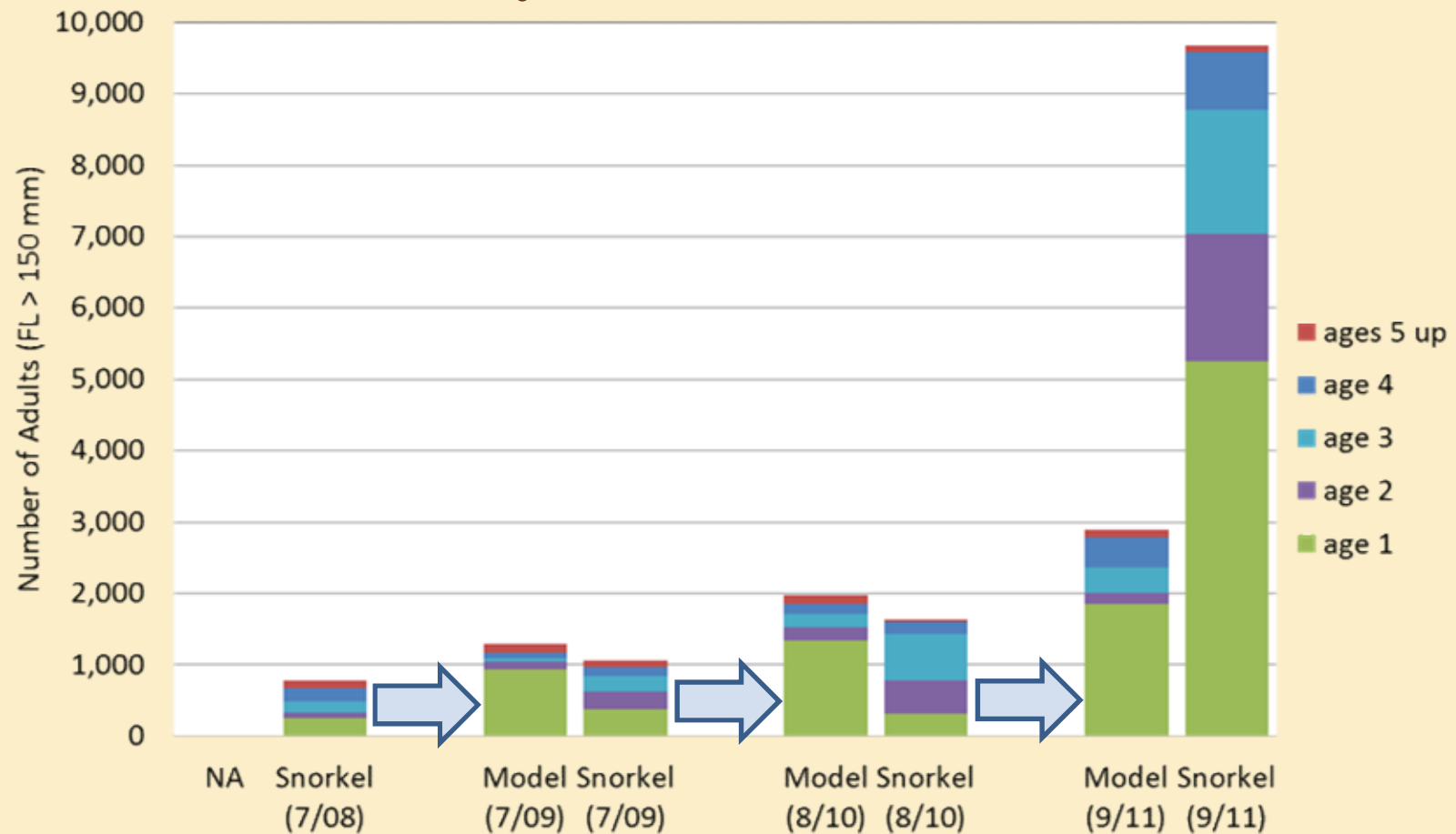
Model Validation

Model- and Survey-based Age composition (2008-2011)



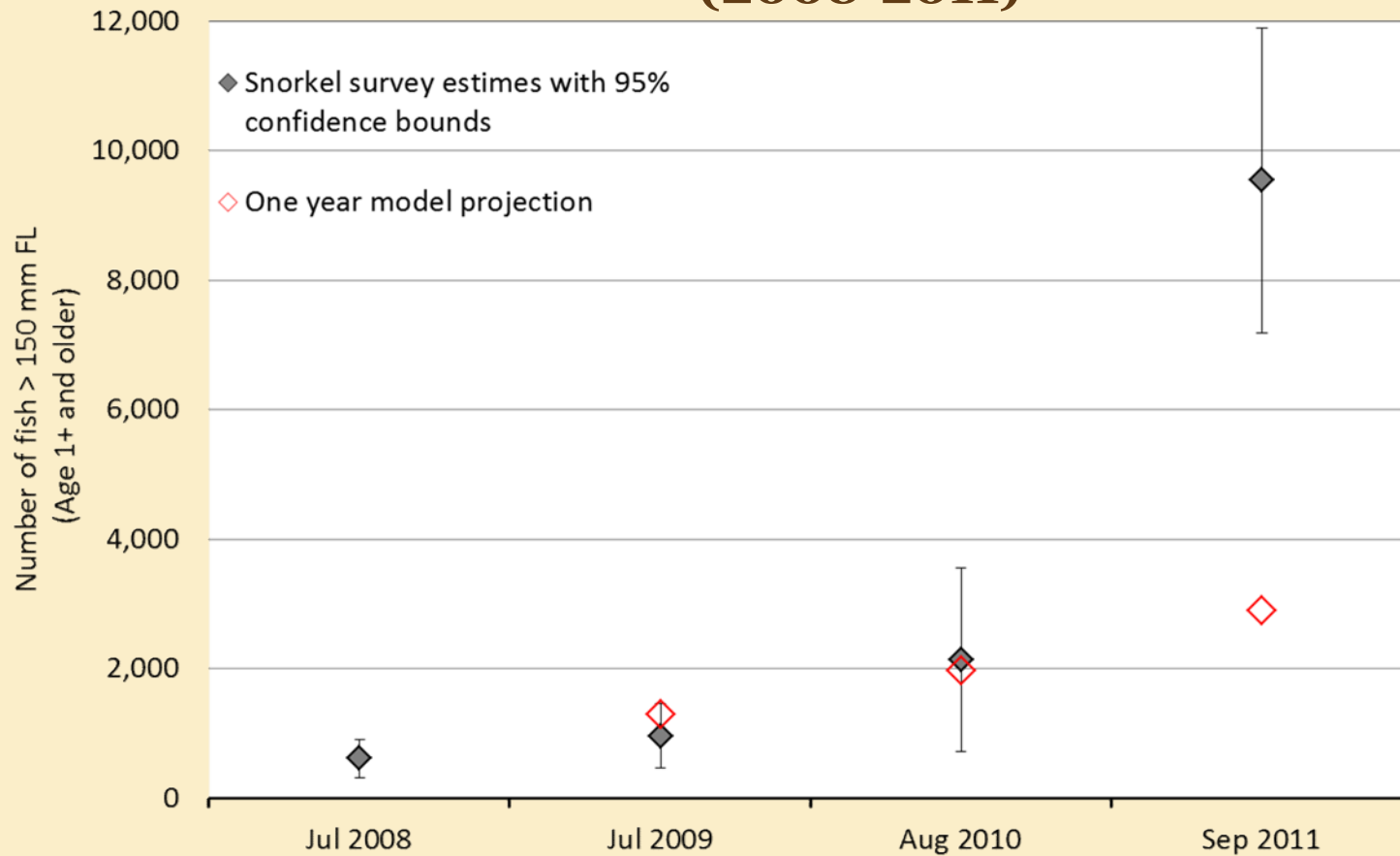
Model Validation

Model- and Survey-based Abundance (2008-2011)



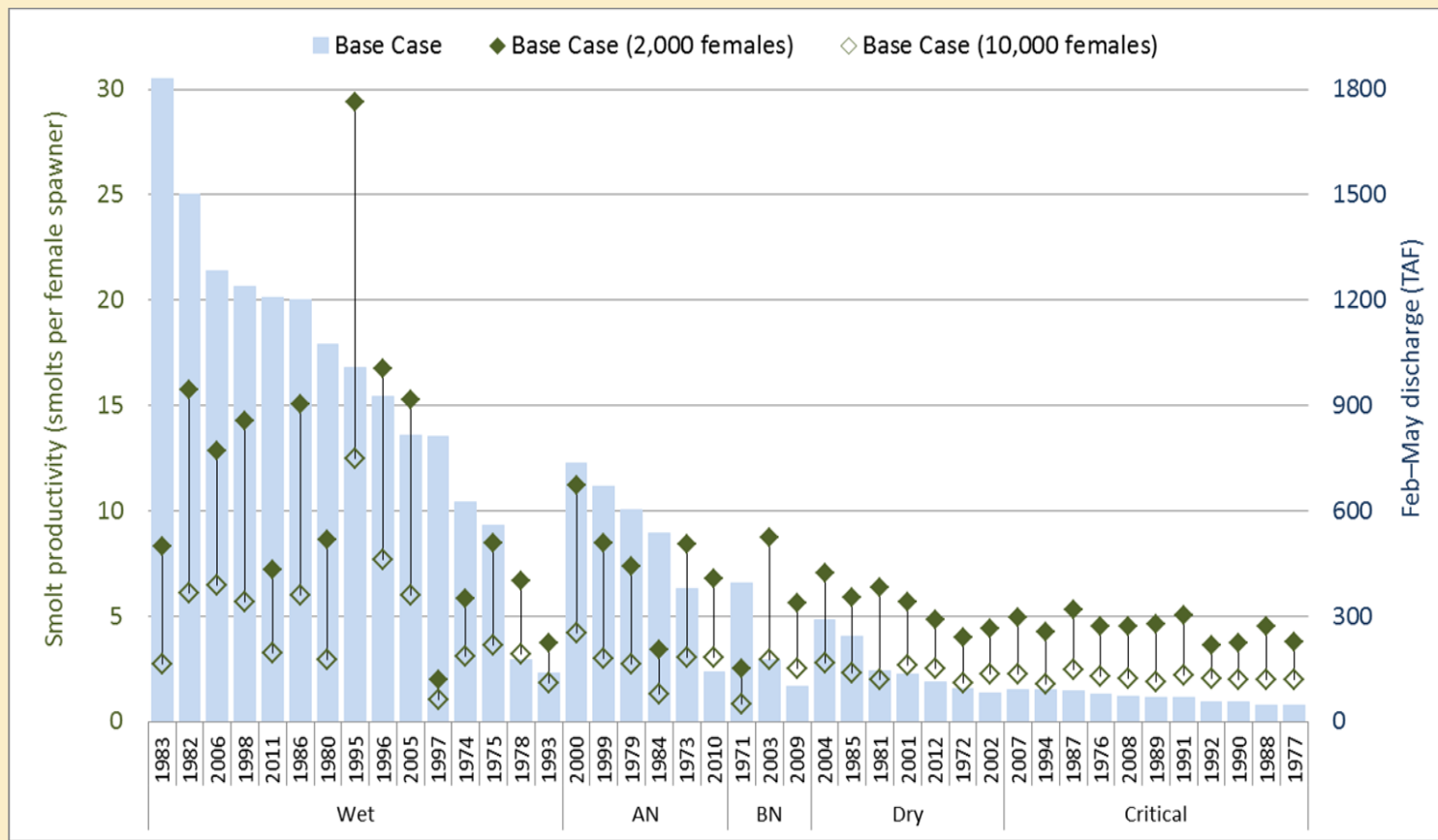
Model Validation

Model- and Survey-based Abundance Ests. > 150 mm FL (2008-2011)



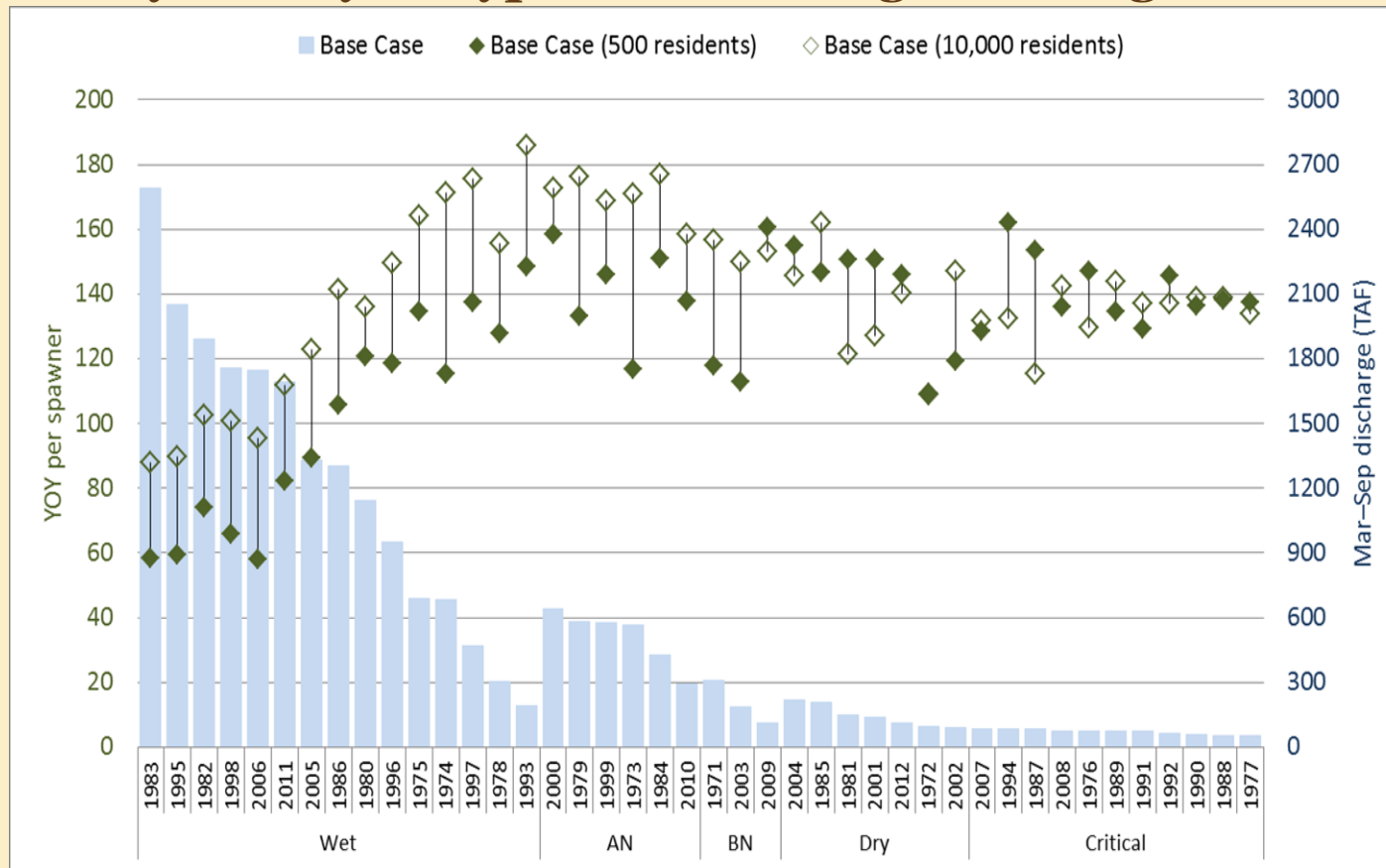
Base Case Scenario Results

TRCh Modeled yearly (1971–2012) Chinook salmon smolt productivity for the base case sorted by La Grange discharge (Feb-May)



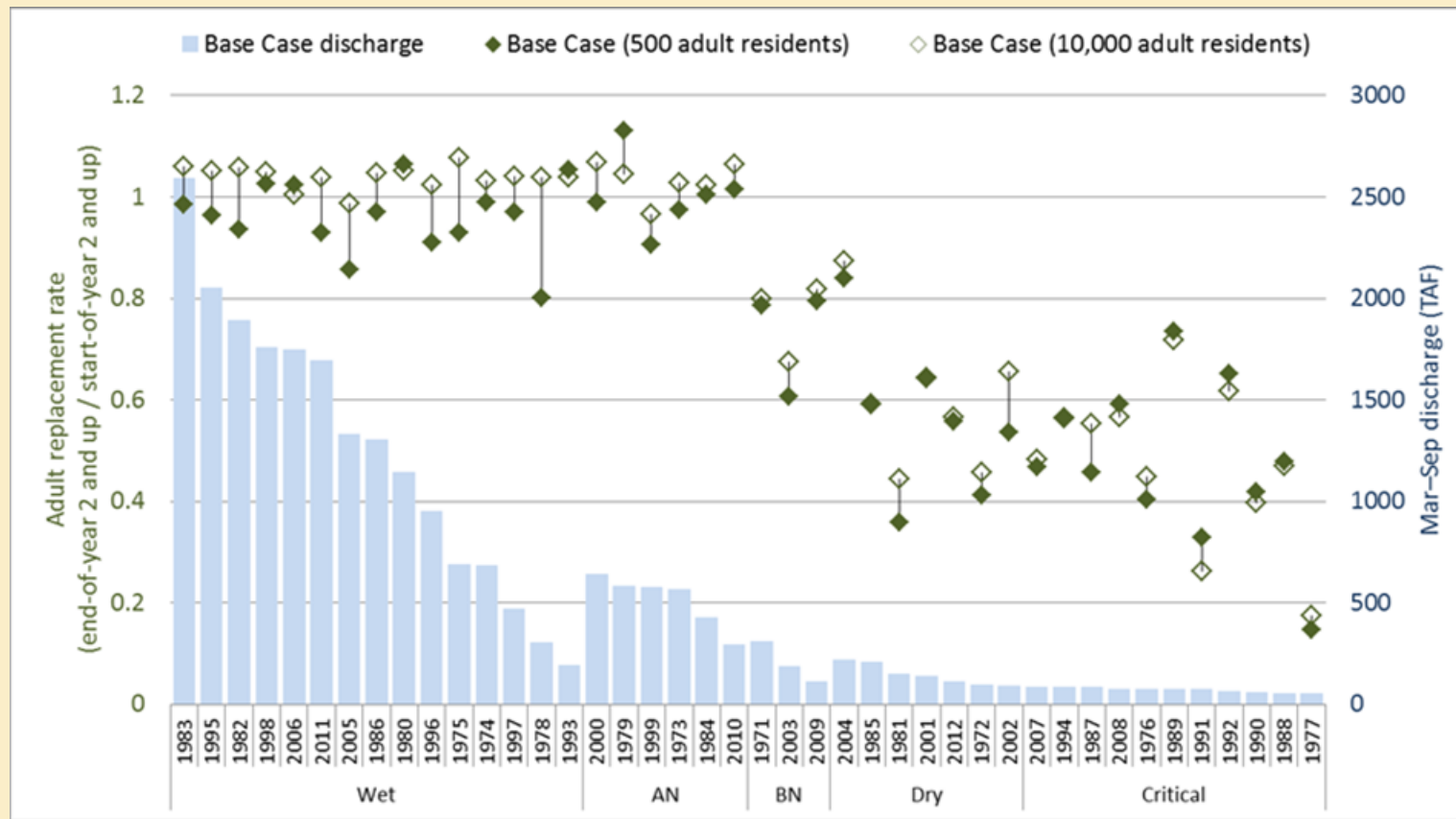
Base Case Scenario Results

TROm v3.2 modeled juvenile *O. mykiss* productivity for the Base Case sorted by water year type and La Grange discharge (Mar–Sep)



Base Case Scenario Results

TR0m modeled adult *O. mykiss* replacement for the Base Case sorted water year type and La Grange discharge (Mar–Sep)



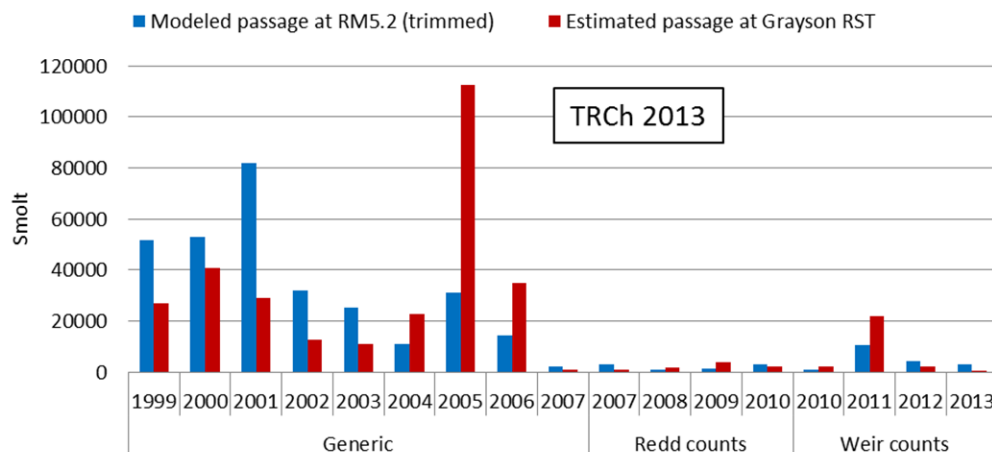
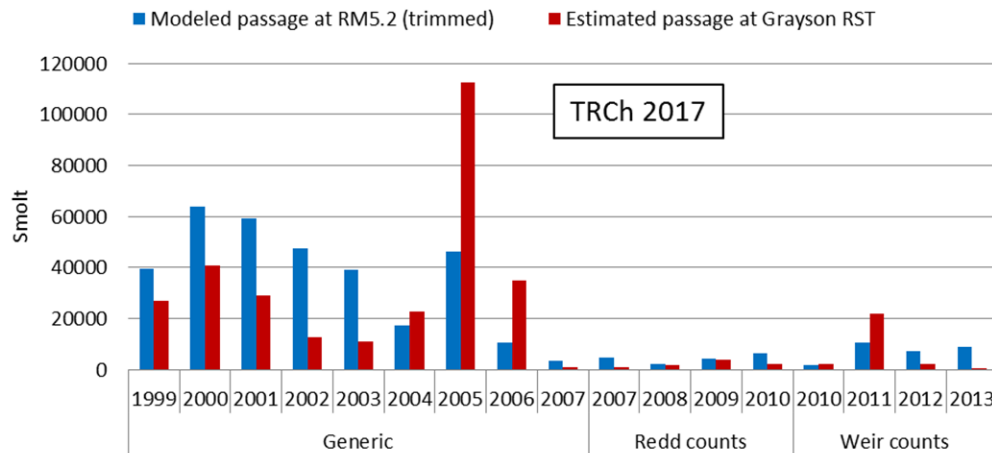
Summary

- **TRCh/TROm Models updated to include**
 - Updated floodplain habitat estimates
 - More detailed information on predator distribution and survival
 - Use of additional RST data for TRCh calibration/validation
 - Incorporation of Swim Tunnel report into TROm growth rate calibration
- **Updated models consistent with 2013 Study Reports**
 - Identified spawning habitat limitation for Chinook salmon
 - Modeled factors affecting Chinook smolt survival (predation, flow) exert greatest influence on production
 - Increased displacement of *O. mykiss* fry with flow results in lower rearing densities and increased mortality
 - Increased extent of thermally suitable habitat with flow in summer for resident *O. mykiss* (Age 1+ and older)

Questions?

2017 vs 2013 TRCh Model Validation

Smolt passage at Grayson (RM 5.2) RST



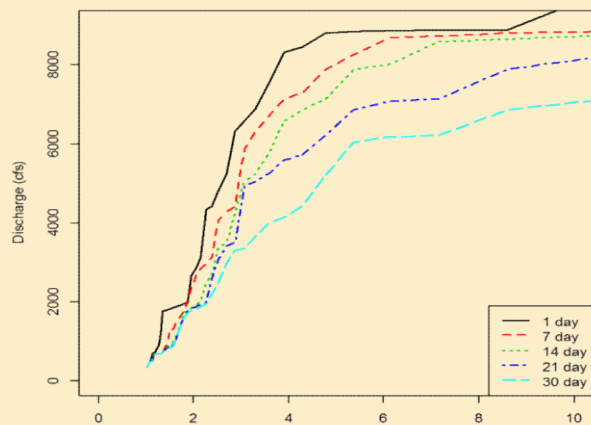
Lower Tuolumne River Floodplain Model

Lower Tuolumne River Floodplain Model

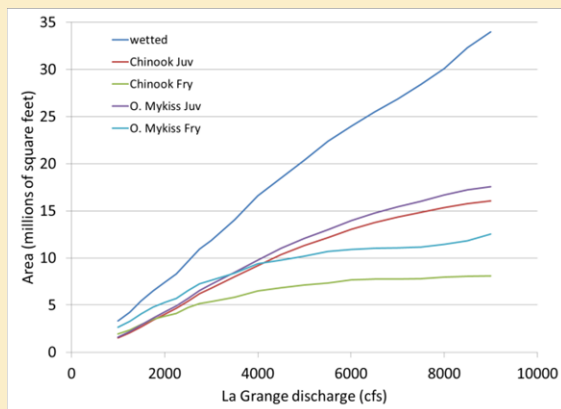
- 1D HEC-RAS and 2D TUFLOW model implemented in 3 reaches (RM 52.2 to 0) to:
 - Analyze the amount of floodplain inundated at flows between approximately 1,000 cfs and 9,000 cfs
 - Assess the suitability of inundated floodplain habitat for juvenile salmon rearing
 - Evaluate the frequency and period of inundation over a range of flows for the base case (WY 1971-2012) hydrology

Area-Duration Frequency Curves to Show Useable Habitat Area

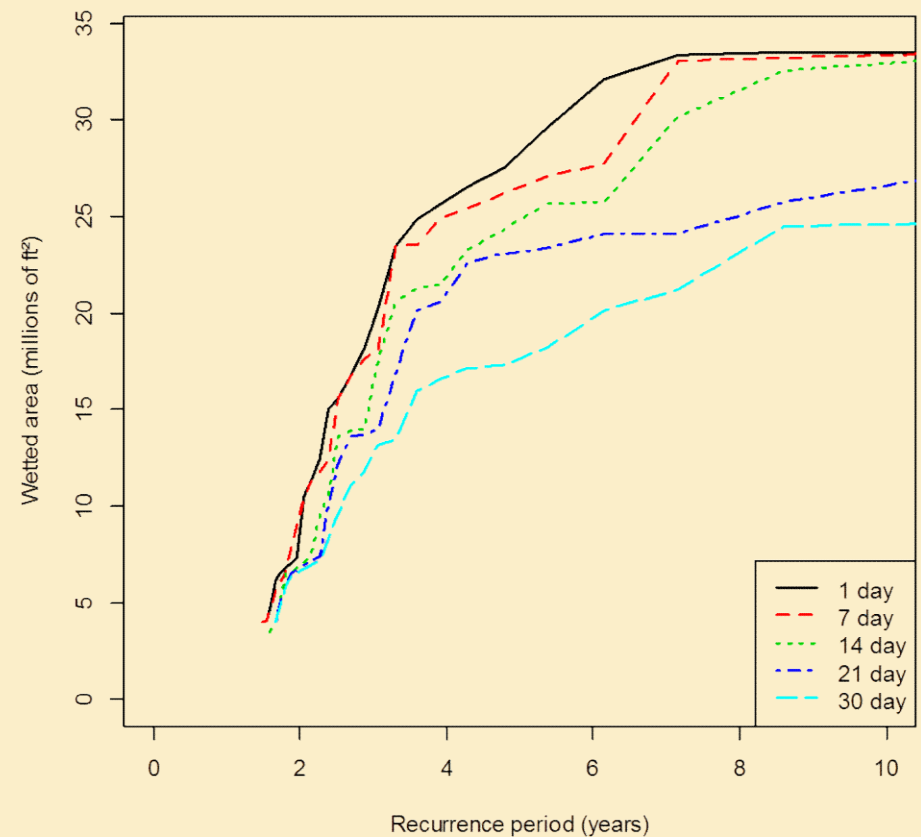
Discharge Frequency



Usable habitat area curve



Area-Duration Frequency



Lower Tuolumne River Floodplain Model

- Workshops (February and December 2014)
- Draft Study Report (September 2015)
 - Comments on suitability of off-channel ponds
- Final Study Report (to be filed with AFLA)
 - No changes in model calibration
 - Small changes in total and usable area estimates

Lower Tuolumne River Floodplain Model

Questions?

From: Staples, Rose
Sent: Tuesday, June 27, 2017 3:02 PM
To: Castillo, Jean - NOAA <jean.castillo@noaa.gov>
Subject: Don Pedro - La Grange Projects Data Requests

Jean, information related to your recent data requests has been compiled and placed on a thumb drive which we will be mailing to you today via FEDEX two-day shipping. A letter summarizing the contents of this thumb drive is attached to this email. Regarding item no. 6 in the letter, given the clarification you provided on June 20, the bathymetric information provided on the thumb drive should satisfy your request.

Regarding the temperature information you requested on June 20, the Districts will follow up on this request via a separate email.

Thank you.

Rose Staples, CAP-OM, MOS
Senior Administrative Assistant



HDR
970 Baxter Boulevard Suite 301
Portland ME 04103
D 207-239-3857
rose.staples@hdrinc.com

hdrinc.com/follow-us



June 27, 2017

Jean M. Castillo
National Marine Fisheries Service
650 Capitol Mall
Suite 5-100
Sacramento, CA 95814-4700

Subject: Don Pedro Project and La Grange Project data request

Dear Ms. Castillo:

Per your request, a thumb drive (TD) containing data relevant to the Don Pedro Project and the La Grange Project has been prepared. This TD was mailed to you on June 27, 2017. The table below summarizes your recent data requests and the contents of this TD.

No.	Requested Data	Status
1	La Grange LiDAR and Survey Data from report	Data is on the TD. See folder LG_LiDAR_Survey_Data
2	Don Pedro bathymetry data and Don Pedro thalweg profile from RM 70 to 82	Data is on the TD. See file Bathymetry_TuolumneRiver.pdf Note: A Don Pedro thalweg profile may be derived from this data.
3	Schematics of Don Pedro Dam and the regulating outlet	Data is on the TD. See file DP_Schematic.pdf
4	Drawings of the following La Grange features: 1. Tunnel structure 2. Forebay structure at upstream end of penstock 3. Sluice gates for powerhouse bypass 4. Penstocks and supports 5. Bank retaining wall 6. Switchyard/substation structure 7. Overhead utilities 8. Underground utilities and grounding 9. Powerhouse and draft tubes 10. Tailrace training wall	Data request is no longer applicable. On June 22, Ms. Castillo confirmed she had already obtained these drawings from FERC.
5	La Grange tailwater rating curve for the powerhouse over a range of flows (50-7,500 cfs)	Data is on the TD. See file Tailwater_at_LG_PH.jpg
6	Profile of the river upstream of Don Pedro Reservoir and upriver from Wards Ferry	On June 19, the Districts sent an email to Ms. Castillo requesting clarification about this data request. Until a response is received, the Districts consider this data request to be on hold.

If you have any questions about this letter or the TD, please contact the individuals below.

Sincerely,

A handwritten signature in blue ink that reads "Steve Boyd". The signature is fluid and cursive, with the first and last names clearly distinguishable.

Steve Boyd
Turlock Irrigation District
P.O. Box 949
Turlock, CA 95381
(209) 883-8364
seboyd@tid.org

A handwritten signature in blue ink that reads "Anna Brathwaite". The signature is cursive and somewhat stylized, with the first name being the most prominent.

Anna Brathwaite
Modesto Irrigation District
P.O. Box 4060
Modesto, CA 95352
(209) 526-7384
anna.brathwaite@mid.org

From: Staples, Rose
Sent: Wednesday, July 5, 2017 11:56 AM
To: Castillo, Jean - NOAA <jean.castillo@noaa.gov>
Subject: Don Pedro - La Grange Projects Data Requests

In regards to the temperature information you requested on June 20th, please find attached water temperature data for the Tuolumne River above North Fork. It is my understanding that the data is for the period April 29, 2015 to October 4, 2016.

Rose Staples, CAP-OM, MOS
Senior Administrative Assistant



HDR
970 Baxter Boulevard Suite 301
Portland ME 04103
D 207-239-3857
rose.staples@hdrinc.com

hdrinc.com/follow-us

From: Jean Castillo - NOAA Federal [mailto:jean.castillo@noaa.gov]
Sent: Tuesday, July 18, 2017 11:52 AM
To: Staples, Rose <Rose.Staples@hdrinc.com>
Subject: Re: Tuolumne - Reservoir Surface Water Temperature

Thank you Rose,

Have a great week!!
Jean

Jean M. Castillo, MSCE, P.E.
Hydraulic/Fish Passage Engineer

*NOAA Fisheries West Coast Region
U.S. Department of Commerce
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4700
Office: 916-930-3613
jean.castillo@noaa.gov*

On Mon, Jul 17, 2017 at 7:28 AM, Staples, Rose <Rose.Staples@hdrinc.com> wrote:

<http://www.donpedro-relicensing.com/documents.aspx>

ILP Activity: Final License Application (75) / Documents: Final (75)

Above is a link to the Don Pedro relicensing website where you should be able to find information on the Reservoir water temperature in the W&AR-03 Study Report filed as part of the Don Pedro Project Final License Application.

(1) Control-Click on the link—(2) Click on ***Final License Application (75)*** and (3) Click on “Documents Final (75). On the screen you should then see a listing of 75 files, with sequential numbering in the file names after the FERC Project Number “P-2299-9075”. File #55 is the W&AR-03 Study Report.

If you have any difficulties locating and/or viewing the file, please let me know.

Thank you.

Rose Staples, CAP-OM, MOS

Senior Administrative Assistant

HDR

970 Baxter Boulevard Suite 301
Portland ME 04103

[D 207-239-3857](tel:207-239-3857)
rose.staples@hdrinc.com

From: Staples, Rose

Sent: Thursday, August 17, 2017 4:24 PM

Cc: Deason, Jesse <jesse.deason@hdrinc.com>; Staples, Rose (Rose.Staples@hdrinc.com) <Rose.Staples@hdrinc.com>; Johnson, Laura <Laura.Johnson@hdrinc.com>

Subject: Don Pedro May 18 2017 Workshop Final Notes E-Filed with FERC Today

Don Pedro Relicensing Participants,

The FINAL NOTES and workshop materials from the May 18, 2017 Modeling Tool Updates Meeting have been filed with FERC per the Don Pedro Workshop Consultation Process and uploaded to the Don Pedro Project Relicensing Website <http://www.donpedro-relicensing.com> as an attachment to the CALENDAR May 18 meeting date. On June 22, 2017, DRAFT NOTES were provided for 30-day review and no comments were received, therefore these final notes are identical to the draft notes previously provided.

If you have any difficulties locating and/or accessing the document, please let me know. Thank you.

Rose Staples, CAP-OM, MOS

Senior Administrative Assistant



HDR

970 Baxter Boulevard Suite 301

Portland ME 04103

D 207-239-3857

rose.staples@hdrinc.com

hdrinc.com/follow-us

To: Don Pedro Relicensing Participants

From: Staples, Rose

Sent: Friday, August 25, 2017 5:48 PM

Cc: Deason, Jesse <jesse.deason@hdrinc.com>; 'Le, Bao' <Bao.Le@hdrinc.com>; Johnson, Laura <Laura.Johnson@hdrinc.com>; Dosch, Lisa <Lisa.Dosch@hdrinc.com>; Staples, Rose (Rose.Staples@hdrinc.com) <Rose.Staples@hdrinc.com>

Subject: Districts File Request with FERC Today on La Grange License Application

The Districts have filed a request with FERC today for a revised filing date of October 11, 2017 for the La Grange Original License Application as well as the corresponding amendment to the Don Pedro Final License Application.

A copy of this filing has been uploaded to the La Grange Licensing website (www.lagrange-licensing.com) and Don Pedro Relicensing website (www.donpedro-relicensing.com) and it is also available on FERC's E-Library at www.ferc.gov.

Rose Staples, CAP-OM, MOS

Senior Administrative Assistant



HDR

970 Baxter Boulevard Suite 301

Portland ME 04103

D 207-239-3857

rose.staples@hdrinc.com

hdrinc.com/follow-us

From: Chris Campbell <c.campbell@cbecoeng.com>
Sent: Tuesday, August 29, 2017 5:10 PM
To: Dosch, Lisa
Cc: Chris Hammersmark; Jai Singh; Borovansky, Jenna
Subject: Re: Lower Tuolumne TUFLOW results

Thank you Lisa, it worked this time.

On Tue, Aug 29, 2017 at 3:38 PM, Dosch, Lisa <Lisa.Dosch@hdrinc.com> wrote:

Chris,

The TUFLOW model, lower_tuolumne_tuflow_results, has been uploaded to the cbec public dropbox with your email being the only recipient email that I used. I've attached the confirmation received after the upload. Please verify that you received the information requested.

Thanks and have a great day,

Lisa Dosch

D 208.665.3991



hdrinc.com/follow-us

From: Chris Campbell [mailto:c.campbell@cbecoeng.com]
Sent: Tuesday, August 29, 2017 12:19 PM

To: Dosch, Lisa <Lisa.Dosch@hdrinc.com>
Cc: Chris Hammersmark <c.hammersmark@cbecoeng.com>; Jai Singh <j.singh@cbecoeng.com>;
Borovansky, Jenna <Jenna.Borovansky@hdrinc.com>
Subject: Re: Lower Tuolumne TUFLOW results

Lisa,

I haven't seen the files yet, please try just sending to me only. Our Dropbox is new feature, so not sure if it's being quirky with the two emails.

Thanks

Chris

On Mon, Aug 28, 2017 at 10:30 AM, Dosch, Lisa <Lisa.Dosch@hdrinc.com> wrote:

Chris and Jai,

The results piece of the TUFLOW model, lower_tuolumne_tuflow_results, has been uploaded to the link you provided below.

The following is the message I included with the upload of the file.

August 28, 2017

To: Chris Campbell, M.S.

Ecohydrologist

cbec, inc.

Jai Singh

Ecohydrologist

cbec, inc. eco engineering

c/o American Rivers, John Cain, and Patrick Koepele

The following zip file contains a copy of the Lower Tuolumne TUFLOW 1D and 2D results that were developed for the Don Pedro Relicensing.

From: Chris Campbell [<mailto:c.campbell@cbecoeng.com>]
Sent: Monday, August 28, 2017 2:29 PM
To: Dosch, Lisa <Lisa.Dosch@hdrinc.com>
Cc: Chris Hammersmark <c.hammersmark@cbecoeng.com>; Jai Singh <j.singh@cbecoeng.com>;
Borovansky, Jenna <Jenna.Borovansky@hdrinc.com>
Subject: Re: Lower Tuolumne TUFLOW results

Lisa,

Jai and I haven't seen an email generated from the upload process. Please confirm you sent to c.campbell@cbecoeng.com or j.singh@cbecoeng.com.

From: Dosch, Lisa
Sent: Friday, August 25, 2017 12:21 PM
To: Dosch, Lisa
Subject: TUFLOW model

August 25, 2017

To: Chris Campbell, M.S.
Ecohydrologist
cbec, inc.

Jai Singh
Ecohydrologist
cbec, inc. eco engineering

c/o American Rivers, John Cain, and Patrick Koepele

The following zip file contains a copy of the Lower Tuolumne TUFLOW 1D and 2D results that were developed for the Don Pedro Relicensing.

- File: lower_tuolumne_tuflow_results.zip

Please contact me if you have any additional questions or need additional information.

Thank you,

Lisa Dosch
Hydropower Regulatory Assistant

HDR
610 West Hubbard, Suite 227
Coeur d'Alene, ID 83814
D 208.665.3991
lisa.dosch@hdrinc.com
hdrinc.com/follow-us

Lisa Dosch
Hydropower Regulatory Assistant



HDR
610 West Hubbard, Suite 227
Coeur d'Alene, ID 83814
D 208.665.3991
lisa.dosch@hdrinc.com

hdrinc.com/follow-us

From: Chris Campbell <c.campbell@cbecoeng.com>
Sent: Friday, August 25, 2017 10:23 AM
To: Dosch, Lisa
Cc: Chris Hammersmark; Jai Singh; Borovansky, Jenna
Subject: Re: Lower Tuolumne TUFLOW results

Thank you Lisa!

From: Jai Singh <j.singh@cbecoeng.com>
Sent: Friday, August 25, 2017 10:19 AM
To: Dosch, Lisa
Subject: Out of office 8/22 through 9/4 Re: Lower Tuolumne TUFLOW results

Thanks for your email. I will be out of the office from Tuesday, August 22 through Monday, September 4th. I will respond to your email when I return on Tuesday, September 5th. If you require immediate assistance, please call our main office line at 916-231-6052.

--

Jai Singh
Ecohydrologist

cbec, inc. eco engineering
2544 Industrial Blvd
West Sacramento, 95691
916.668.5225 (direct)

On Fri, Aug 25, 2017 at 10:18 AM, Dosch, Lisa <Lisa.Dosch@hdrinc.com> wrote:

Good morning Chris and Jai,

I have received the Lower Tuolumne TUFLOW results and will work on uploading them to the cbec Public Dropbox. I will send a follow up message once this is complete.

Lisa Dosch

D [208.665.3991](tel:208.665.3991)



hdrinc.com/follow-us

From: Chris Campbell [mailto:c.campbell@cbecoeng.com]
Sent: Tuesday, August 22, 2017 1:50 PM
To: Dosch, Lisa <Lisa.Dosch@hdrinc.com>
Cc: Chris Hammersmark <c.hammersmark@cbecoeng.com>; Jai Singh <j.singh@cbecoeng.com>
Subject: Re: Lisa Dosch submitted a file(s)

Lisa,

We skimmed through the files provided and it appears that the 1D and 2D result files for the lower reach are missing. Please upload those via the Public Dropbox with Jai and Chris C as email recipients since Jai is out on vacation thru Labor Day.

On Fri, Aug 18, 2017 at 5:04 PM, Jai Singh <j.singh@cbecoeng.com> wrote:

Chris,

We've now received the Tuolumne model files from HDR along with a copy of their FERC report. They are a pretty large package. Either I or someone else can dig into them to see what exactly they provided.

Thanks,

Jai

From: Jai Singh <j.singh@cbecoeng.com>
Sent: Thursday, August 17, 2017 11:42 AM
To: Dosch, Lisa
Cc: Borovansky, Jenna
Subject: Re: Tuolumne TUFLOW Model Request

Hi Lisa,

Thanks also for sending the link to the report. We will certainly take a look at that as well.

Best,

Jai

From: Jai Singh <j.singh@cbecoeng.com>
Sent: Thursday, August 17, 2017 11:41 AM
To: Dosch, Lisa
Cc: Borovansky, Jenna
Subject: Re: Tuolumne TUFLOW Model Request

Hi Lisa,

Thanks very much for uploading these files. I'm in the process of downloading them now and will let you know if I have any issues or questions.

Best,

Jai

On Thu, Aug 17, 2017 at 10:13 AM, Dosch, Lisa <Lisa.Dosch@hdrinc.com> wrote:

Jai,

The final piece of the TUFLOW model, tuflow_tuo_middle, has been uploaded to the link you provided below. I've attached to this message the confirmation that the file has been received. In total, the three files provided were:

- Model file: tuflow_tuo_lower_final_inputs_outputs.zip
- Model file: tuflow_tuo_middle_Final_inputs_outputs.zip
- Model file: tuflow_tuo_upper_final_inputs_outputs.zip

Again, please contact me if you have any additional questions or need additional information.

Lisa Dosch

D 208.665.3991



hdrinc.com/follow-us

From: Dosch, Lisa
Sent: Thursday, August 17, 2017 8:37 AM
To: 'Jai Singh'
Cc: Borovansky, Jenna
Subject: RE: Tuolumne TUFLOW Model Request

Good morning Jai,

As of this morning, I have uploaded the lower and upper model files to the link you provided below. I am working on uploading the middle model file today. It is 1.27 GB, so it has been taking time to upload this file. Once the uploading is complete, I will let you know.

The following is the message I included with the upload of the files.

To: Jai Singh, cbec, inc. eco engineering
c/o American Rivers, John Cain, and Patrick Koepele

The following zip files contain a copy of the TUFLOW model that was developed for the Don Pedro Relicensing.

- Model file: tufLOW_tuo_lower_final_inputs_outputs.zip
- Model file: tufLOW_tuo_middle_Final_inputs_outputs.zip
- Model file: tufLOW_tuo_upper_final_inputs_outputs.zip

The model explanation in the report, W&AR-21 – Lower Tuolumne River Floodplain Hydraulic Assessment Study Report, should provide good background on the files you received. Here is a link to the report.

LINK HAS BEEN REMOVED

A slightly revised final report will be filed this September in response to comments from the USFWS. The primary changes were the addition of a few more figures and a slight change in the way ponds were addressed in the post-processing of the data.

Please contact me if you have any additional questions or need additional information.

Lisa Dosch
D 208.665.3991



hdrinc.com/follow-us

From: Jai Singh <j.singh@cbecoeng.com>
Sent: Wednesday, August 16, 2017 9:30 AM
To: Dosch, Lisa
Subject: Re: Tuolumne TUFLOW Model Request

Hi Lisa,

Thanks very much for your help.

Please use this link for our new Dropbox (it is the same as the link at the bottom of my new email signature line):

On Wed, Aug 16, 2017 at 9:26 AM, Dosch, Lisa <Lisa.Dosch@hdrinc.com> wrote:

Good morning Jai,

Here is my email address for you to send the link to upload the TUFLOW model as we discussed.

Lisa Dosch

Hydropower Regulatory Assistant



HDR

610 West Hubbard, Suite 227
Coeur d'Alene, ID 83814
D [208.665.3891](tel:208.665.3891)
lisa.dosch@hdrinc.com

hdrinc.com/follow-us

From: Jai Singh [mailto:j.singh@cbecoeng.com]
Sent: Monday, August 14, 2017 3:50 PM
To: Borovansky, Jenna
Cc: John Cain; Steve Rothert; Patrick Koepele; Lisa Hunt; Chris Hammersmark
Subject: Re: Tuolumne TUFLOW Model Request

Hi Jenna,

Thanks very much for your prompt response.

Please use this address and phone number for delivery (phone number is different):

cbec, inc. eco engineering
2544 Industrial Blvd
West Sacramento, 95691
(916) 231-6052

Thanks!

Jai

On Mon, Aug 14, 2017 at 3:46 PM, Borovansky, Jenna <Jenna.Borovansky@hdrinc.com> wrote:

Hello Jai:

I have received the email. Our TUFLOW modeler has already packaged up the files below for delivery to you pending the approval. I think they may fit onto a large thumb drive. I am out of the office, but will touch base with my colleague tomorrow morning to determine if she is able to send the files to you on a thumb drive or if we will need you to provide us with an external hard drive.

Stay tuned.

Thanks, Jenna

p.s. In the meantime, please confirm that the address and phone below is correct for FedEx delivery if we are able to get the files onto a hard drive.

Jenna Borovansky

D [208.665.3987](tel:208.665.3987) M [425.281.9557](tel:425.281.9557)

From: Jai Singh [mailto:j.singh@cbecoeng.com]
Sent: Monday, August 14, 2017 3:39 PM
To: Borovansky, Jenna
Cc: John Cain; Steve Rothert; Patrick Koepele; Lisa Hunt; Chris Hammersmark
Subject: Tuolumne TUFLOW Model Request

Hi Jenna,

I am writing you at the suggestion of John Cain and Patrick Koepele to request that you send us the Tuolumne TUFLOW model files HDR developed as part of FERC re-licensing efforts. As a means of background, American Rivers is our client and Patrick has been assisting us with data acquisition for the Tuolumne.

DWR has signed a data sharing agreement allowing HDR to provide American Rivers with the Tuolumne TUFLOW model which we understand incorporates CVFED LiDAR data. I have attached the agreement to this email.

Can you please help with the following items?

1. Can you please provide the Tuolumne TUFLOW model input files, the various model control files and water surface results files as soon as possible?
2. Can you please confirm that you have received this email and are able to meet this request?
3. Please let me know if you can send the files electronically, or if you need us to provide an external hard drive or other storage device for the file transfer.

Please let me know if you any questions regarding our request or the specific files we are requesting.

Thanks!

Jai

Jai Singh
Ecohydrologist

cbec, inc. eco engineering
2544 Industrial Blvd
West Sacramento, 95691
916.668.5225 (direct)

Website – <http://www.cbecoeng.com>