

2022 Plenary Session



At the 39th Annual Salmonid Restoration Conference held in Santa Cruz, California from April 19 – 22, 2022.

Keynote Speakers



Slide 3 - **Salmon Fishing, More than a Sport: How Salmon are Vital to Native American Culture, Health, and Prosperity**, [Brook Thompson](#), Native Scholar, Stanford University

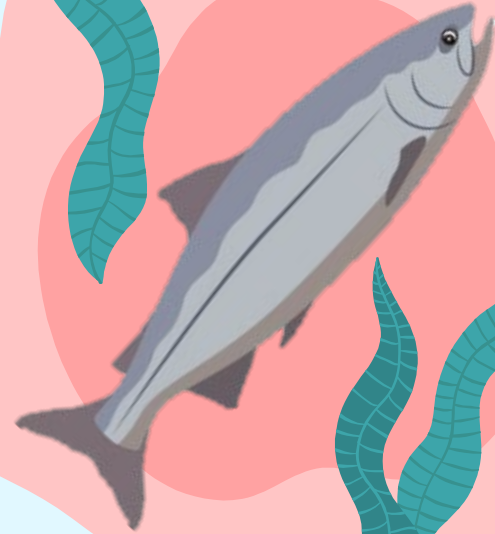
Slide 32 - **Adapting to Increasing Drought Intensity: Recommendations for Reform in Policies and Practice**, [Jeffrey Mount](#), Ph.D., Senior Fellow, Public Policy Institute of California

Slide 55 - **Answering the Question Most of Us are Afraid to Ask in Southern Salmon Restoration: Why Bother?**, [Sean A. Hayes](#), Ph.D., NOAA Fisheries Northeast Fisheries Science Center

Slide 98 - **Protecting and Restoring California's Ocean Ecosystems**, [Margaret Spring](#), Chief Conservation and Science Officer, Monterey Bay Aquarium

Salmon Fishing , More than a Sport

How Salmon are Vital to Native American
Culture, Health, and Prosperity





Portland State
UNIVERSITY

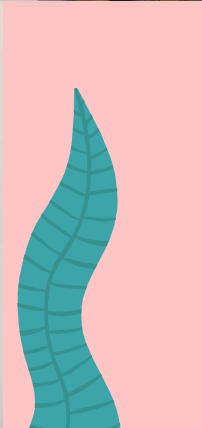
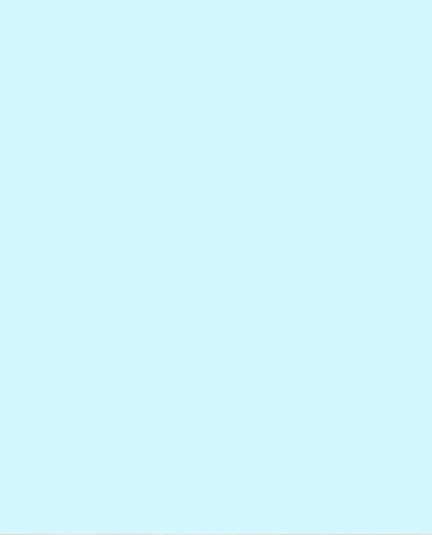
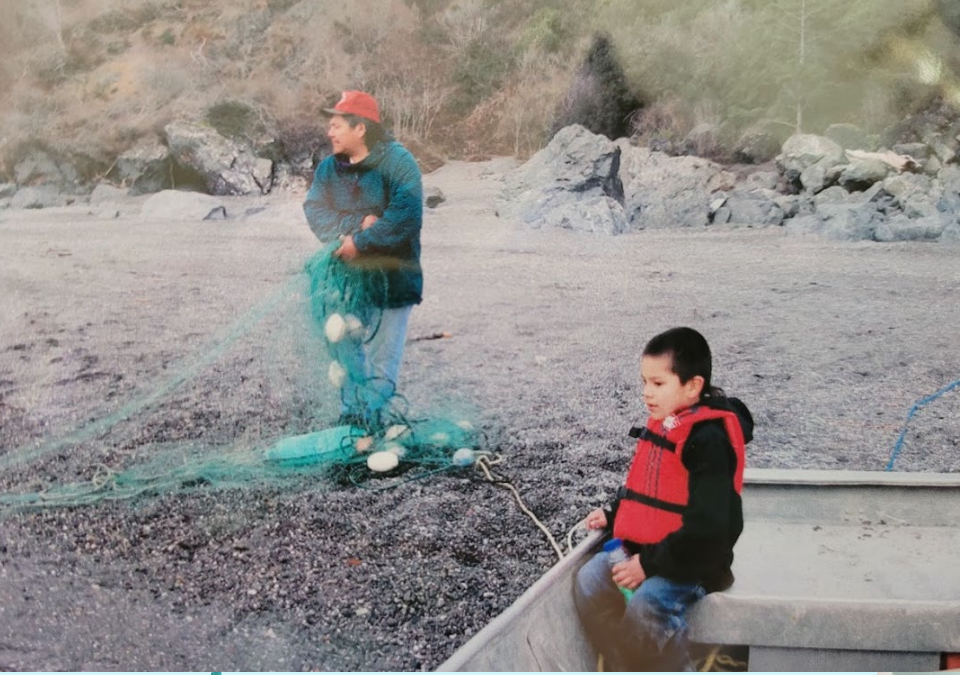


Stanford
University



UNIVERSITY OF CALIFORNIA
SANTA CRUZ







2007

Fishing license;
Pulled my first
fish !

12 years old





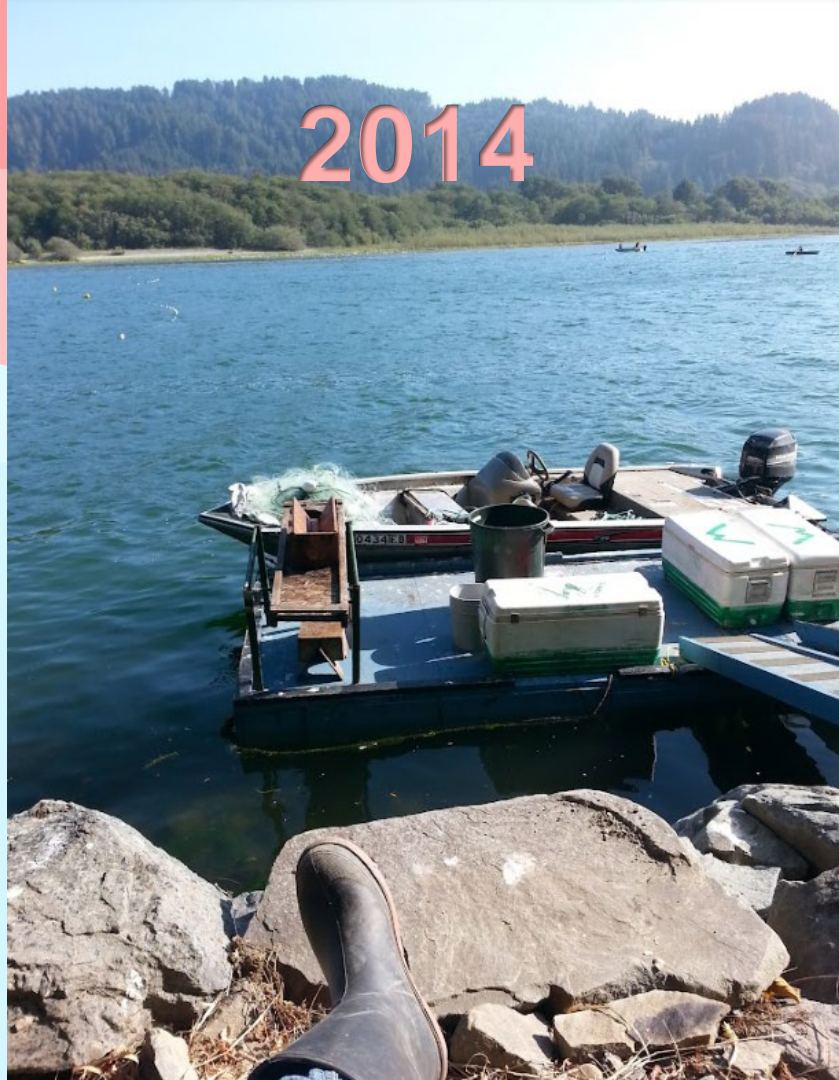




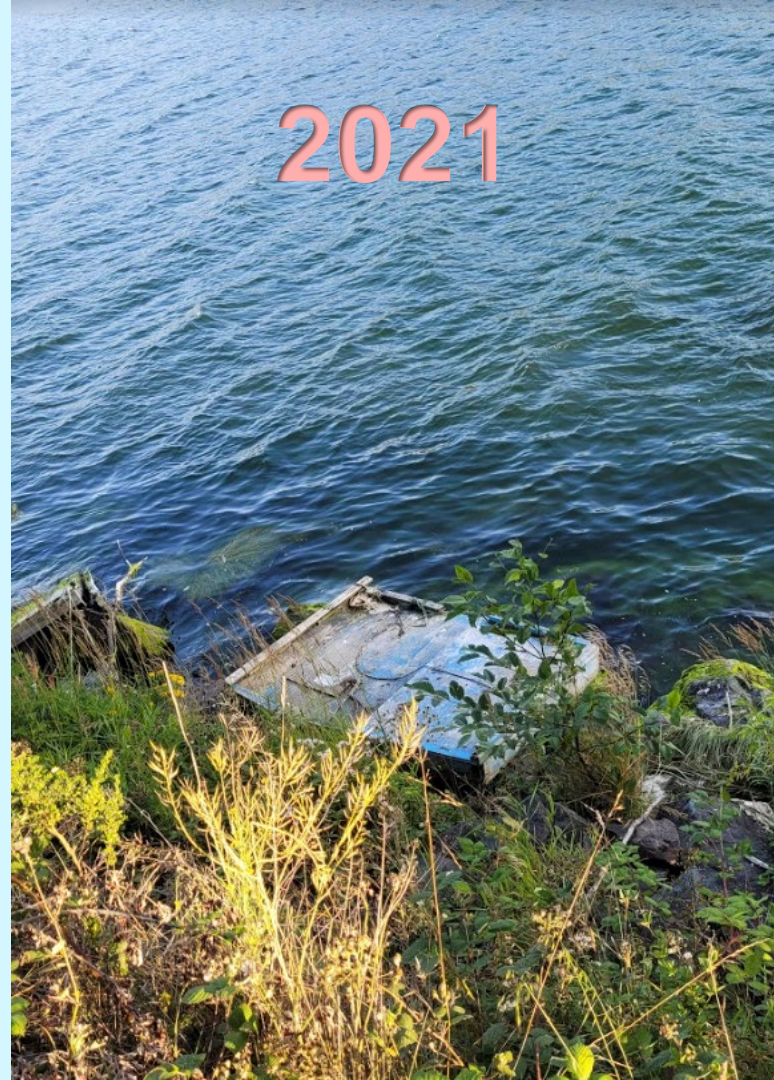




2014



2021







Yurok Tribe: Klamath River salmon stock conditions dire, fishery canceled for 5th time

The Yurok Tribe is suffering significant economic damage on top of the extreme cultural and social impacts of failing fish runs," Vice Chairman...

Apr 16, 2021



CAUTION

BLUE GREEN ALGAE IS PRESENT IN THE KLAMATH RIVER
(posted 07/10/2020 & 8/28/2020)



1. Avoid swimming or wading in areas when the water has a strong bright green color or where algae mats are present.



2. Keep pets, especially dogs out of strong bright green water. Do not allow them to drink river water or lick algae from their fur.



3. Swimmers should shower & rinse pets with tap water after swimming.

4. Fish may be eaten after removing guts & liver- rinse fillets in tap water.

5. Do not drink or cook with river water.

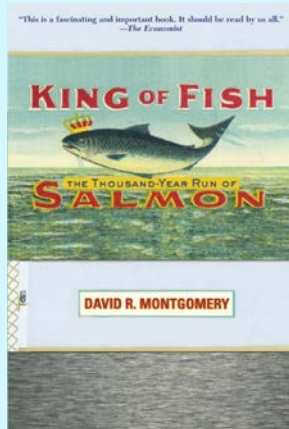
Blue green algae in the river during the summer & fall may result in dangerous buildup of toxins in the water.

ACTIVITIES NEAR THE WATER SUCH AS FISHING, CAMPING & HIKING ARE SAFE.

An aerial photograph of the Grand Coulee Dam. The image shows the massive concrete dam structure with multiple spillways. Water is cascading over the spillways, creating white rapids. The reservoir behind the dam is a large, calm body of water. The surrounding landscape is rugged and hilly, with some vegetation and rocky terrain. The sky is clear and blue.



IMPACTS OF DAMS



- Dams and diversions play a major role in chinook infectious disease rates.
- Cuts off salmon habitat.
- Warm stagnate water behind the dam is a breeding ground for disease and parasites.
- Increases water temperature.
- Relies on hatcheries for population replacement, which may compete with wild salmon and spread disease.
- Contributes to adult fish kills like in 2002 (There are regular juvenile fish kills).
- Production of toxic blue-green algae.
- Impact to health, culture, and livelihood of tribes and people on the Klamath.

HISOTRY

~9,000
BCE

2022



“That a war of extermination will continue to be waged between the races until the Indian race becomes extinct must be expected”
- Peter Burnett, 1851 CA’s first Gov

Death of
CA Gold 100,000
Rush Indians

1849

First two
months*

Yurok
Contact

1851

Native
CA Slave
Trade

1850-1870

Dams

1911

*20 years 80% killed California’s Little-Known Genocide; 2020, Erin Blakemore, <https://www.history.com/news/californias-little-known-genocide>

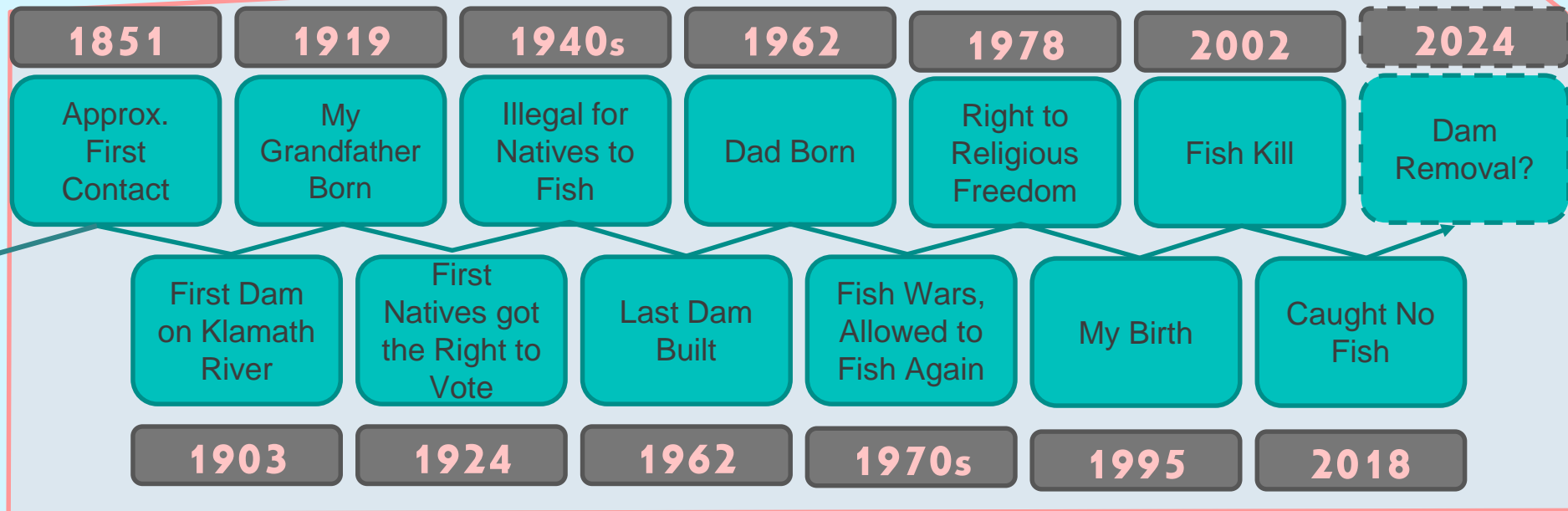


EXPANDED TIMELINE

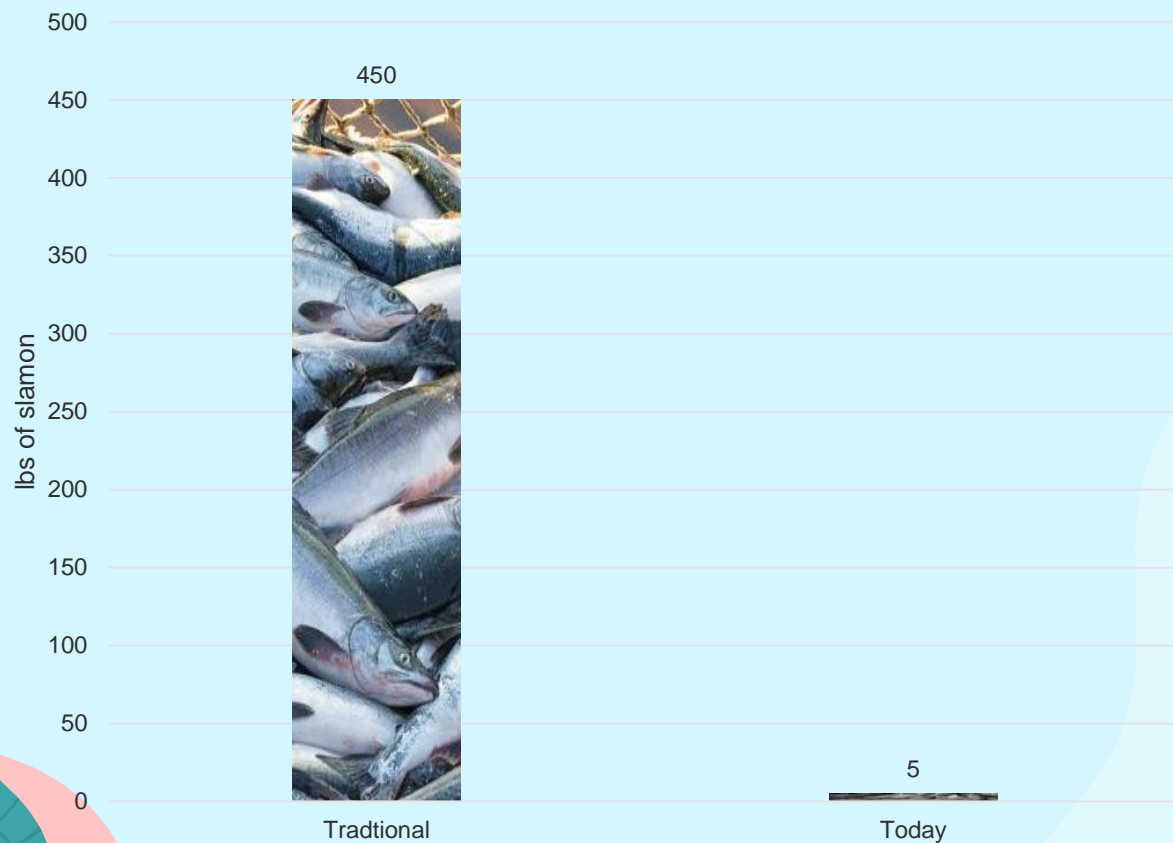
(171 years)

~9,000
BCE

2024



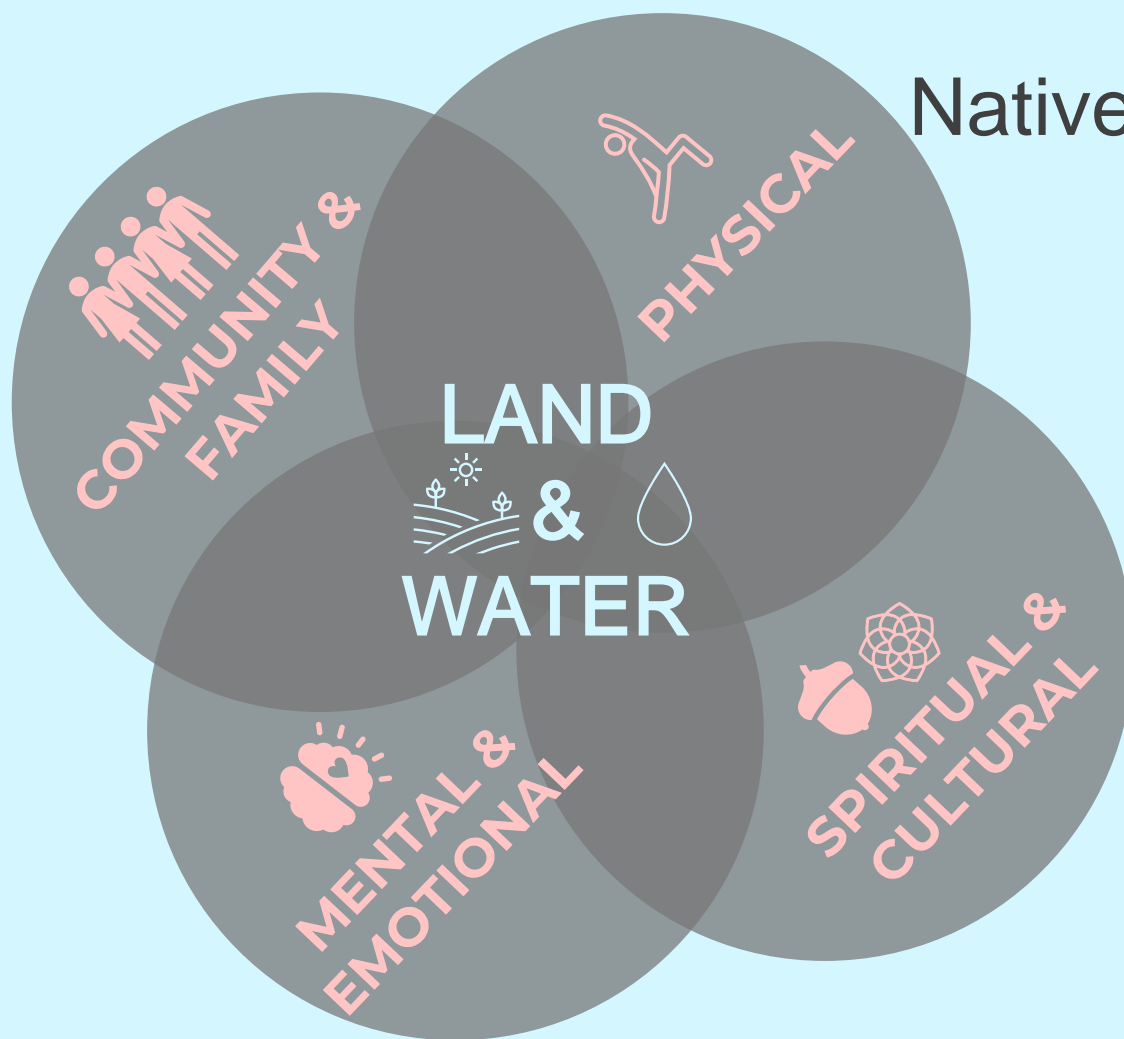
Pounds of Salmon per Person per Year



Karuk Statistics

Salmon People

Native Health



Native Health

COMMUNITY

- Belonging
 - Support
 - Purpose
- i.e. Fishing together

PHYSICAL

- Prevents disease
- Less Stress
- Endorphins
- Longer life

i.e. Eating Salmon & exercise from fishing

LAND & WATER



CULTURAL

- Sense of Purpose
 - Self-esteem
 - Community Building
- i.e. First Salmon Ceremony

MENTAL

- Better physical health
 - Improved Mood
 - Better Relationships
- i.e. participating in ceremony with community

www.opexgyms.com/blog/mental-health-benefits-of-exercise

<https://www.webmd.com/balance/how-spirituality-affects-mental-health>

www.nami.org/Blogs/NAMI-Blog/November-2019/The-Importance-of-Community-and-Mental-Health

www.womenheart.org/wp-content/uploads/2019/04/Minorities_Native-American-Women-Heart-Disease-Brochure-FINAL.pdf

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 North Coast Journal

Yurok Tribe Declares Emergency After Rash of Suicides

The Yurok Tribe has declared a state of emergency after seven young tribal members took their own lives over an 18-month span.

Jan 24, 2016



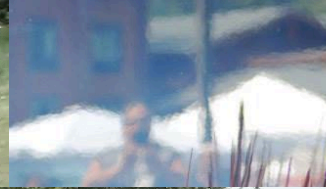
 North Coast Journal

Mental Health 'Tsunami' Looms: Can California Prevent a ...

Within 18 months, the Yurok tribe tallied seven suicides in the Weitchpec area. The tribe declared a state of emergency and began applying...

Sep 30, 2020





LOSS OF SALMON; LOSS OF LIFE



Diabetes 21% above US Avg



Mental, emotional, cultural and spiritual health benefits of traditional foods.



Heart Disease 40% above US Avg



72.44% of respondents rarely or never had the access to Native food.



First appearance diabetes in the 70's
(Last dam in 1962)



44.91% of households said they got food from hunting, fishing, or gathering.

VULNERABLE TO CLIMATE CHANGE

Indigenous peoples are disproportionately affected by the effects of climate change. Approx. 370 million people who are indigenous (~5% world's pop).

"Indigenous peoples and climate change", International Labour Office, Geneva, 2017.



DEFORESTATION

Indigenous Peoples and local communities manage at least 24%

"Indigenous Peoples Must be Central to Tackling the Climate Crisis", SDG Knowledge Hub, 2021



BIODIVERSITY

Indigenous peoples protect 80% of the Earth's biodiversity

"Indigenous peoples defend Earth's biodiversity—but they're in danger", Gleb Raygorodetsky, 2018.



SEA LEVEL RISE

27 million people in nearly 2,000 communities in 87 countries. Isn't a part of the world where native coastal people don't live.

"Indigenous peoples of the world's coastlines are losing their fisheries — and their way of life", Darryl Fears, 2016.



AGRICULTURE

Loss of food sources and economic support.

"The effects of climate change on indigenous peoples", United Nations, Department of Economic and Social Affairs

AB2108 awpw.assembly.ca.gov

The image shows two screenshots from a web browser. The top screenshot is the homepage of the California State Assembly Committee on Water, Parks, and Wildlife. It features the committee's name, a search bar, and navigation links. A 'Welcome' message is followed by the committee's jurisdiction and location. Two members are listed: Assembly Member Rebecca Bauer-Kahan and Assembly Member Megan Doherty. A red circle highlights a link labeled 'Submit Position Letter' under the heading 'For information on how to submit a position letter'. The bottom screenshot is a 'Note Submission' form. It includes fields for 'Select a Bill' (Measure: AB, 2108), 'Session Type' (Regular), 'Select Your Stance' (Support selected), and 'Enter Your Stance'. A table lists the bill details, and a dropdown menu shows 'Water, Parks, and Wildlife' as the selected committee.

California State Assembly
COMMITTEE ON WATER, PARKS, AND WILDLIFE

Committee Home Members & Staff Hearings Issues Publications Helpful Info Interesting Stuff!

Welcome to Committee on Water, Parks, and Wildlife

Committee Jurisdiction: Primary jurisdictions are water resources, flood management, fish and game, parks and recreation, and wildlife.

The Water, Parks, and Wildlife Committee is located in the Legislative Office Building, 1020 N Street, Room 160, Sacramento, CA 95814 and the phone number is (916) 319-2096.

Assembly Member Rebecca Bauer-Kahan
Chair of the Water, Parks, and Wildlife Committee

Assembly Member Megan Doherty
Vice Chair of the Water, Parks, and Wildlife Committee

For information on how to submit a position letter, please click the link below:
[Assembly Parks Reference Guide](#)
[Submit Position Letter](#)

Note Submission

Select a Bill

Measure: AB 2108

Session Type: Regular

Select Your Stance

Support Oppose

Enter Your Stance

Bill	Subject	Author
AB 2108	Water policy: environmental justice: disadvantaged and tribal community representation.	Robert Rivas

Select a Committee

Water, Parks, and Wildlife

☐ Submit a letter instead

AB -2108 Water policy: environmental justice: disadvantaged and tribal community representation

“This bill would require that one of the persons appointed by the Governor to the state board be qualified in the field of water supply and water quality relating to disadvantaged or tribal communities and not be the same member as the member appointed who is qualified in the field of water supply and water quality relating to irrigated agriculture. The bill would also require that at least one person appointed to each regional board have specialized experience to represent disadvantaged or tribal communities.”

The effects of pollution do not stop
at state lines, borders, or
generations. We are all downriver
people at some point, and we, as a
voice for the land, must prevent
harm at its source.

Q&A

THANK YOU



WEBSITE: [BROOKMTHOMPSON.COM](https://brookmthompson.com)



INSTAGRAM: [BROOK_M_THOMPSON](https://www.instagram.com/brook_m_thompson)

Why Is Community Important To Mental Health?

We're social beings, and we are not meant to live in isolation. Community is critical for us to thrive, especially for someone with mental illness who is already experiencing the common symptoms of loneliness and isolation.

Community provides many elements that are critical to mental health, but here are three of the most beneficial aspects.

Belonging

If you've ever felt like you don't fit in, you know it can be a lonely experience. Community provides a sense of belonging — a group you identify as being a part of. This is different than conforming to be in a group. A true sense of belonging includes the ability for you to feel you are a part of the community as your true self. There is not anything you have to change to be a part of the community, but instead, you are embraced and appreciated for your unique qualities.

Support

Who do you turn to when you need something? Having people you can call on when you need to talk or need help with something can help you through difficult situations that might feel insurmountable alone. Knowing there are people who support you can help you feel cared for and safe, and can benefit your outlook on life.

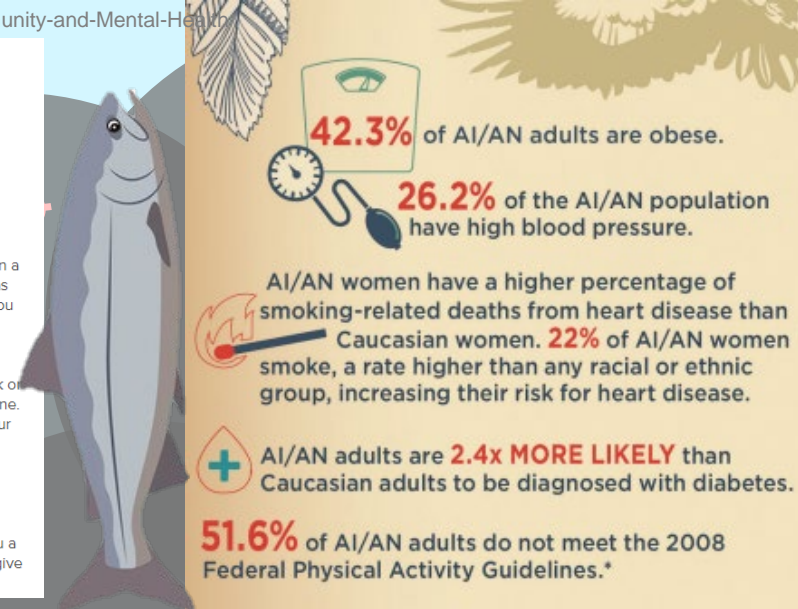
Purpose

In community, people fill different roles. Perhaps you're the friend who enjoys cooking and can be counted on to bring a hot meal over when someone is going through something. Or you're the friend who others know they can call when they need to talk about their struggles. These roles can give you a sense of purpose through bettering other people's lives. Having purpose, and helping others, helps give meaning to life.

www.opexgyms.com/blog/mental-health-benefits-of-exercise

Positive impacts of spirituality. There are several ways that spirituality can support your mental health:

- You may feel a higher sense of purpose, peace, hope, and meaning.
- You may experience better confidence, self-esteem, and self-control.
- It can help you make sense of your experiences in life.
- When unwell, it can help you feel inner strength and result in faster recovery.
- Those in a spiritual community may have more support.
- You may work at better relationships with yourself and others.



REDUCED STRESS	IMPROVED MOOD AND MENTAL CLARITY
MENTAL HEALTH BENEFITS OF EXERCISE	
RELEASES ENDORPHINS TO ENERGIZE YOUR SPIRITS	INCREASED MOTIVATION, FOCUS AND LEARNING
SENSE OF CONTROL OVER YOUR WELLBEING	CAN STIMULATE REST AND RELAXATION

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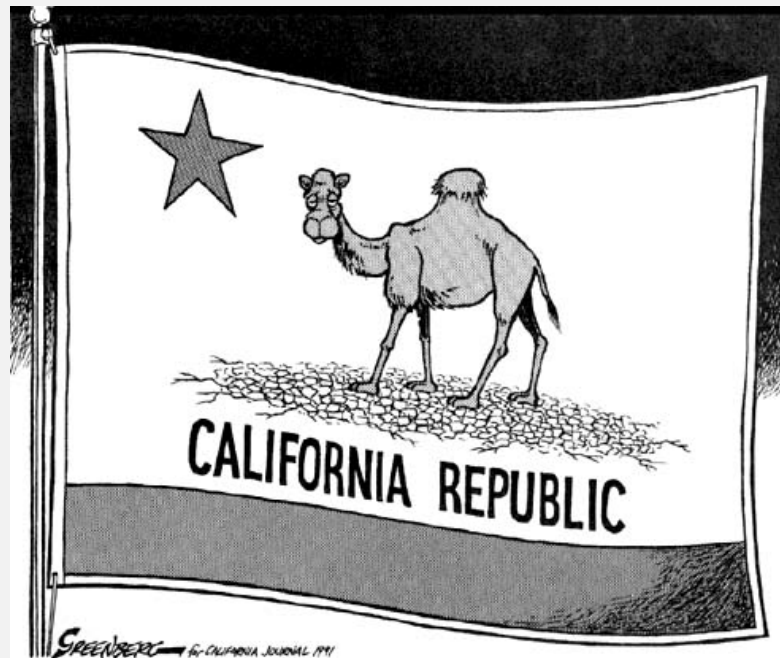




Adapting to Increasing Drought Intensity

Recommendations for Reform in Policy and Practice

Jeffrey Mount, PPIC Senior Fellow and
UC Davis Emeritus Professor



PPIC

PUBLIC POLICY
INSTITUTE OF CALIFORNIA

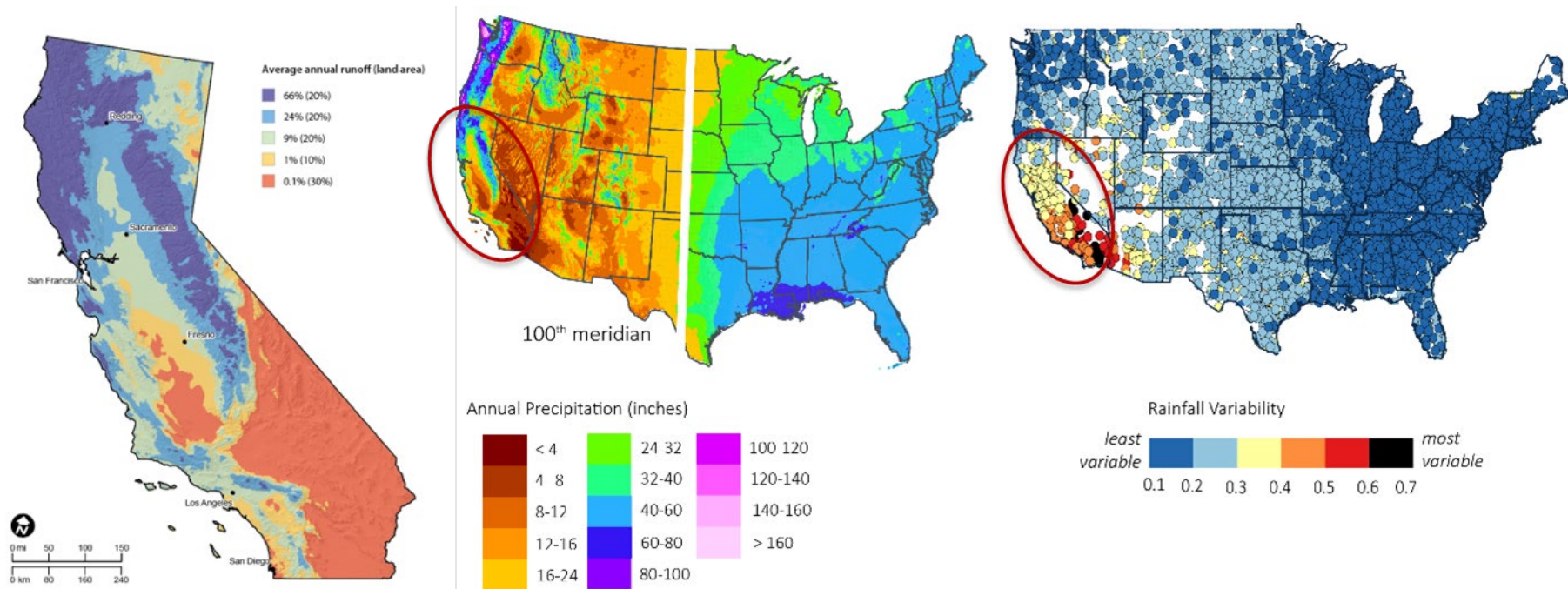
A Talk Stolen in its Entirety from the Work of Others



- Biologists/Ecologists
 - Ted Grantham
 - Letitia Grenier
 - Eric Stein
 - Josh Viers
 - Jim Cloern
 - Frank Davis
 - Mark Schwartz
 - Alison Whipple
 - Nate Seavey
 - Anna Sturrock
 - Carson Jeffres
 - Rob Lusardi
 - Caitrin Chappelle
- Hydrologists/Climatologists
 - Mike Dettinger
 - Daniel Swain
 - Sarah Null
 - HB Zeff
 - Sarah Yarnell
- Engineers
 - Jay Lund
 - Greg Gartrell
 - Alvar Escriba-Bou
 - Bill Fleenor
- Legal/Policy Experts
 - Brian Gray
 - Buzz Thompson
 - Jennifer Harder
 - Leon Szeptycki
 - Karrigan Bork
- Economists
 - Ellen Hanak
 - Richard Howitt
 - Josue Medellin-Azuara
 - Yusuke Kuwayama

With apologies to those of you not listed here. If we talked, I stole from you.

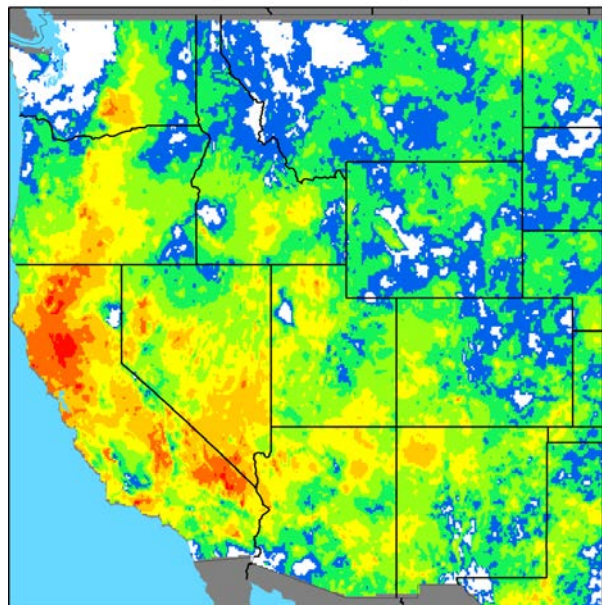
Reminder: Western US is drier, with more variable precipitation—California is most variable



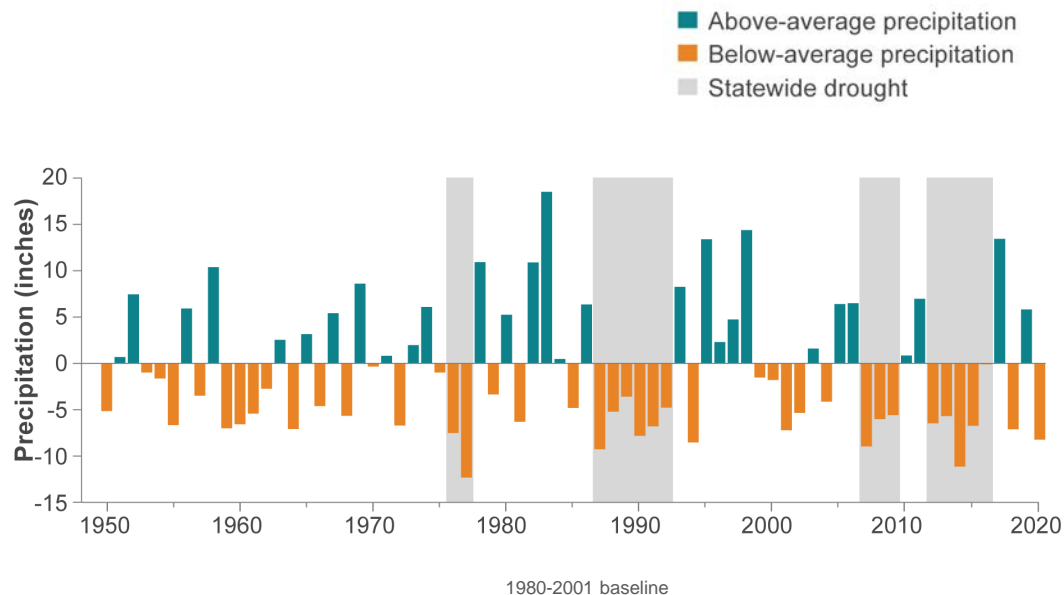
Courtesy Mike Dettinger

This Drought is Part of an Unfortunate Pattern

Precipitation Anomaly since Oct 2019, as of 1 Apr 2022
(normal = 1981-2010)

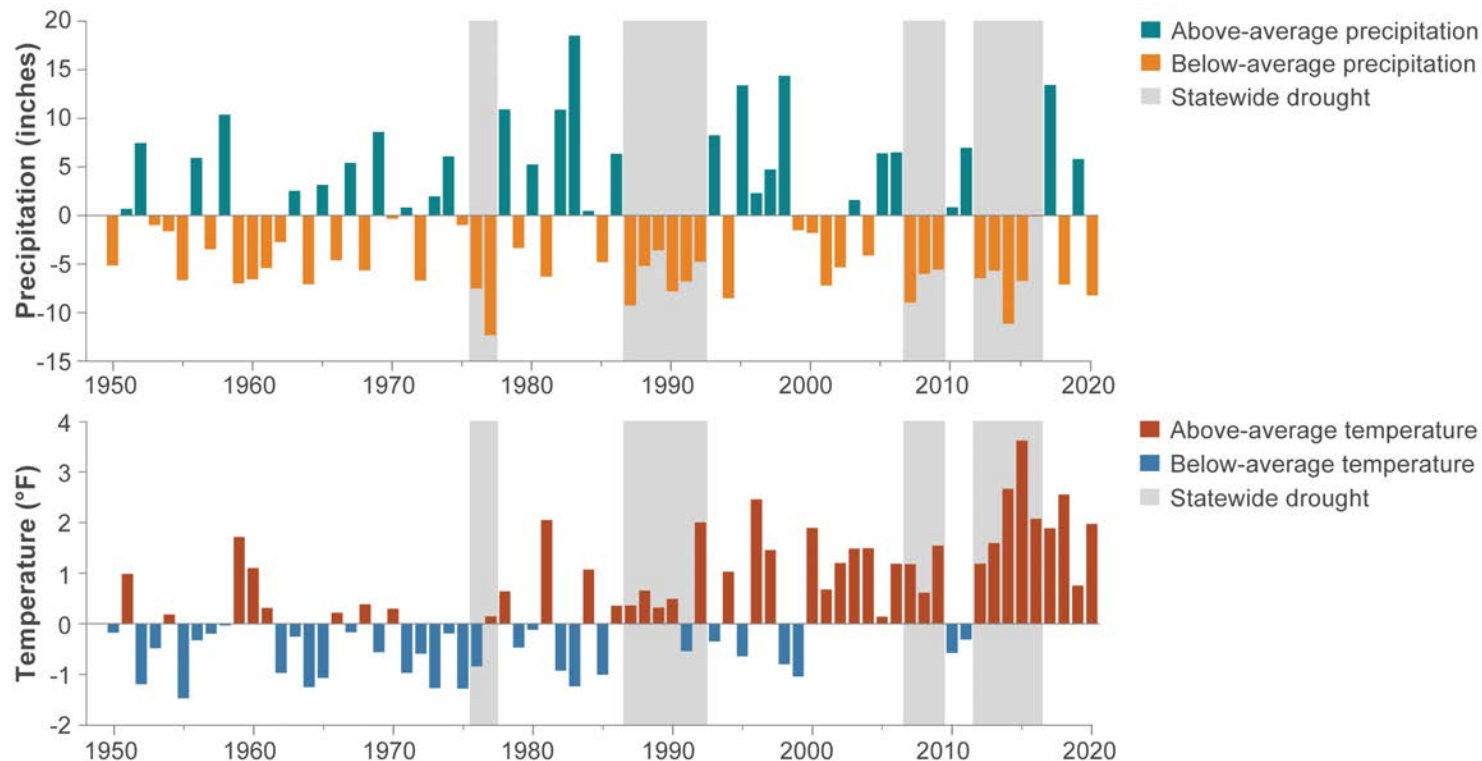


Normal Water-Years Worth of Missing or Extra Precip
-2.00 -1.75 -1.50 -1.25 -1.00 -0.75 -0.50 -0.25 >0



Source: Climate Tracker, Western Regional Climate Center

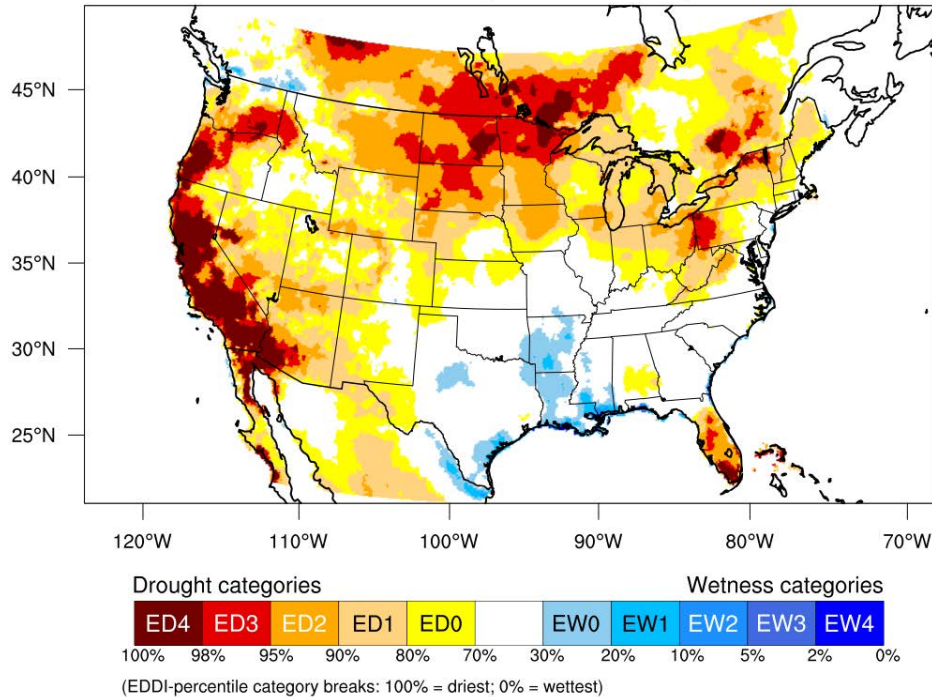
We are in the Era of the Hot Drought



Source: Climate Tracker, Western Regional Climate Center 1980-2001 baseline

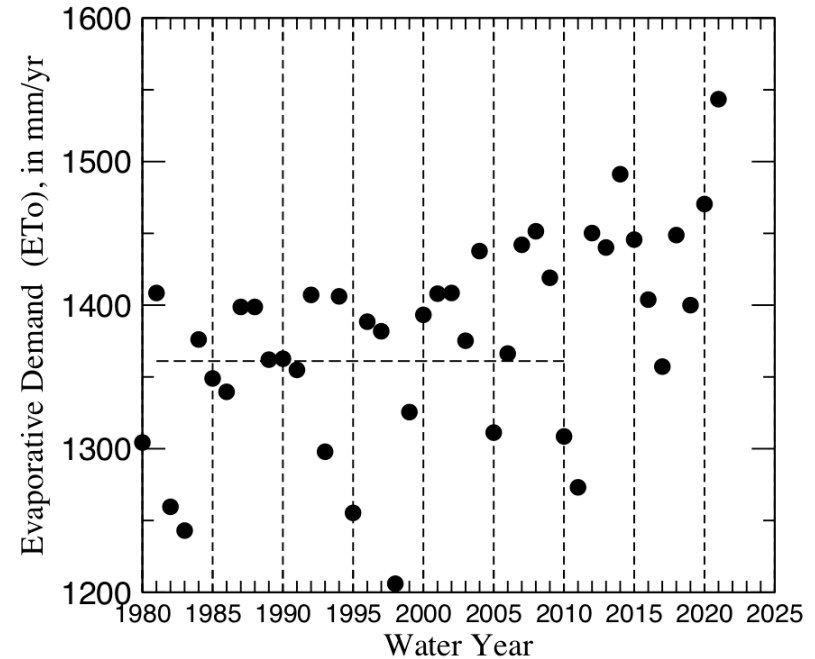
The Big Change: Evaporative Demand

Evaporative Demand WY 2021



Generated by NOAA/ESRL/Physical Sciences Laboratory

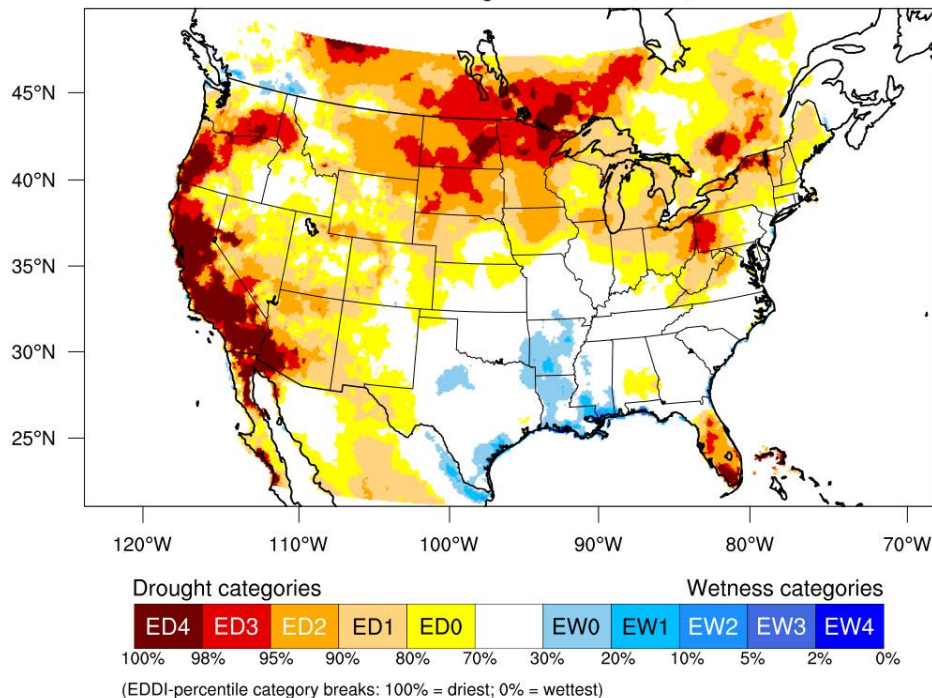
Water Year Evaporative Demand
California North of 36N



Source: Mike Dettinger

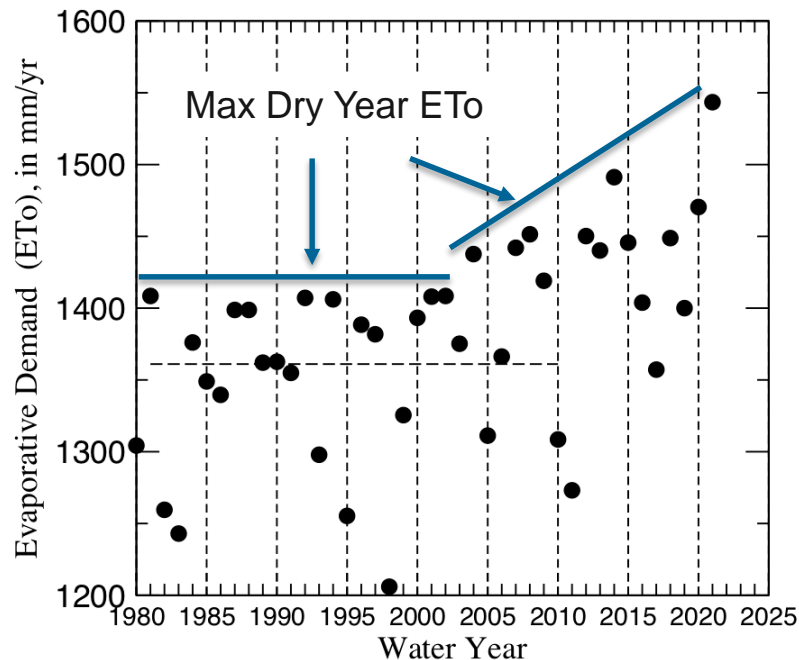
The Big Change: Evaporative Demand

Evaporative Demand WY 2021



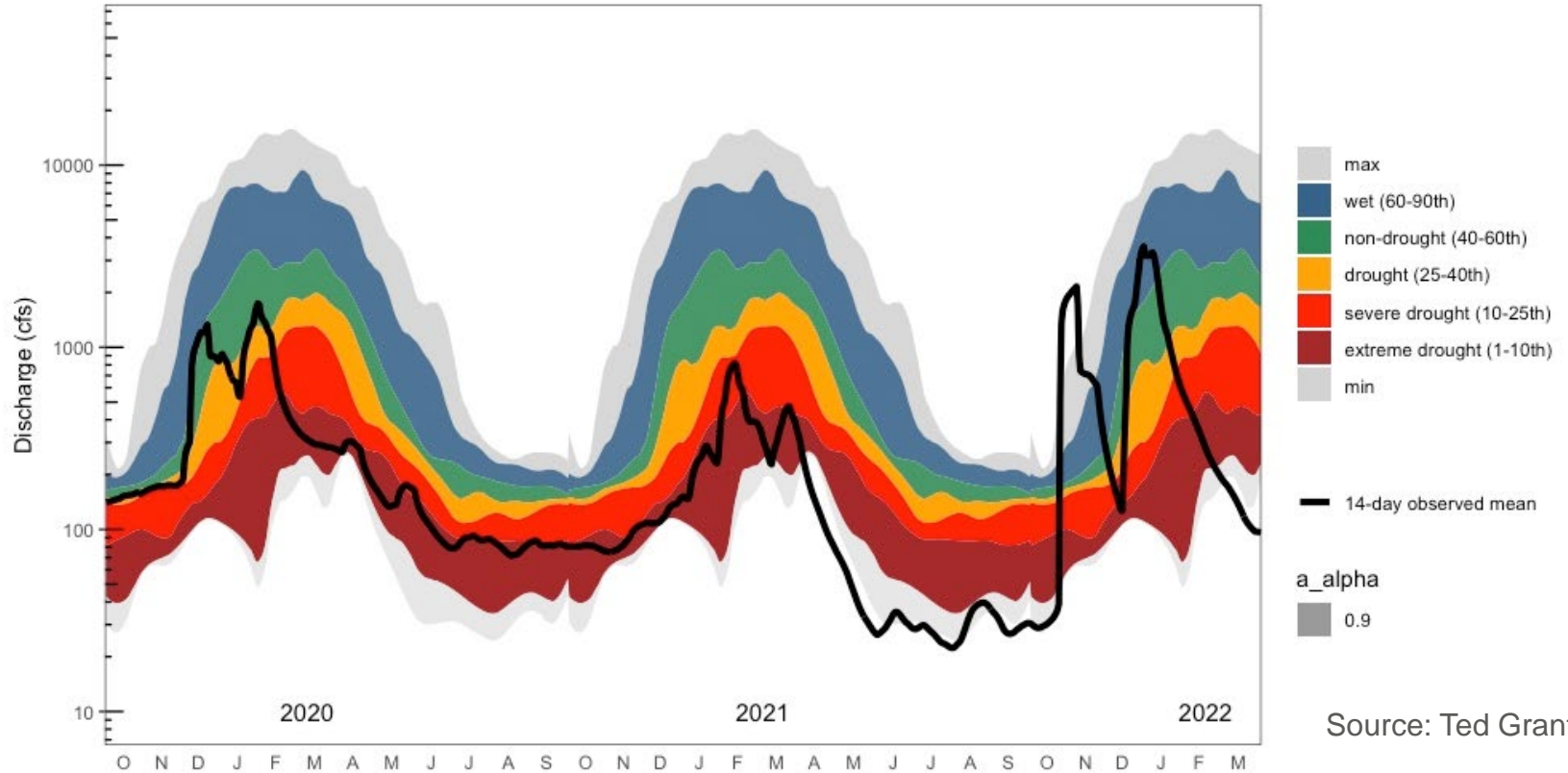
Generated by NOAA/ESRL/Physical Sciences Laboratory

Water Year Evaporative Demand
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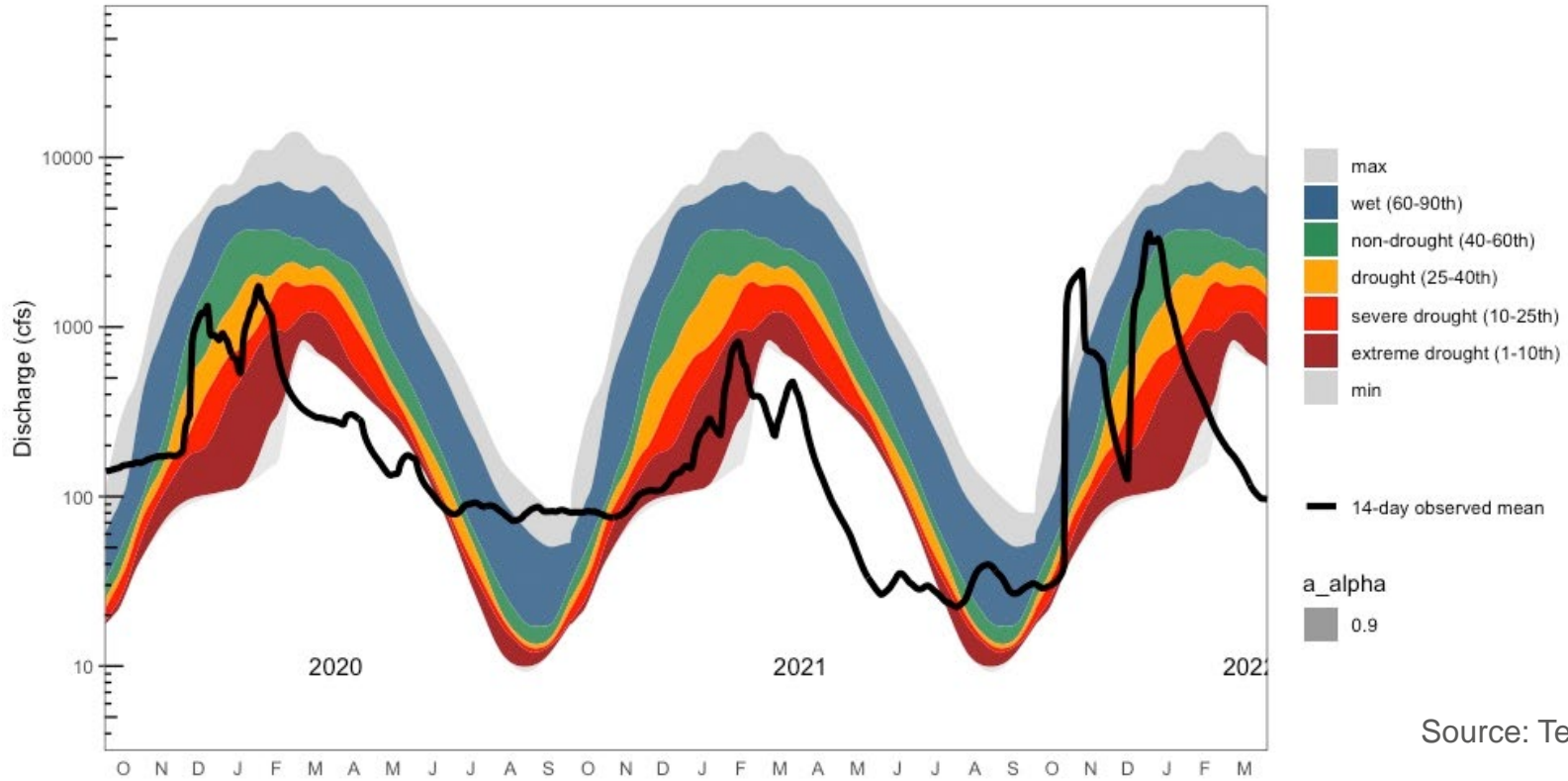
Source: Mike Dettinger

RUSSIAN R NR HEALDSBURG CA
 Historical monthly flow ranges (1980-2020)
 with rolling 14-day average observed flow
 2019-10-01 to 2022-04-01



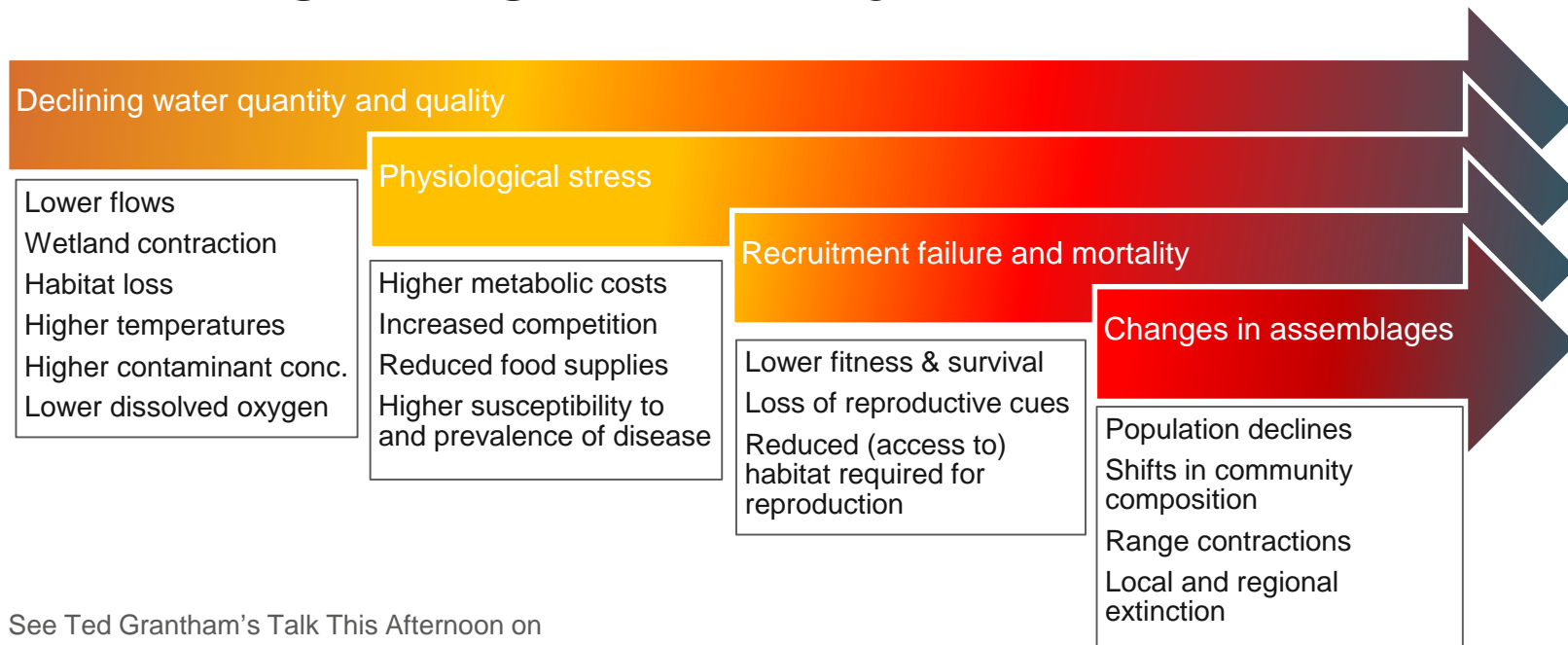
Source: Ted Grantham

RUSSIAN R NR HEALDSBURG CA
Natural modeled monthly flow ranges (1980-2015)
with rolling 14-day average flow
2019-10-01 to 2022-04-01



Source: Ted Grantham

Your Challenge: Managing Bad Things During Increasing Drought Intensity



See Ted Grantham's Talk This Afternoon on
Ecological Drought Indicators

A Systemic Problem: the Environment is a Constraint, not a Priority

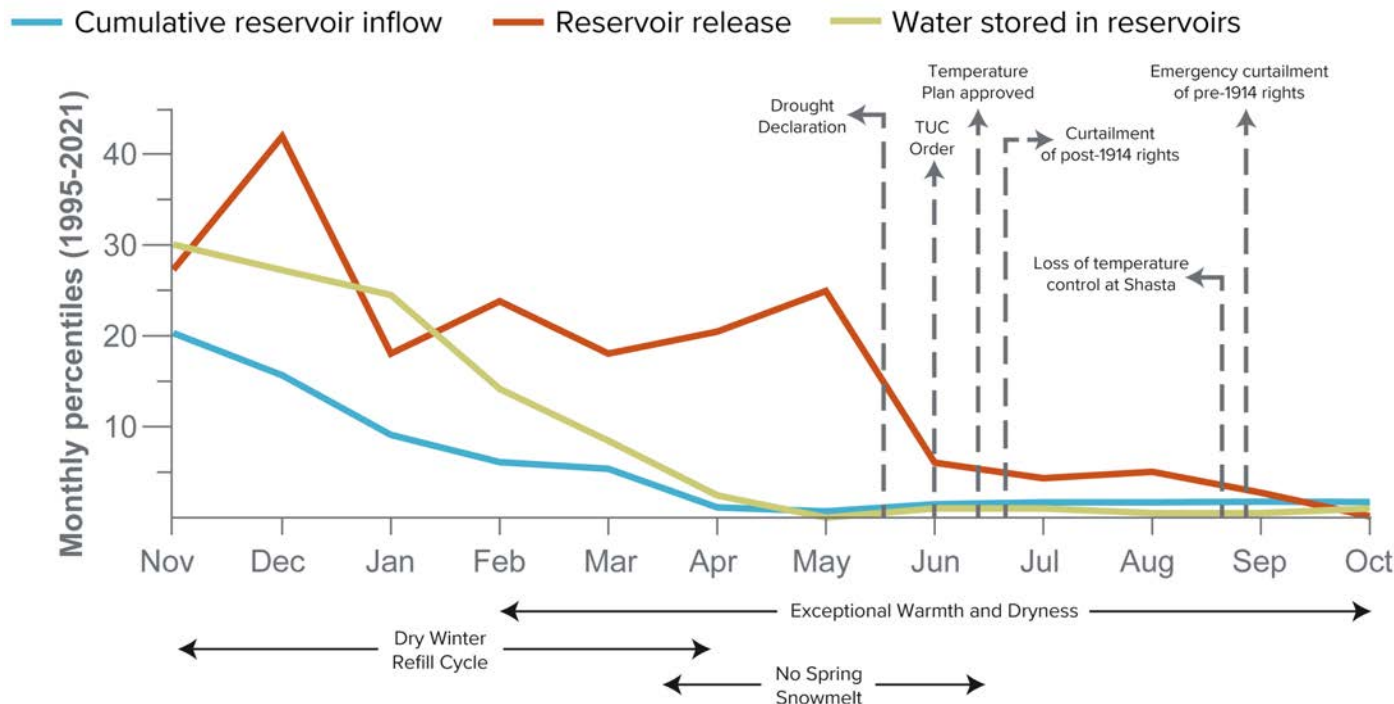
The Problem

- The environmental constraints
- Reflected in flow and water quality standards
- Narrow focus on listed species, not ecosystems
- Thresholds in regulation produce bizarre changes in conditions and are difficult to change
- A manage to the edge mentality

■ *The 2016 WIIN Act directs that the biological opinions governing project operations must "provide the maximum quantity of water supplies practicable" to CVP and SWP contractors "without causing additional harm to the protected species."*

CVP and SWP North of Delta (Water Year 2021)

Monthly reservoir storage, inflow and releases

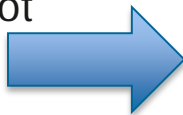


SOURCE: California Department of Water Resources.

Making the Environment a Priority/Partner

The Problem

- The environmental constraints
- Reflected in flow and water quality standards
- Narrow focus on listed species, not ecosystems
- Thresholds in regulation produce bizarre changes in conditions and are difficult to change
- Manage to the edge mentality



A Policy Response

- Ecosystem-based management makes the environment a partner
- Assets for the environment, flexibly managed, best chance of success
- Commitment to efficiency of use builds trust
- Plans and priorities to provide a transparent roadmap
- Use of agreements and existing laws to provide assurances

1. An alternative path: Ecosystem-based management instead of ESA-based management

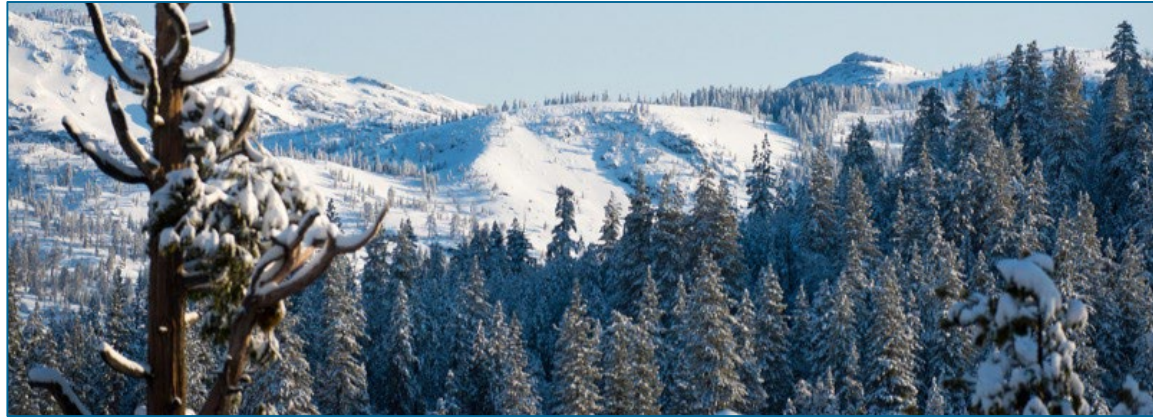
- Manages for *ecosystem condition* rather than listed species
- Integrates human uses and emphasizes multiple benefits
- Produces greater net benefits and reduces water conflict



South Fork Eel River. Source: Ted Grantham

2. Partners need assets to bring to the table

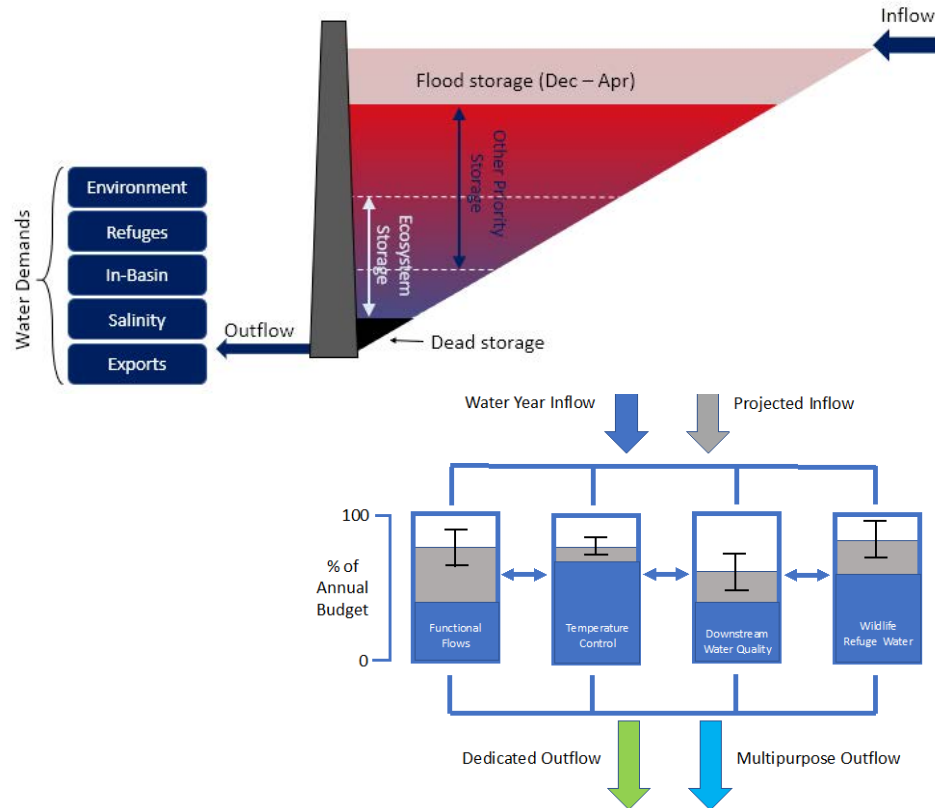
- Ecosystem Water Budgets (EWB)
 - A defined quantity of water in a watershed that can be flexibly managed like a priority water right in order to meet ecosystem goals



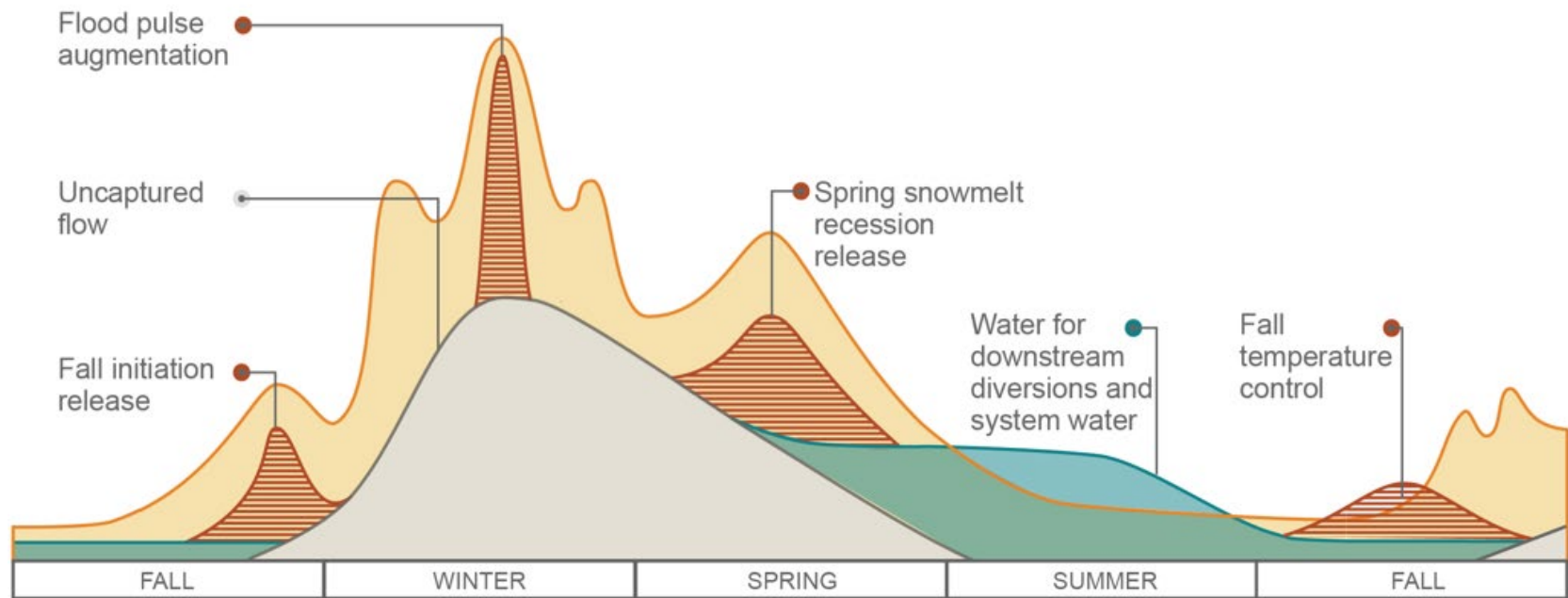


Ecosystem water should be flexibly managed

- Integrate into the water rights system within a watershed
- Create a management structure with ecosystem trustees
- Grant management flexibility, including trading and storage
- Improve certainty over allocation by fixing budget and term



3. Partners Make Efficient Use of their Assets: Functional Flows/Flow Shaping



Yellow area = natural flow regime; blue areas = water for downstream diversions and system water; gray area = uncaptured flows; hatched red areas = EWB.



Efficiency of use requires pairing of functional flows with structural habitat



Photo: DWR



Photo: Josh Viers

4. Partners have a plan and set priorities

- Planning and plans matter
- Few comprehensive, ecosystem-based watershed plans out there
- And a profound unwillingness to set priorities
- The Australian model: Annual Environmental Watering Plans
 - Vetted with users in advance
 - Decision tree released in the fall
 - Managed by a trustee
 - Linked to structural habitat

Restoration Administrator Flow Recommendation

To: Don Portz, Chad Moore, Emily Thomas, Don Portz
Cc: Michael Jackson, Rufino Gonzalez, Doug Obegi, Steve Ottemoeller, Ian Buck-Macleod, TAC
Date: November 15, 2021
From: Tom Johnson, Restoration Administrator
Subject: Revised Recommendation for 2021 Restoration Flows

The following is a Restoration Flow Recommendation by the Restoration Administrator (RA) for the remainder of the 2021 Restoration Year Flows pursuant to the Restoration Flow Guidelines (RFG) Ver. 2.1, as amended, and Exhibit B of the Settlement.

Background

The SRRP has issued a Final 2021 Restoration Allocation (Allocation) dated June 25, 2021, which designates 2021 as a **Critical-High** Water Year Type with an Unimpaired Inflow Hybrid forecast of 529 TAF and provides an allocation of Restoration Flows of 70,919 thousand acre-feet (TAF) as measured at Gravelly Ford (GRF). The Allocation also specified certain contractual and operational constraints on Restoration Flow releases for 2021.

The current approved Restoration Flow Recommendation is dated June 1, 2021, and included several key elements:

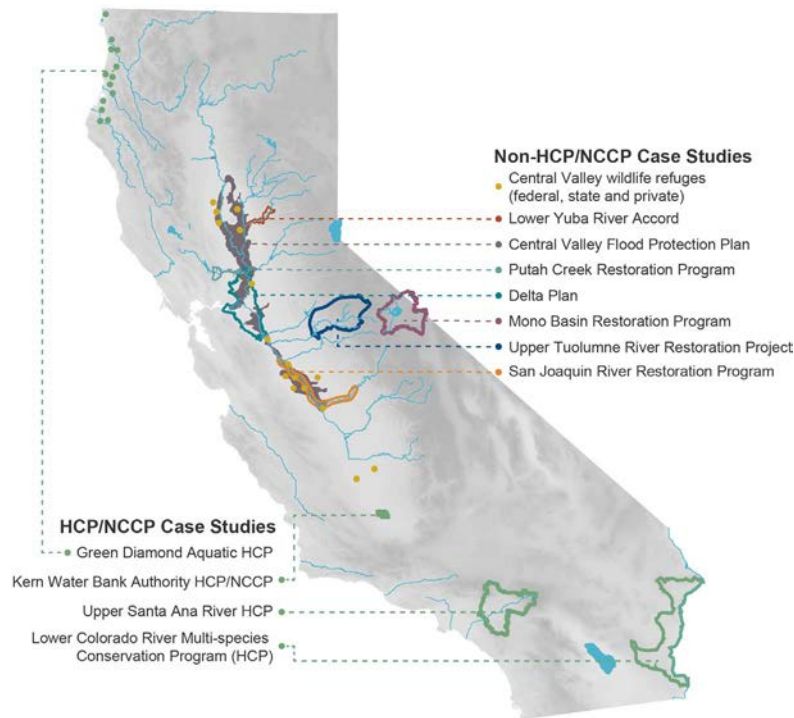
1. There have been no Restoration Flows released since June 4, 2021, in order to conserve water and the Millerton Reservoir cold water pool. This has resulted in a disconnection of the San Joaquin River, with Reach 2A, Reach 4A, and middle Eastside Bypass having no Restoration Flows since June.
2. Restoration Flows were scheduled to resume on September 10, 2021, with flow magnitude and volumes sufficient to reconnect the river quickly. However, Restoration Flows have been postponed to a later date to preserve cold water pool and protect spawning/incubating spring-run Chinook salmon.

As of November 1, 23,639 AF of Restoration Flows have been released. As of November 1, the remaining Restoration Flow and URF Exchange water for 2021 totals approximately 57,878 AF. Since early October, an Ad Hoc Flow Recommendation placed a minimum release "floor" of 230 cfs for Friant Dam in the event that riparian holding contract demand dropped below 230 cfs (needed to keep at least 5 cfs at GRF). On October 8, holding contract demand dropped below 230 cfs, and small amounts of Restoration Flows exceeding 5 cfs at GRF began to occur.

Key drivers for Restoration Flow Recommendations are keeping the San Joaquin River connected and flowing throughout the Restoration Area and ensuring appropriate flow and water temperature for key spring-run Chinook Salmon life stages in the Restoration Area. Because 2021 was a Critical-High water year type, there was insufficient water to meet both objectives, thus the recommended cessation of Restoration Flows on June 1. Going forward, objectives will be to continue to manage flows and water

5. A partner trusts but verifies, using existing laws and policies

- Establish Sustainable Watershed Management Plans using
 - Water Quality Control Plans
 - Habitat Conservation Plans
 - Natural Communities Conservation Plans
- Negotiated, comprehensive agreements best with a regulatory backstop
- Although doable with existing laws, legislation would help (SWMA?).

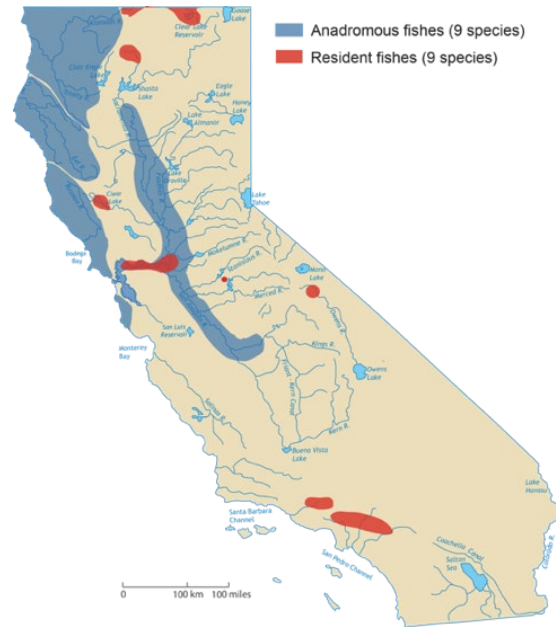


12 Programs worth looking at closely

Summary: what's it going to take?

- 1) Ecosystem-based management
- 2) Ecosystem water budgets and trustees to manage them
- 3) Functional flows paired with structural habitat
- 4) Plans with priorities
- 5) Use of existing laws (although legislation would help)
- **And the SRF helping build a better bridge between science and policy**

Half the fish at high risk of extinction in this drought are *not* listed under ESAs



Source: Hanak et al. (2015)

Thanks



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PUBLIC POLICY
INSTITUTE OF CALIFORNIA

NOVEMBER 2017

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Charlene Kabcenell
Foundation, the S. D.
Bechtel, Jr. Foundation,
the US Environmental
Protection Agency, and
the Water Foundation

Managing California's Freshwater Ecosystems

Lessons from the 2012–16 Drought



PPIC

PUBLIC POLICY
INSTITUTE OF CALIFORNIA

DECEMBER 2019

Jeffrey Mount,
Brian Gray,
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Ted Grantham,
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Sarah Yarnell
with research support
from Golce Sencan

Supported with funding
from the S. D. Bechtel,
Jr. Foundation and the
funders of the PPIC
CalTrout Ecosystem
Fellowship

A Path Forward for California's Freshwater Ecosystems



PPIC

PUBLIC POLICY
INSTITUTE OF CALIFORNIA

25 YEARS

AUGUST 2020

Ted Grantham,
Jeffrey Mount,
Eric D. Stein,
Sarah Yarnell
with research support from
Golce Sencan

Supported with funding
from the S. D. Bechtel, Jr.
Foundation and the funders
of the PPIC CalTrout
Ecosystem Fellowship

Making the Most of Water for the Environment

A Functional Flows Approach for
California's Rivers



PPIC

About these slides

These slides were created to accompany a presentation. They do not include full documentation of sources, data samples, methods, and interpretations. To avoid misinterpretations, please contact:

Jeff Mount (mount@ppic.org, 415-291-4476)

Thank you for your interest in this work.

Southern Salmon Restoration Why bother?

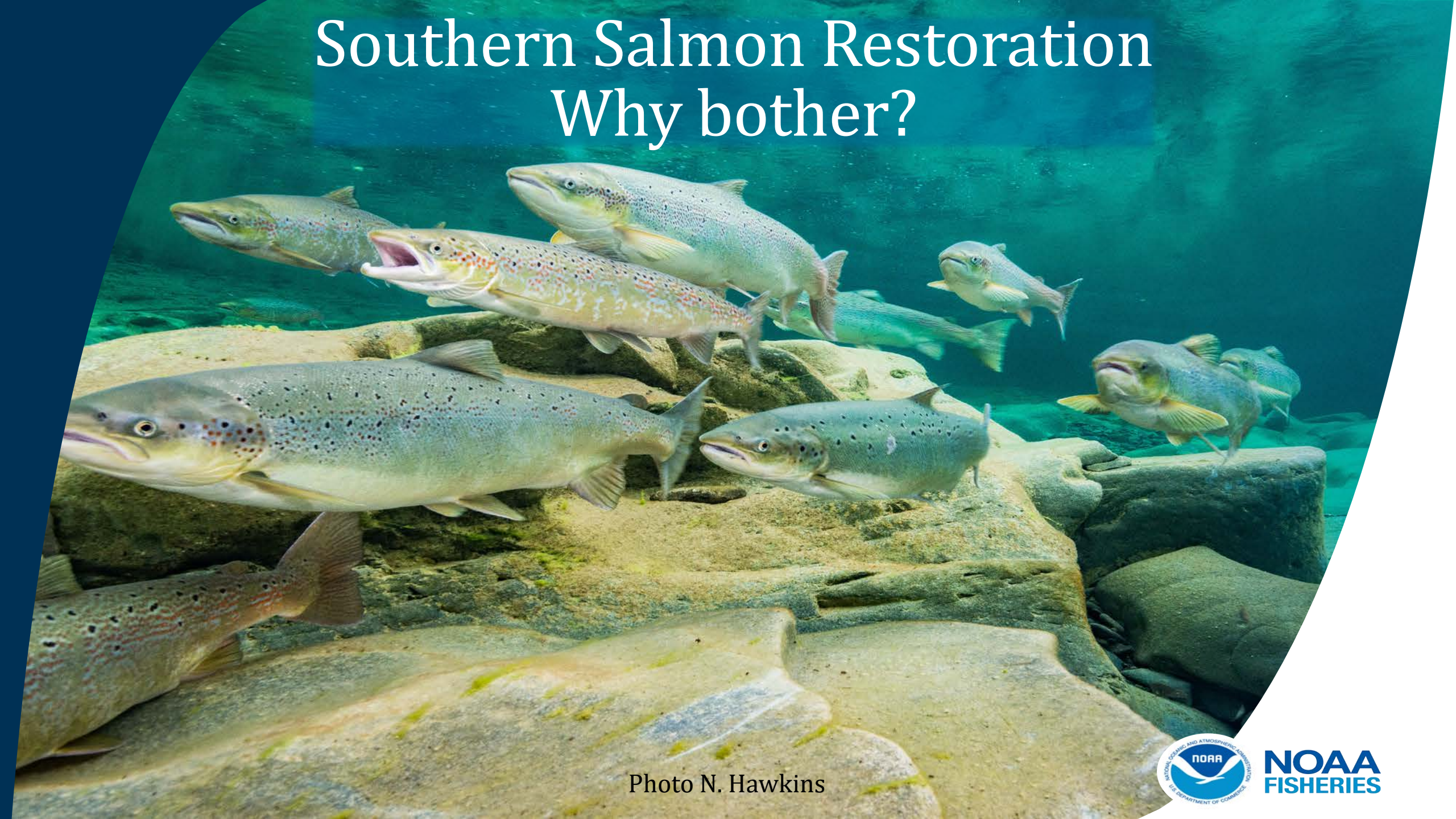


Photo N. Hawkins



NOAA
FISHERIES

Southern Salmon Restoration

Why bother?

The ideas and thoughts in this presentation are solely those of the authors and do not represent the policies of NOAA fisheries or UCB



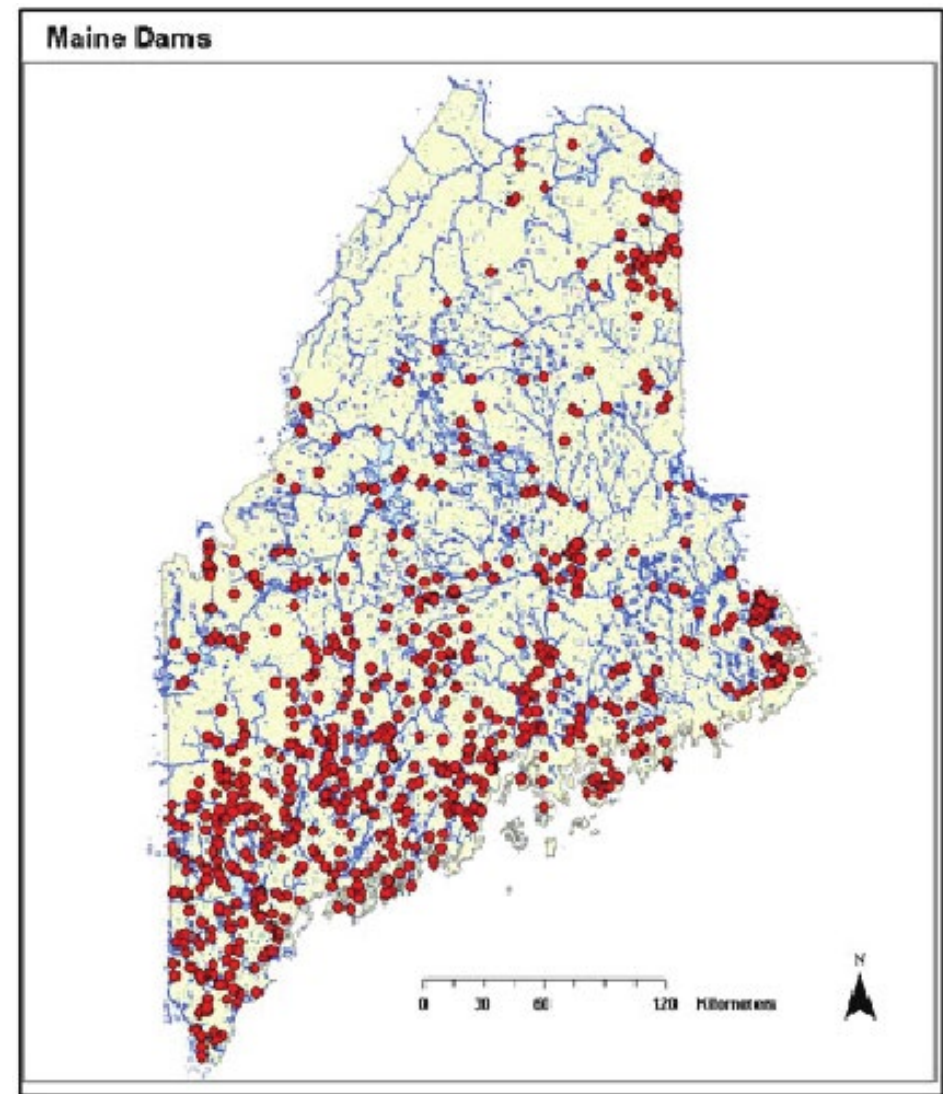
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My Co-Authors are not responsible for anything Sean says



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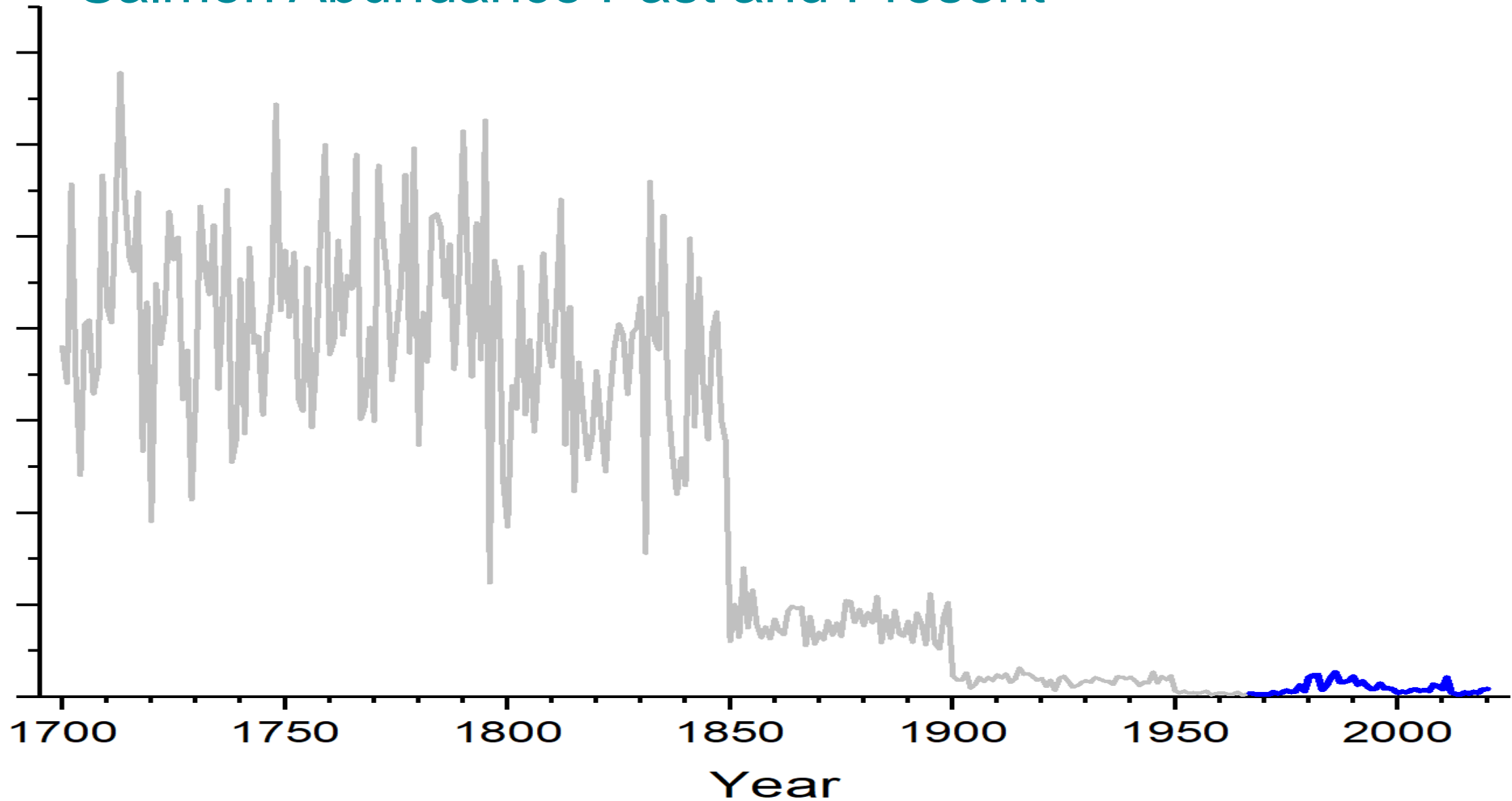
Fish Passage



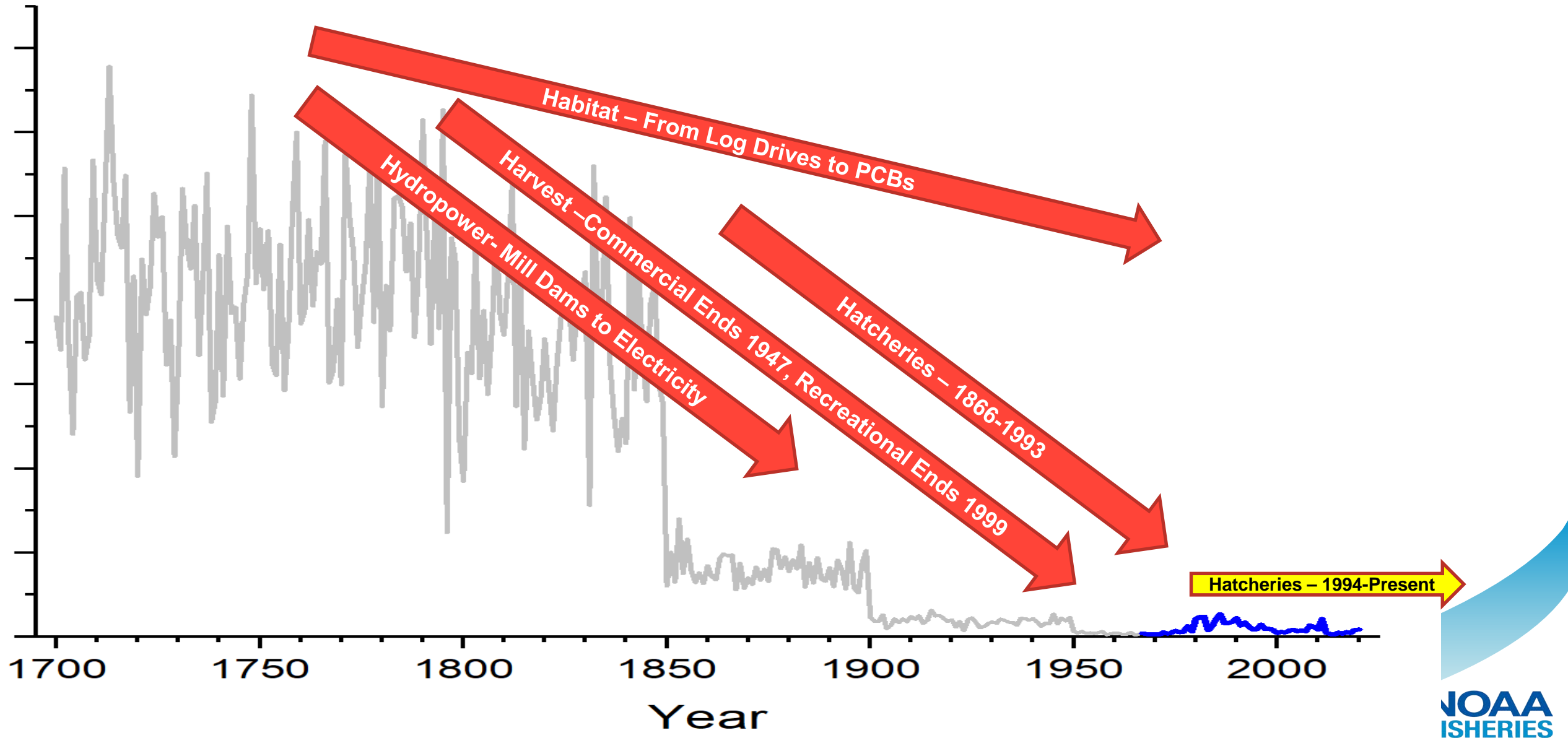


LAURAFRIES.COMPHOTO CREDIT: KEVIN DOTY 7:32 PM · AUG 19, 2020

Salmon Abundance Past and Present



Drivers- The 4 H's



Drivers- The 4 H's + 3 Climate H's

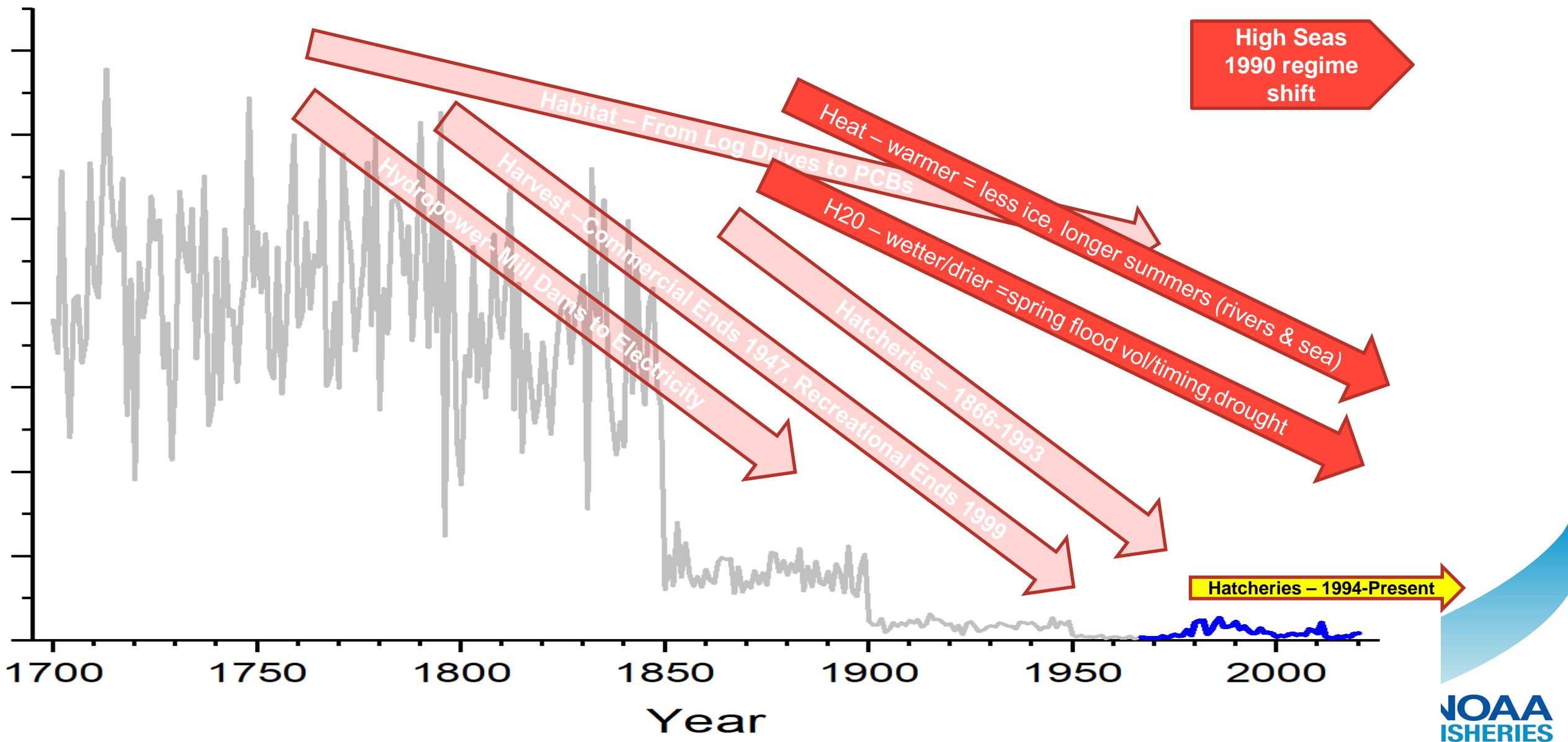
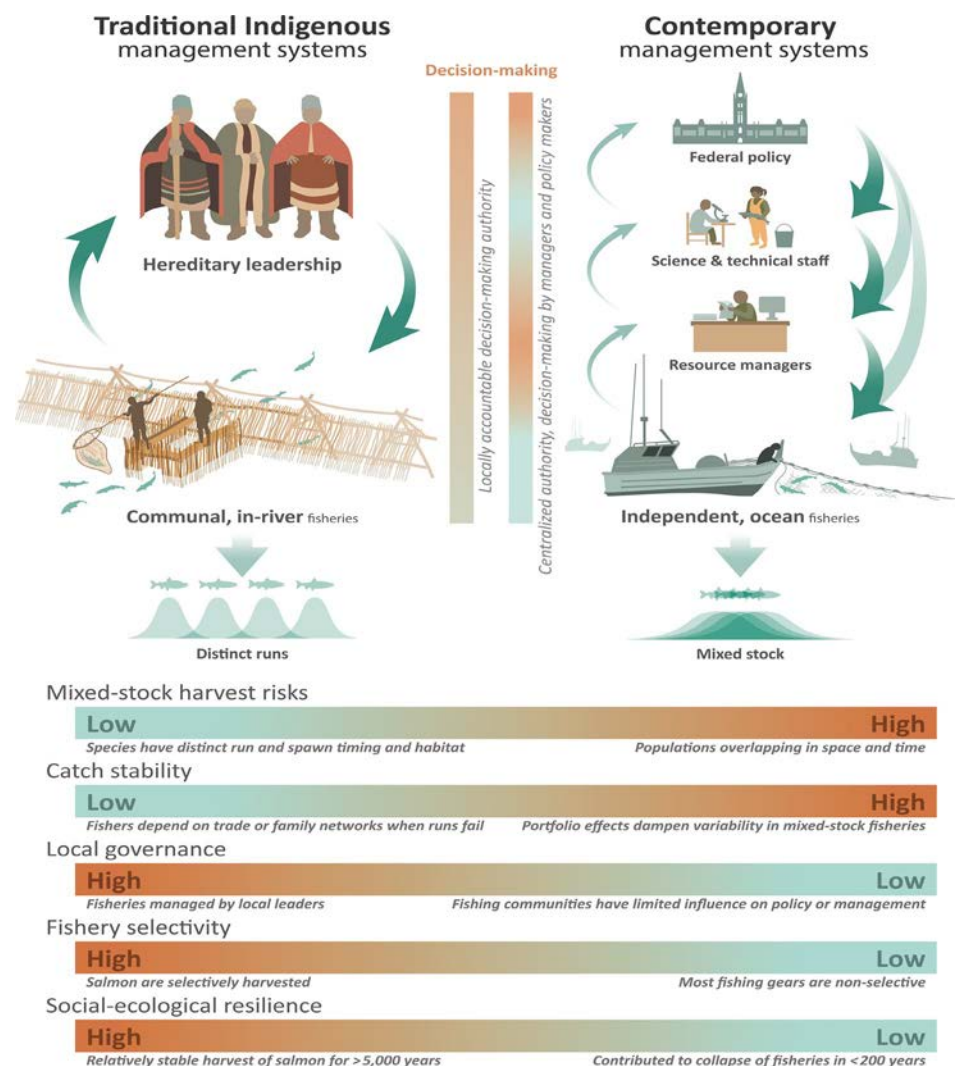


Figure 2. A comparison of Indigenous and contemporary fishery management systems







<https://www.census.gov/popclock/>

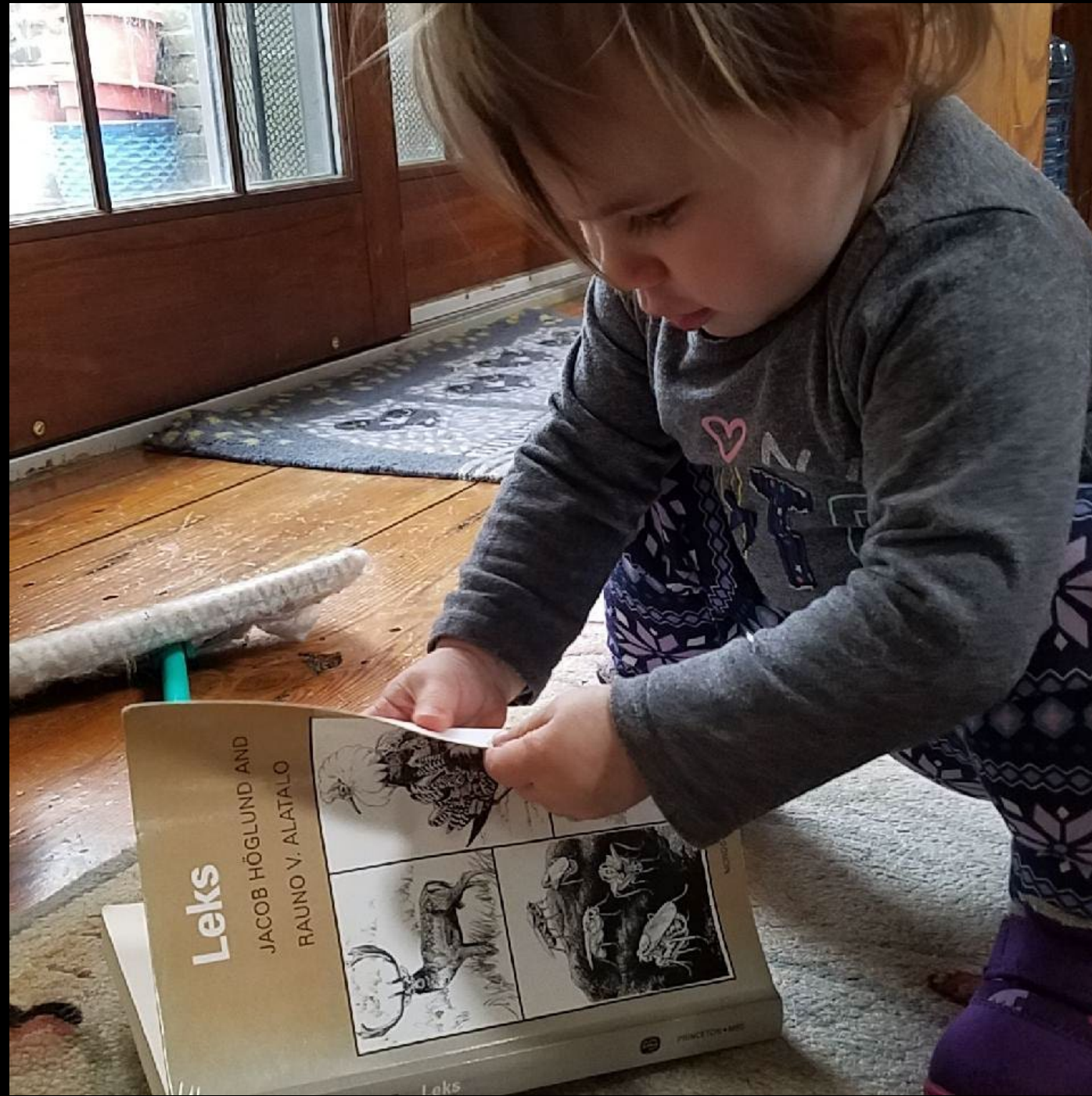
Global population increase of 258 Million since start of COVID-19




4/18/22

7,890,554,000

<https://www.census.gov/popclock/>



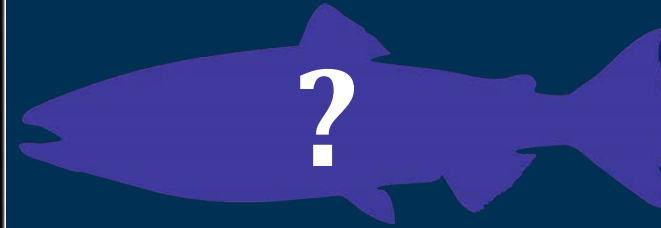


OUTLOOK
NOT SO
GOOD

Evolutionary Stable Strategy/State

An **evolutionarily stable strategy (ESS)** is a [strategy](#) (or set of strategies) that is *impermeable* when adopted by a [population](#) in adaptation to a specific environment, that is to say it cannot be displaced by an alternative strategy (or set of strategies) which may be novel or initially rare.

Evolutionarily stable state (convergent stability) occurs when that population's "genetic composition is restored by selection after a disturbance, provided the disturbance is not too large" ¹ This population as a whole can be either monomorphic or [polymorphic](#).^[1]



- Glacial Max 20kya
- Sea level >120m lower
- Steep shoreline- no estuaries!!

Dolby, G. A. *et al.* 2016. Sea-level driven glacial-age refugia and post-glacial mixing on subtropical coasts, a palaeohabitat and genetic study. *Proc. R. Soc.B* **283**:20161571.
 Gautney, J. R. 2018. New world paleoenvironments during the Last Glacial Maximum: Implications for habitable land area and human dispersal. *Journal of Archaeological Science: Reports* **19**:166-176.

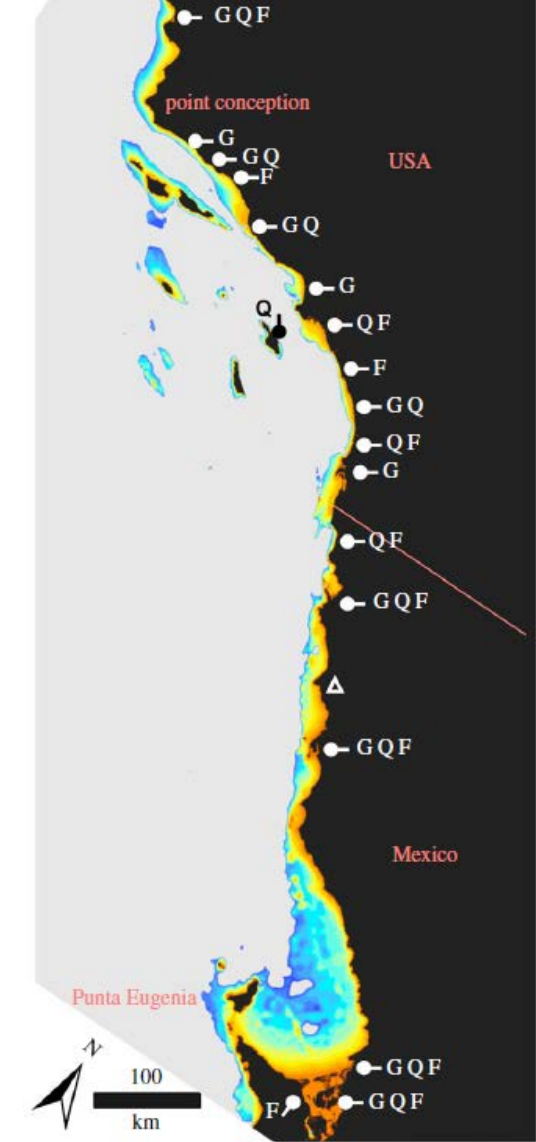
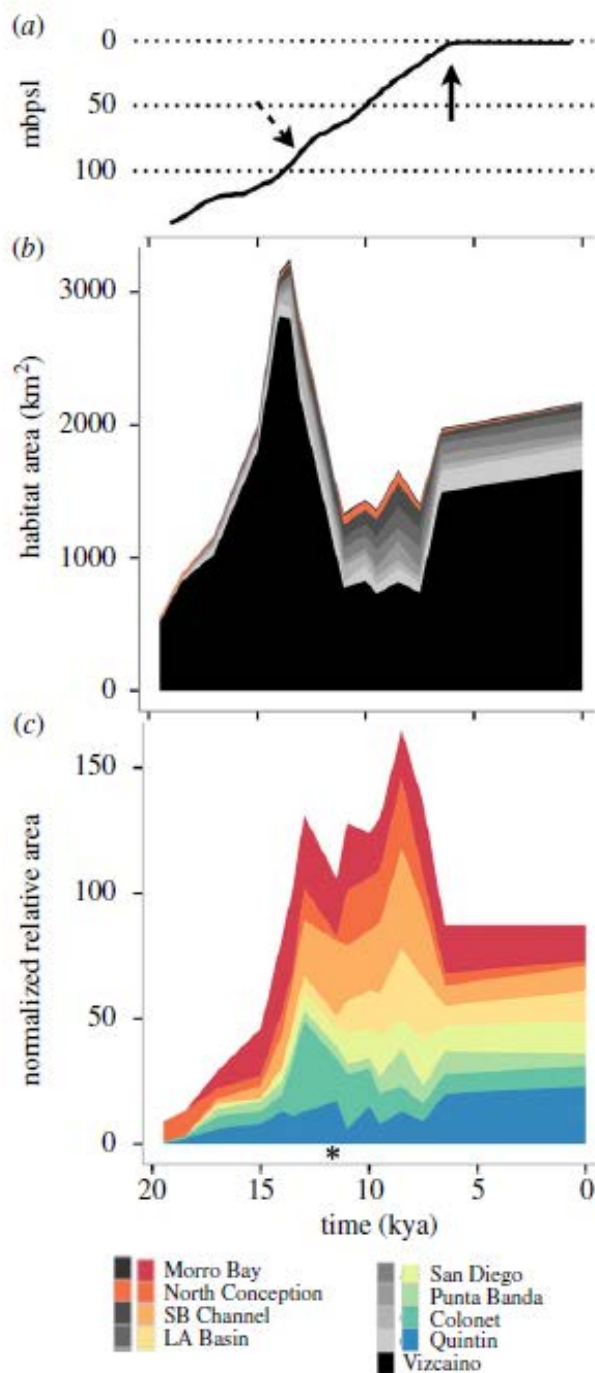
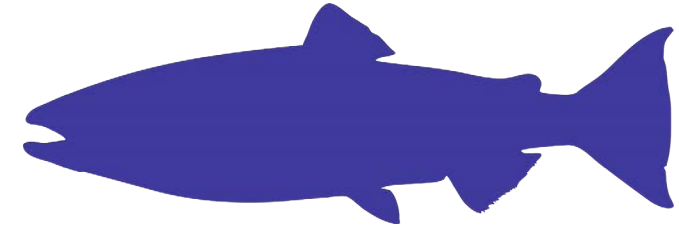


Figure 1. Sample collection and bathymetric map. Bathymetry is contoured at 10 m intervals from 0 to 140 m below present sea level (orange to dark blue, respectively). White markers note sample sites for fish species where: G, *Gillichthys mirabilis*; Q, *Quietula y-cauda*; F, *Fundulus parvipinnis*. Triangle denotes the Cabo Colonet region, which our models predict supported habitat approximately 10 thousand years ago (kya), but does not today. Note the distribution of offshore islands, whose sizes increased with lowered sea level.

ESS and Salmon timelines



5,000 BCE ago- begin modern habitat types

1600 CE first European settlement of NA salmon habitat

~6,000 yrs life history evolution on 'stable' landscape

1800's CE- commence impacts of 4H's, climate change & Colonial management

Dolby, G. A. *et al.* 2016. Sea-level driven glacial-age refugia and post-glacial mixing on subtropical coasts, a palaeohabitat and genetic study. *Proc. R. Soc.B* **283**:20161571.



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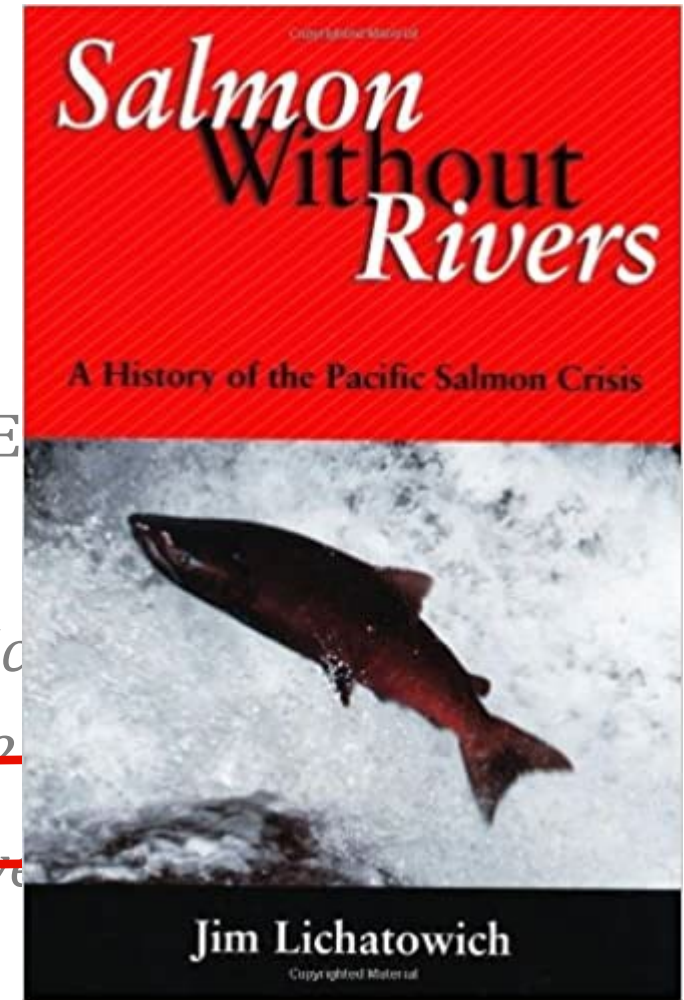
History of recent policy

- 1973 The Endangered Species Act
- 1991 Definition of a species under ESA (Waples)- the DPS/E

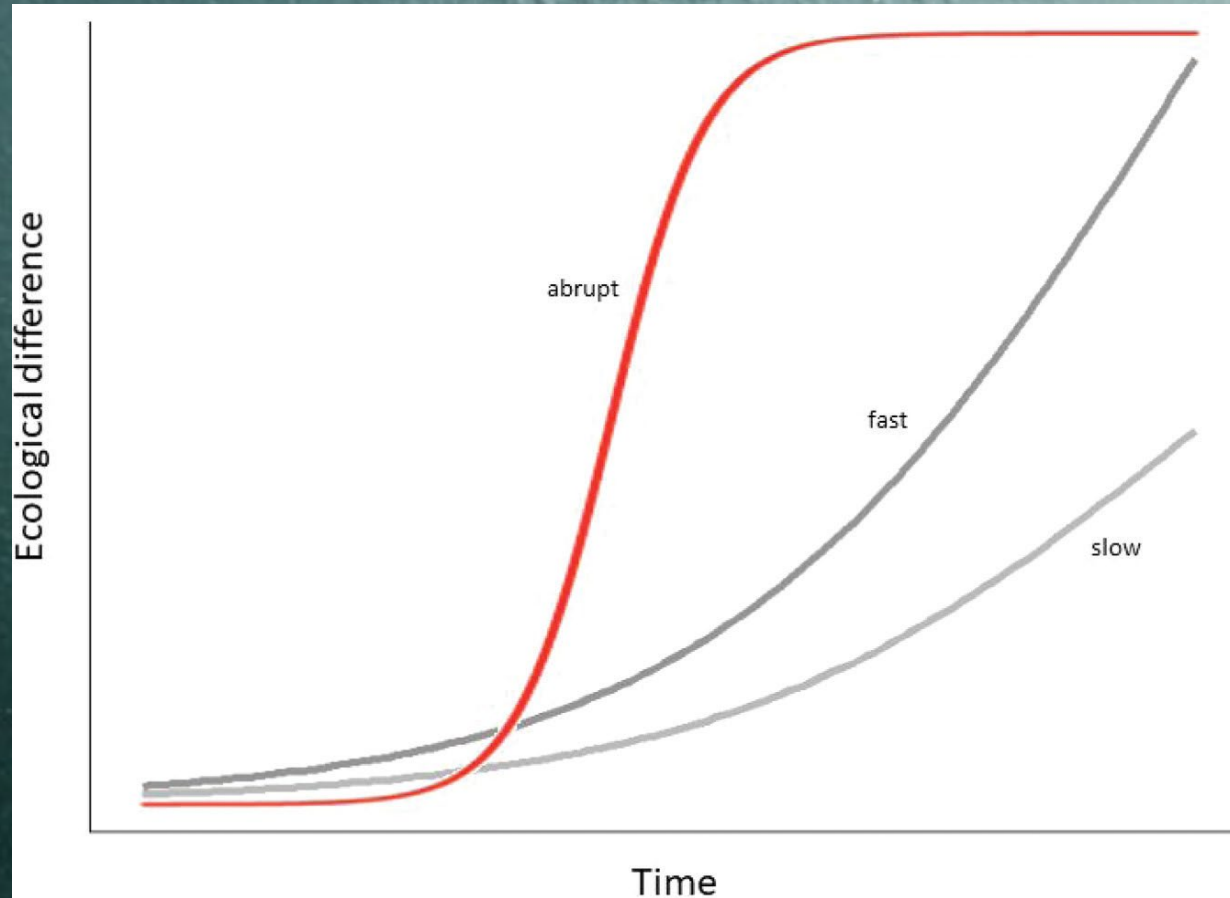
1) *Is the population genetically distinct from other conspecific*

2) *Does the population ~~occupy unusual or distinctive habitat?~~*

3) *Does the population show evidence of unusual or ~~distinctive~~ environment?*



Stationarity vs Ecological Transformation?



A large salmon, likely a Chinook, is shown swimming in shallow, clear water over a rocky riverbed. The fish has a dark, speckled back and a bright pinkish-red belly. Its mouth is slightly open, showing small teeth. The water is clear, revealing the smooth, rounded stones on the bottom. The lighting is bright, creating reflections on the water's surface.

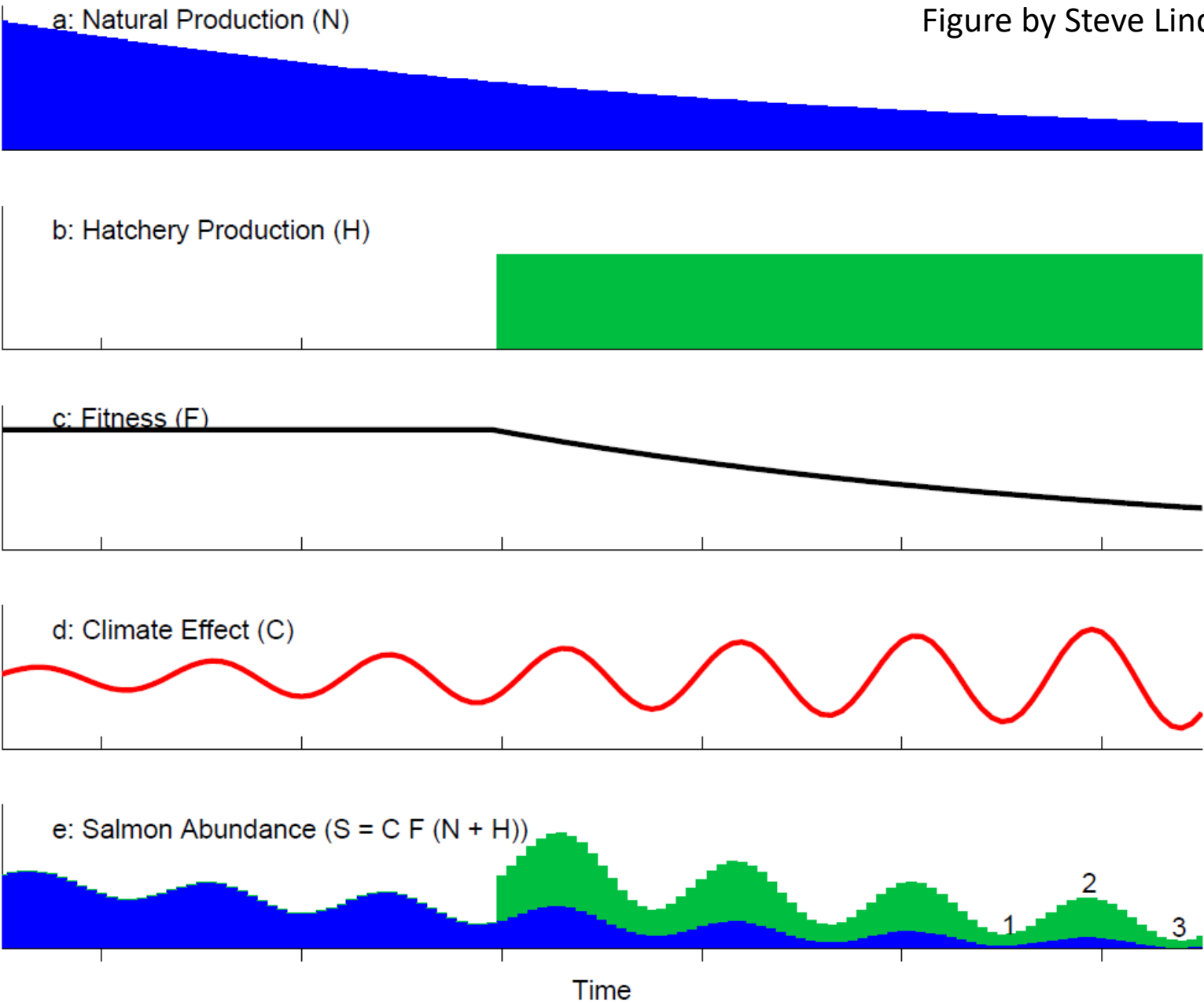
Set goals...

but be honest....

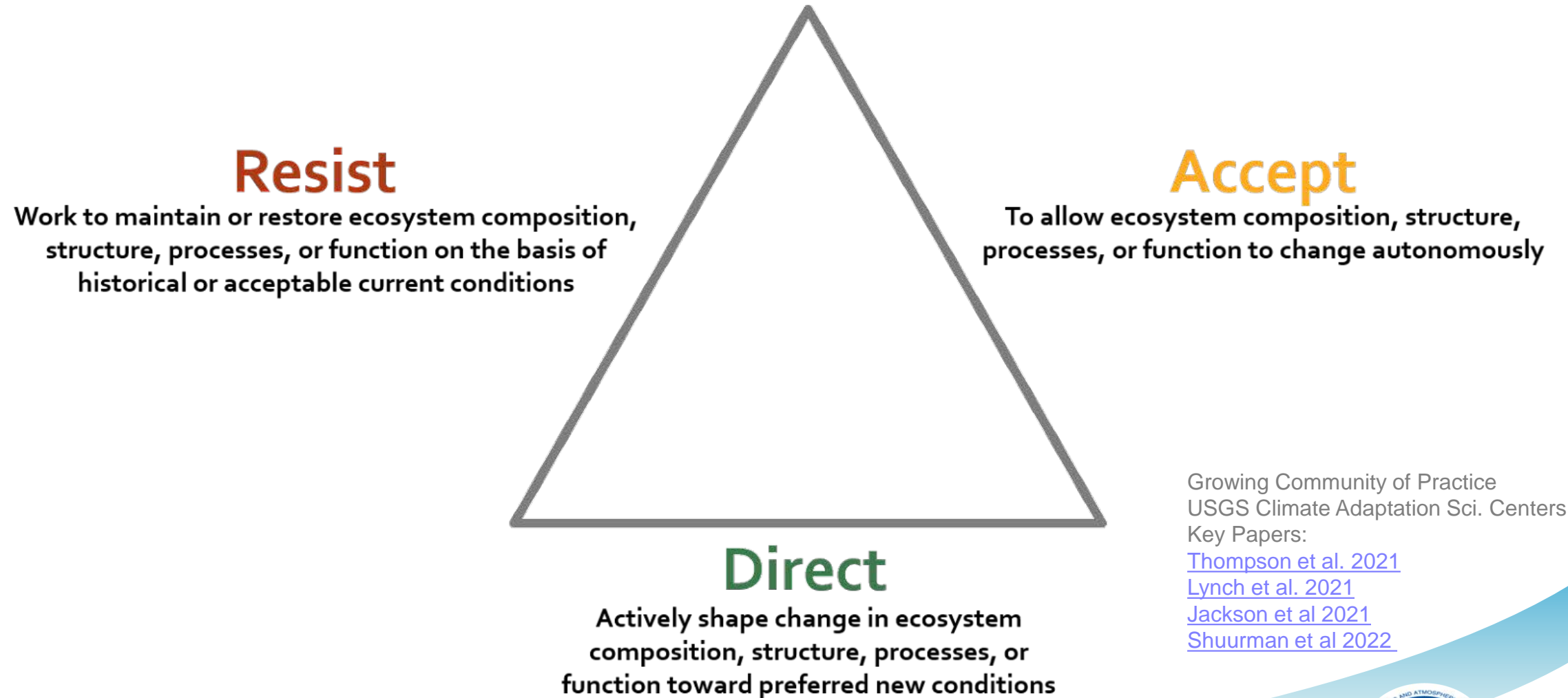
Photo M. Bond



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Resist-Accept-Direct Framework



Growing Community of Practice
USGS Climate Adaptation Sci. Centers

Key Papers:

[Thompson et al. 2021](#)

[Lynch et al. 2021](#)

[Jackson et al 2021](#)

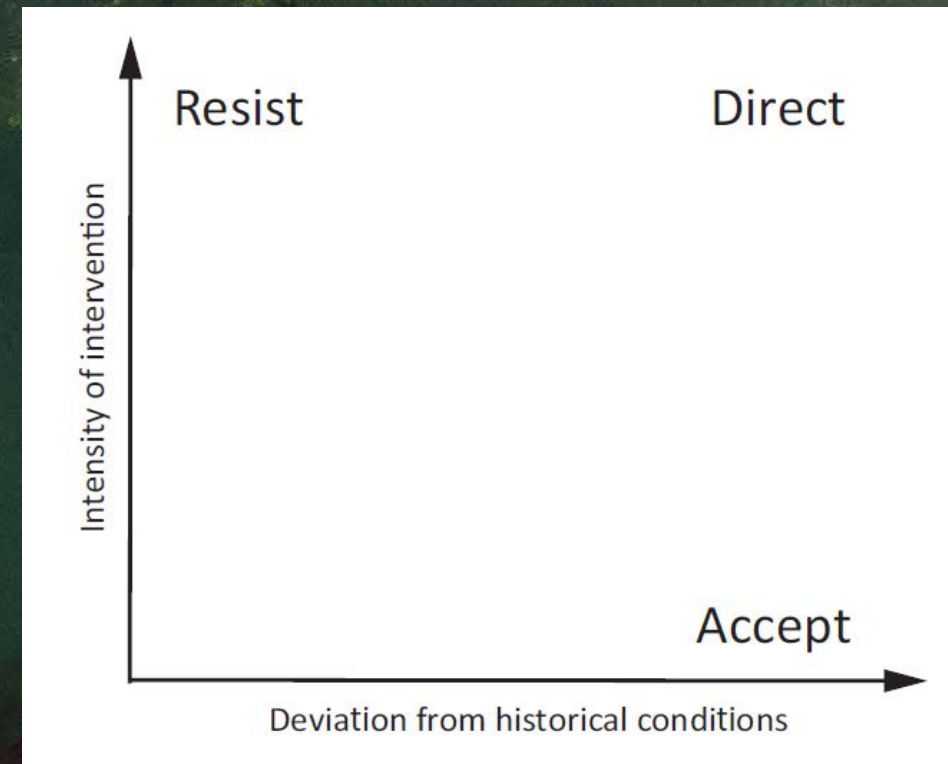
[Shuurman et al 2022](#)

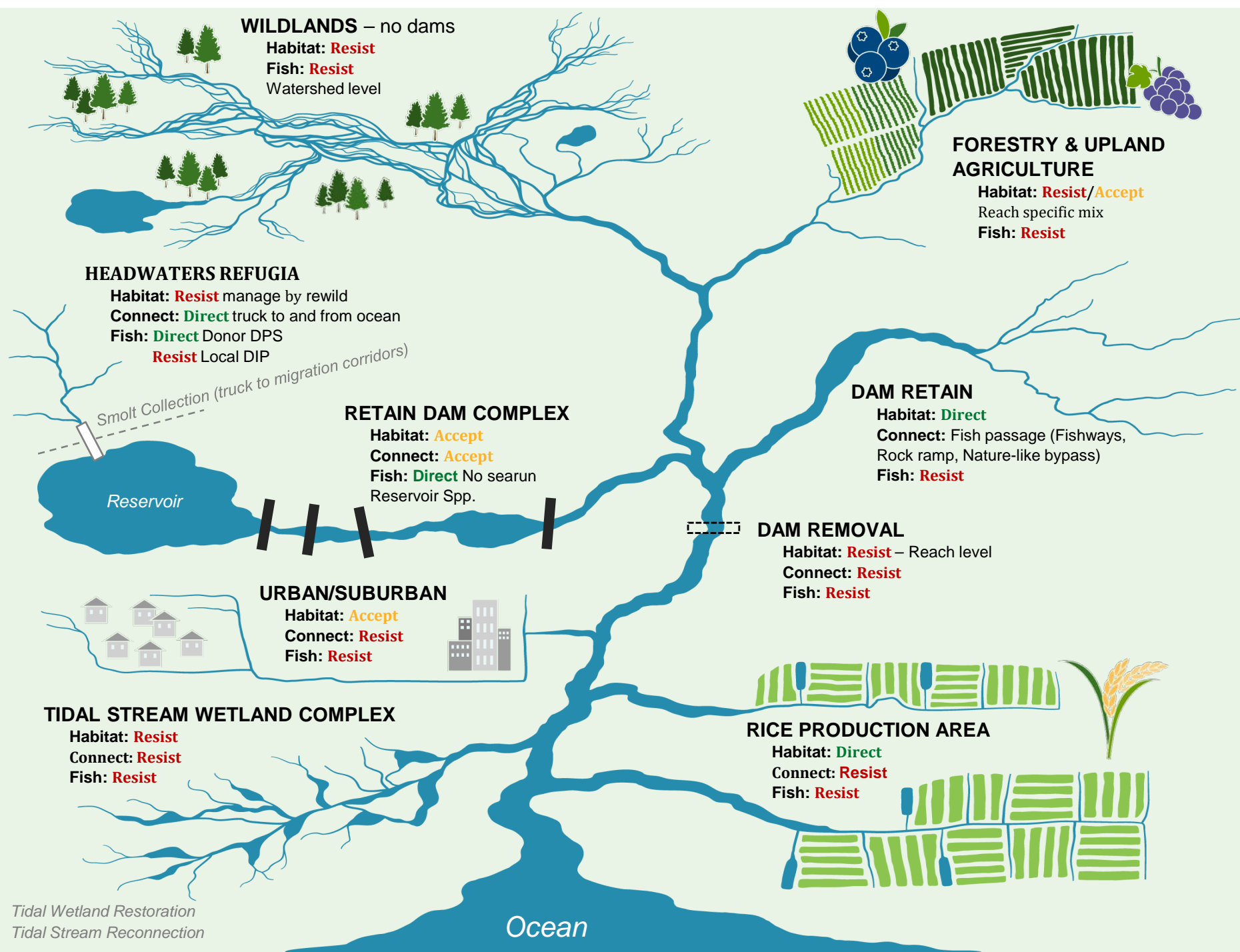


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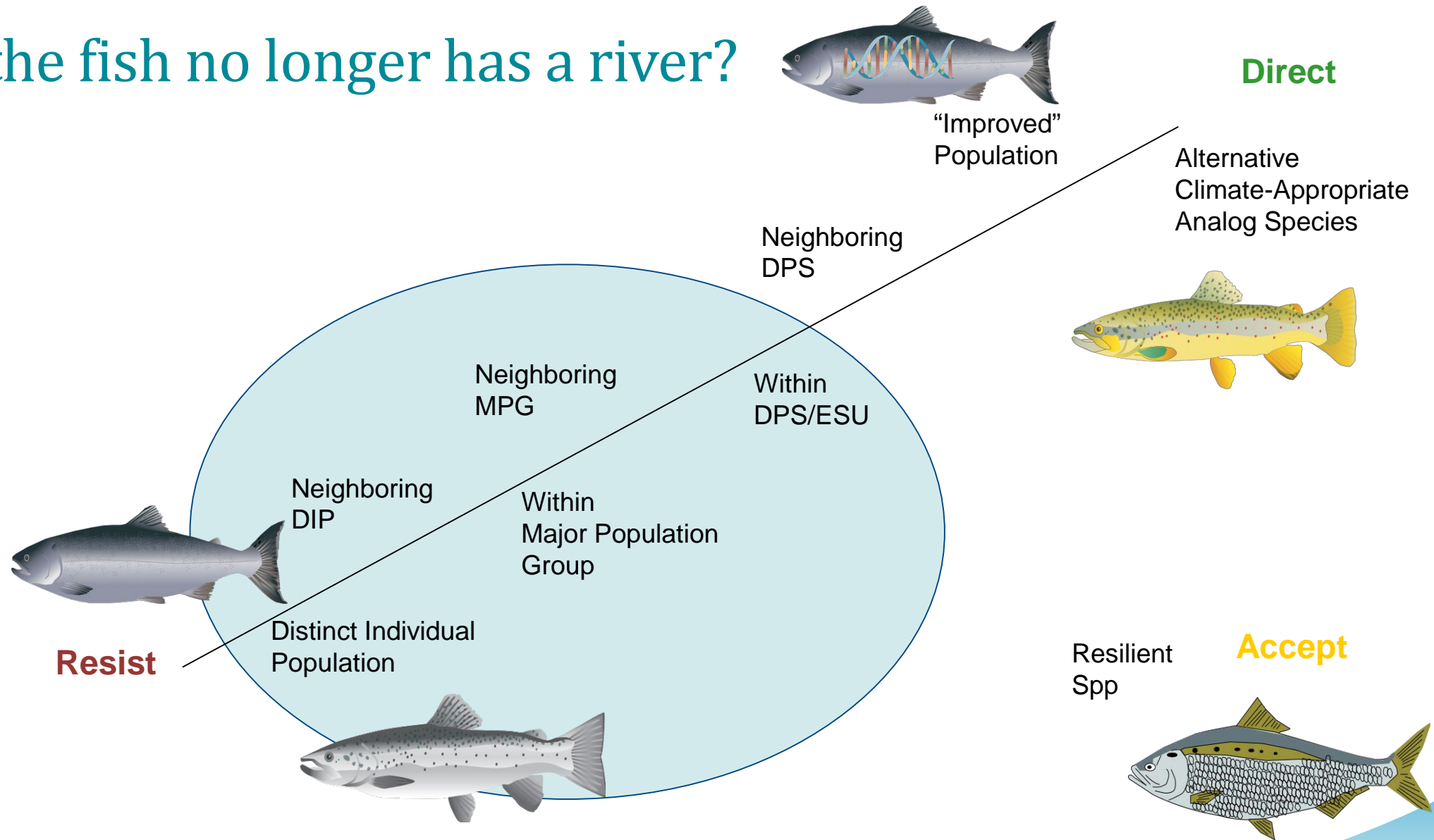
Framing the issue

- Fish
- Connectivity
- Habitat

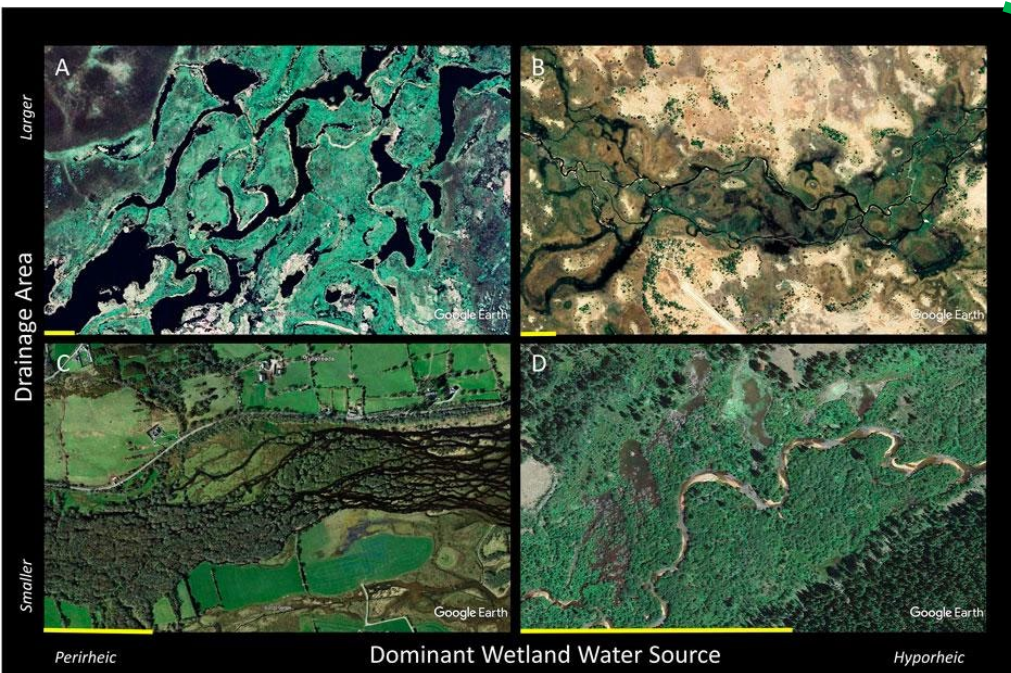




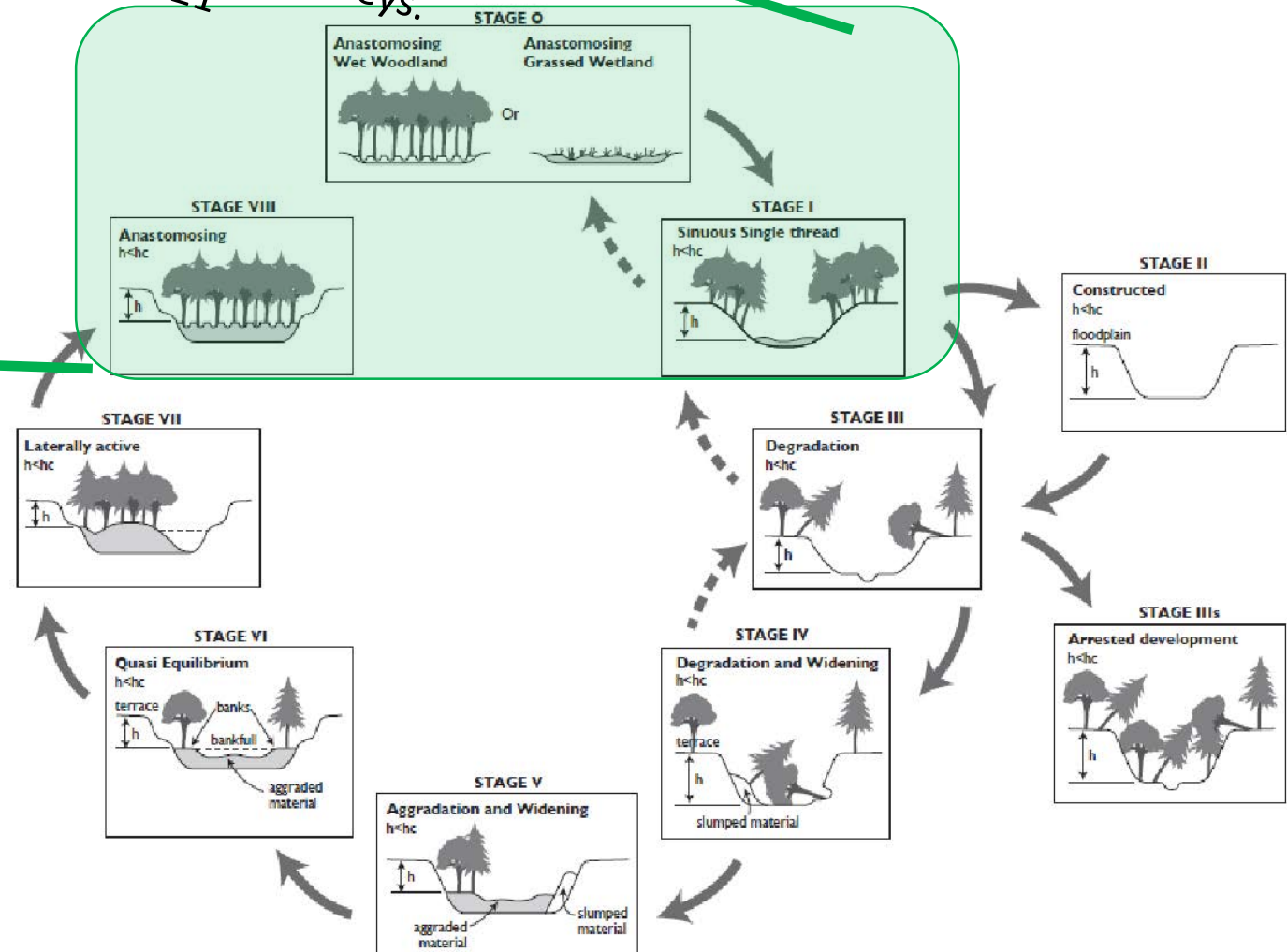
When the fish no longer has a river?



Pre – European land and water development era



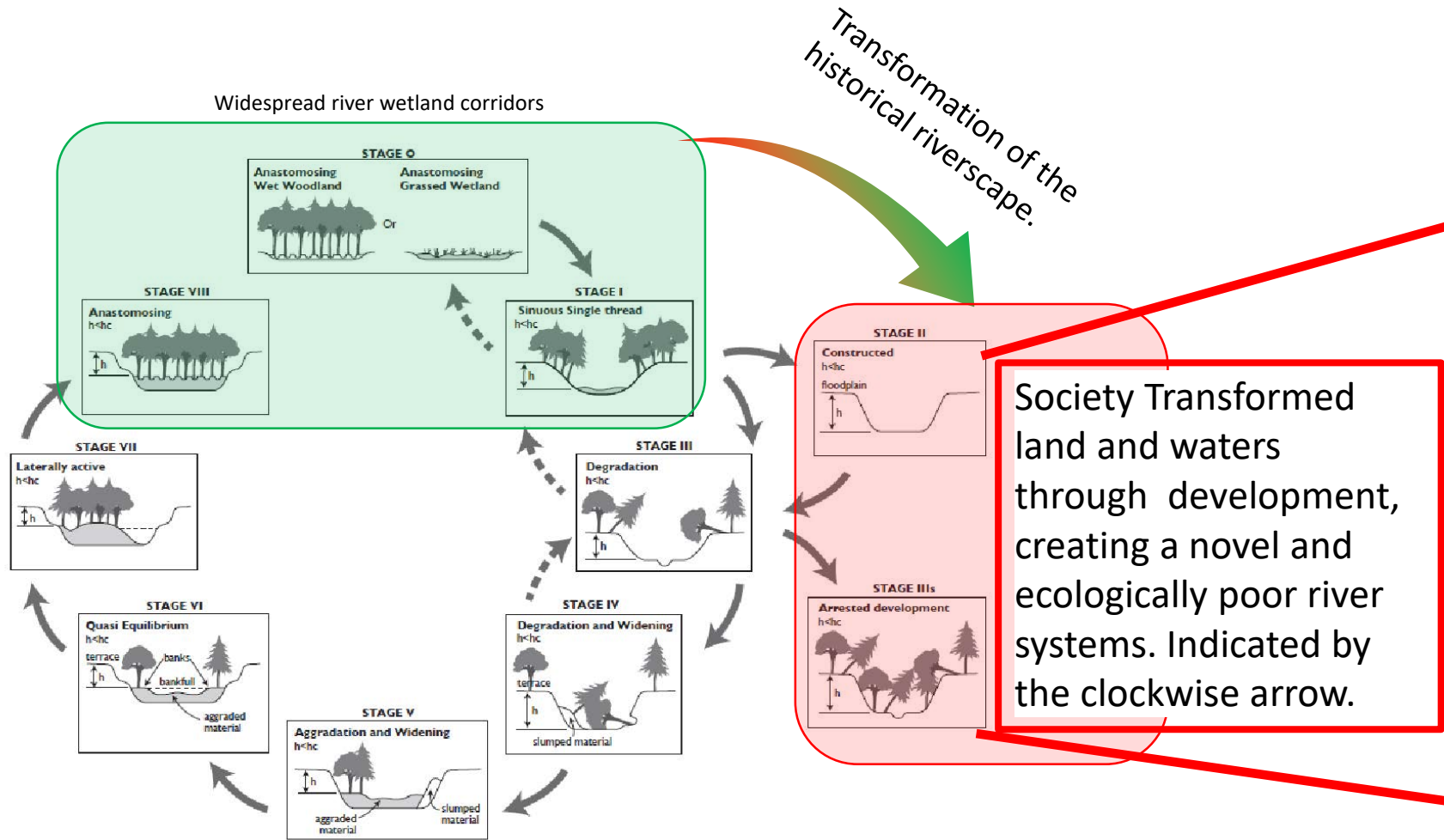
Widespread river wetland corridors in alluvial valleys.
Wohl et al 2021



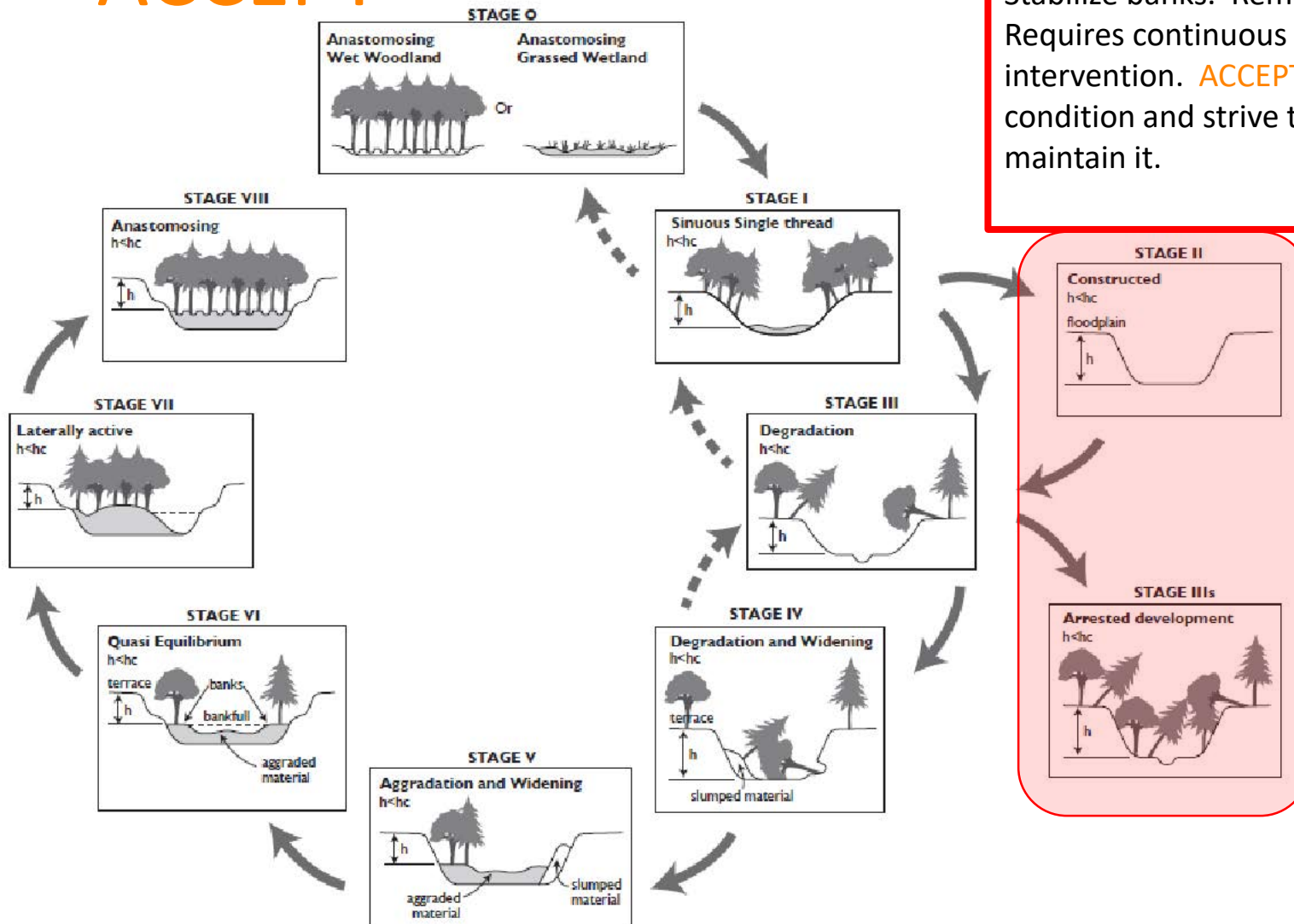
A few remaining examples.

Rivers for agriculture and water transport/flood control

- enlarged simplified channels and disconnected floodplains.



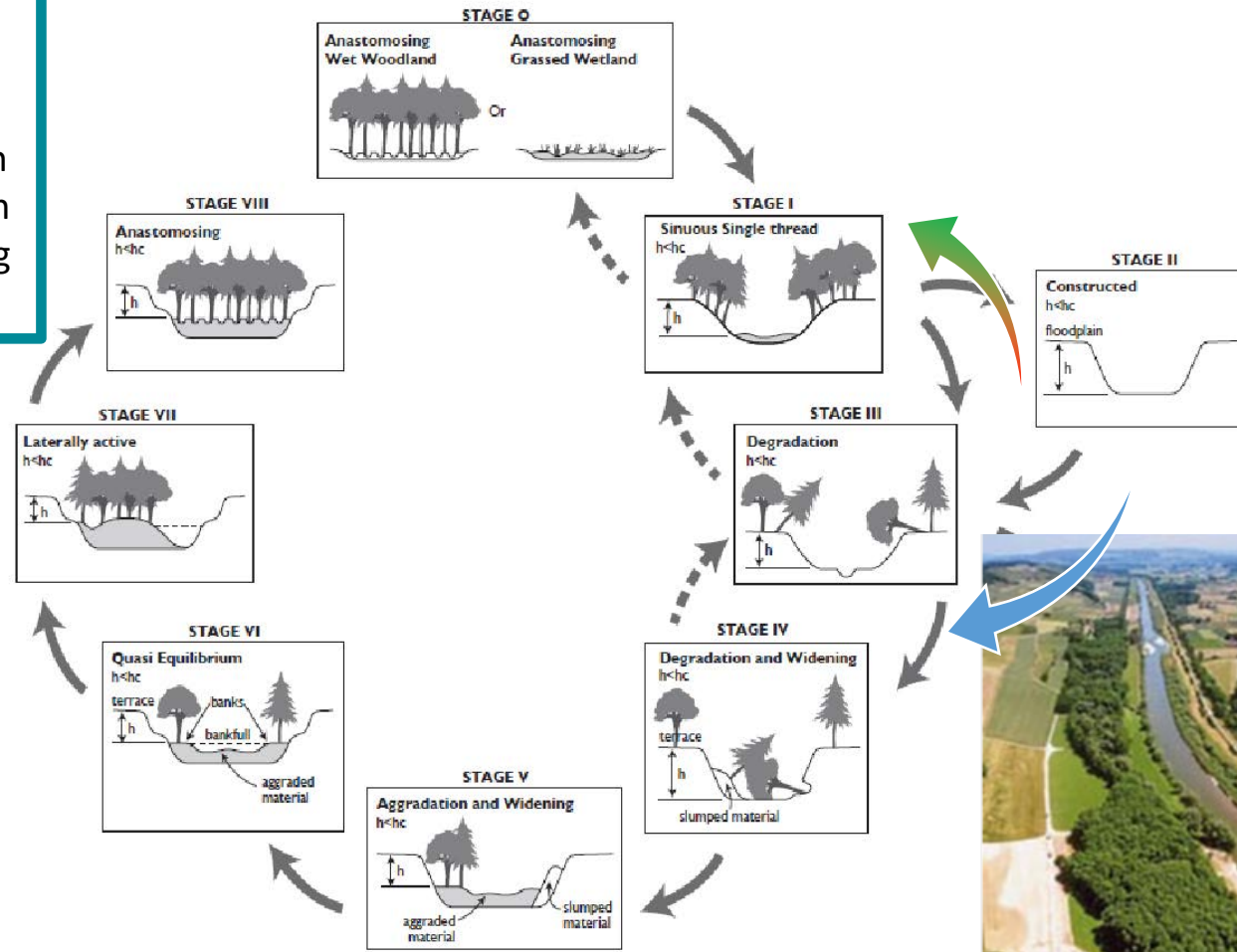
ACCEPT



DIRECT

early actions aimed at some improvements to serve resources and landowners both, nominal restoration.

Realized that it was progressively less feasible to maintain the novel ecosystem and its stabilization schemes that maintain society desired transformation. Resulted in **DIRECT** actions yield small improvements in habitat, indicated by the small arrows going clockwise and counterclockwise.



Construct habitat features in incised channels and flood control channels.
Stabilize with rock or bioengineering. Not self-sustaining.



River Thur before restoration

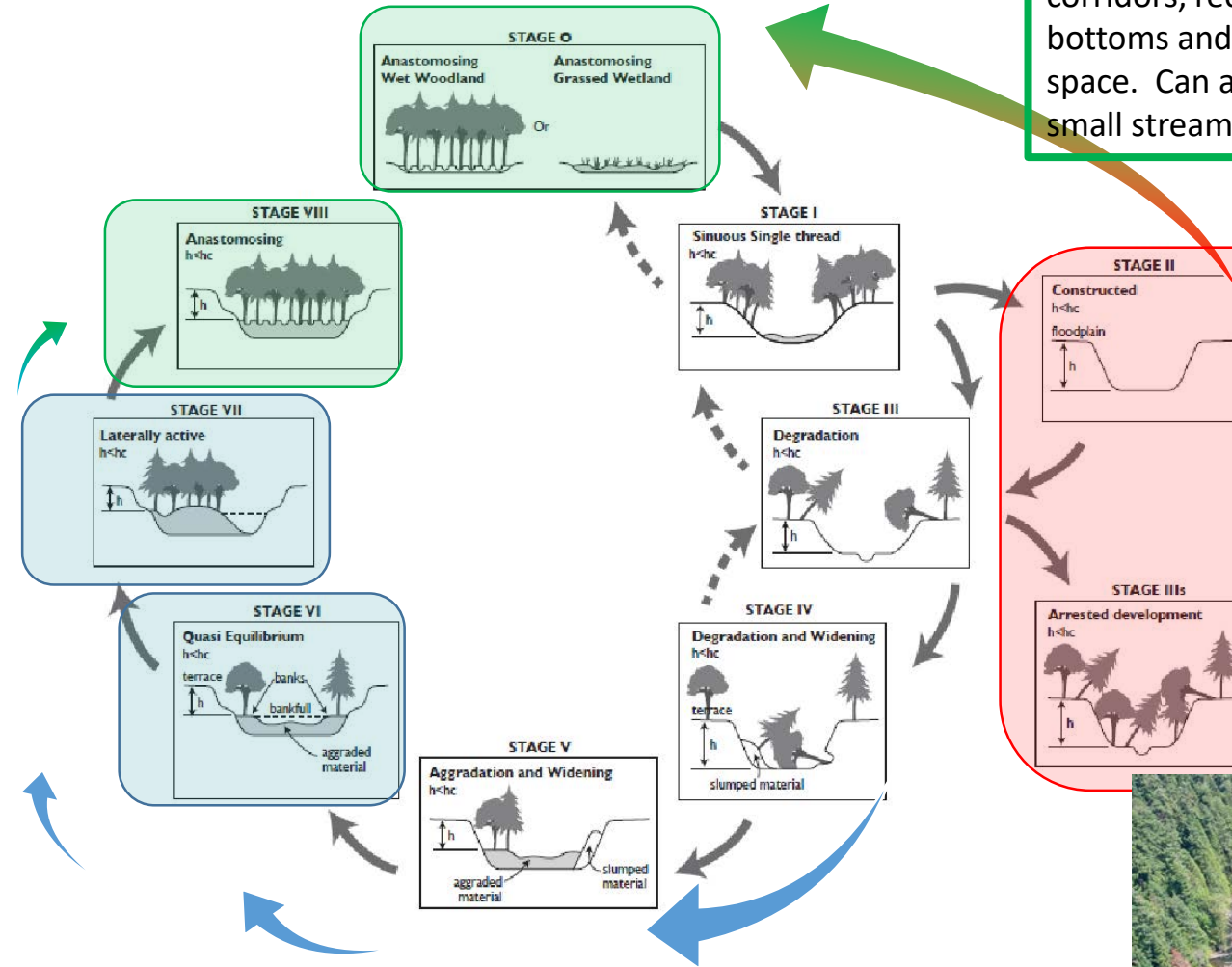


River Thur after restoration



Today – Go Big or Go Home with **RESIST** or **DIRECT**

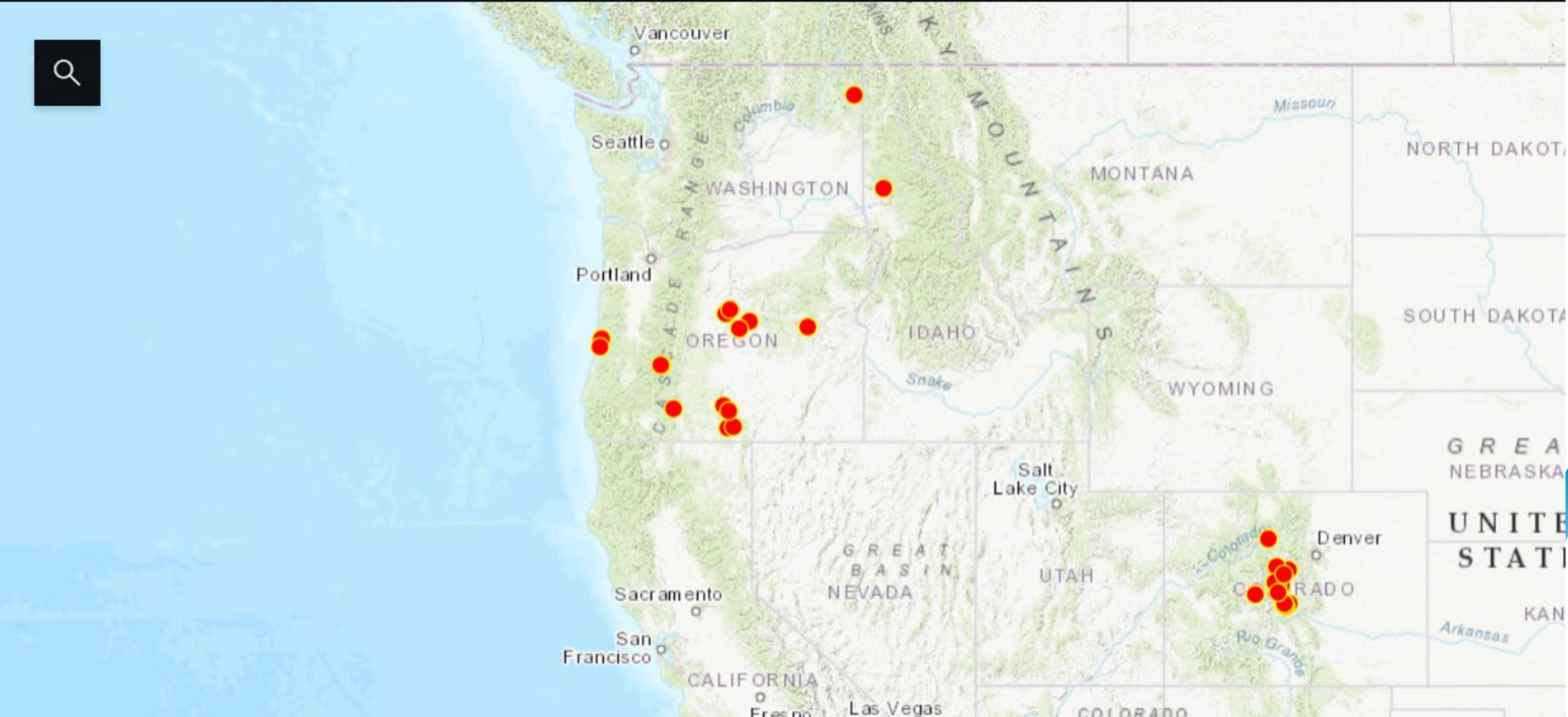
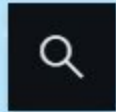
DIRECT pathway to create Stage 8. Accelerate physical and biological processes to evolve riverscapes to higher functional states. Most applicable to small streams and a few feet of incision. May culminate in Stage 8 conditions. 1-10 years each step. Early interventions will require maintenance.



RESIST pathway to restore river wetland corridors, recreate Stage 0. Recontour valley bottoms and fill channels to optimize process space. Can address deep incision on large and small streams. 1-3 years.

Knowledge and technology improved and society wants significant improvements in salmon populations and overall ecosystem health. Becomes feasible through ownership changes, grants and regulatory support mechanisms.





Indigenous values/perspectives and RAD framework?

RAD= shiny new idea in Western Science

Indigenous Stewardship= millennia of practice



So.... Why bother?

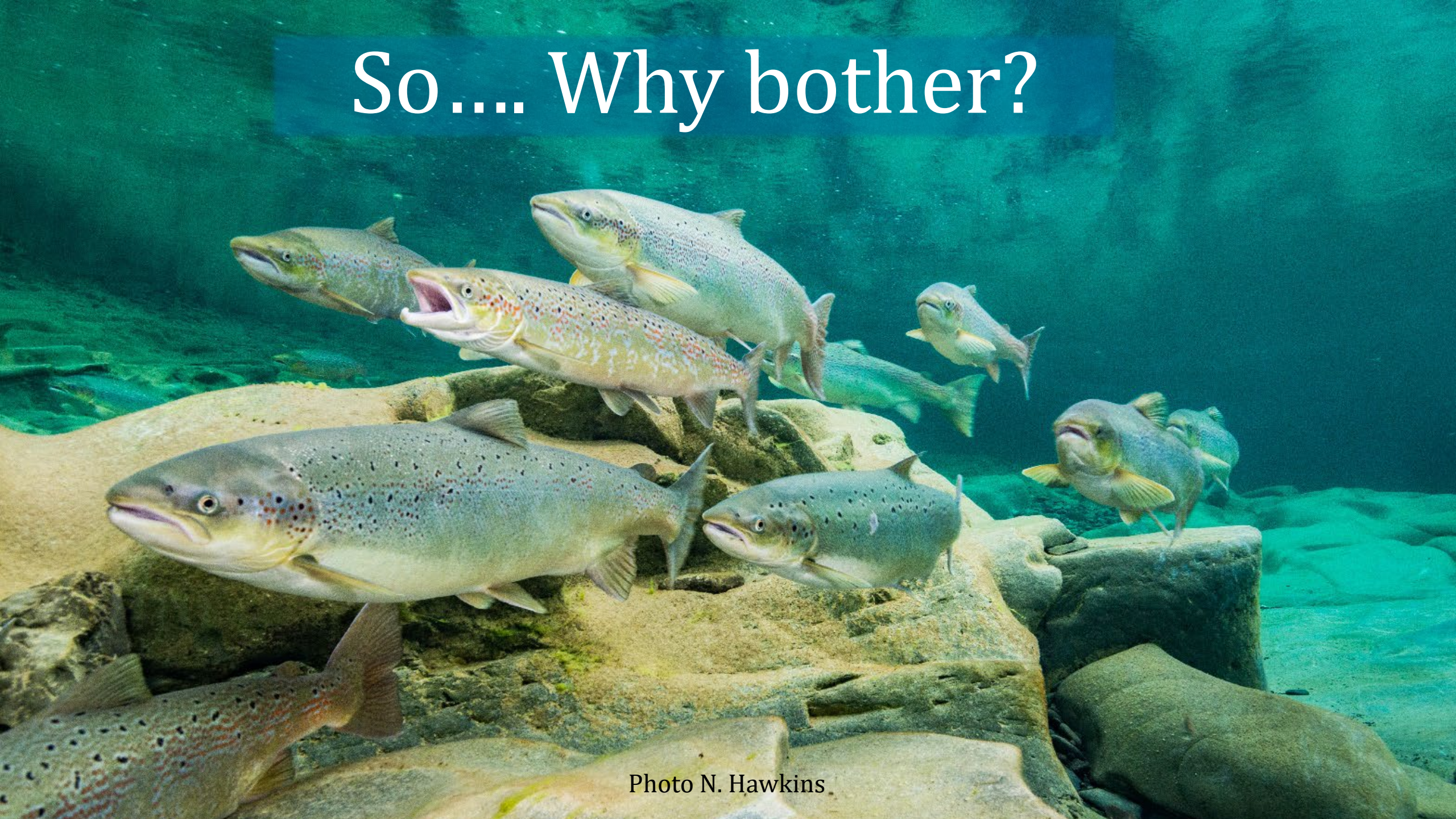


Photo N. Hawkins

Writing the manual...

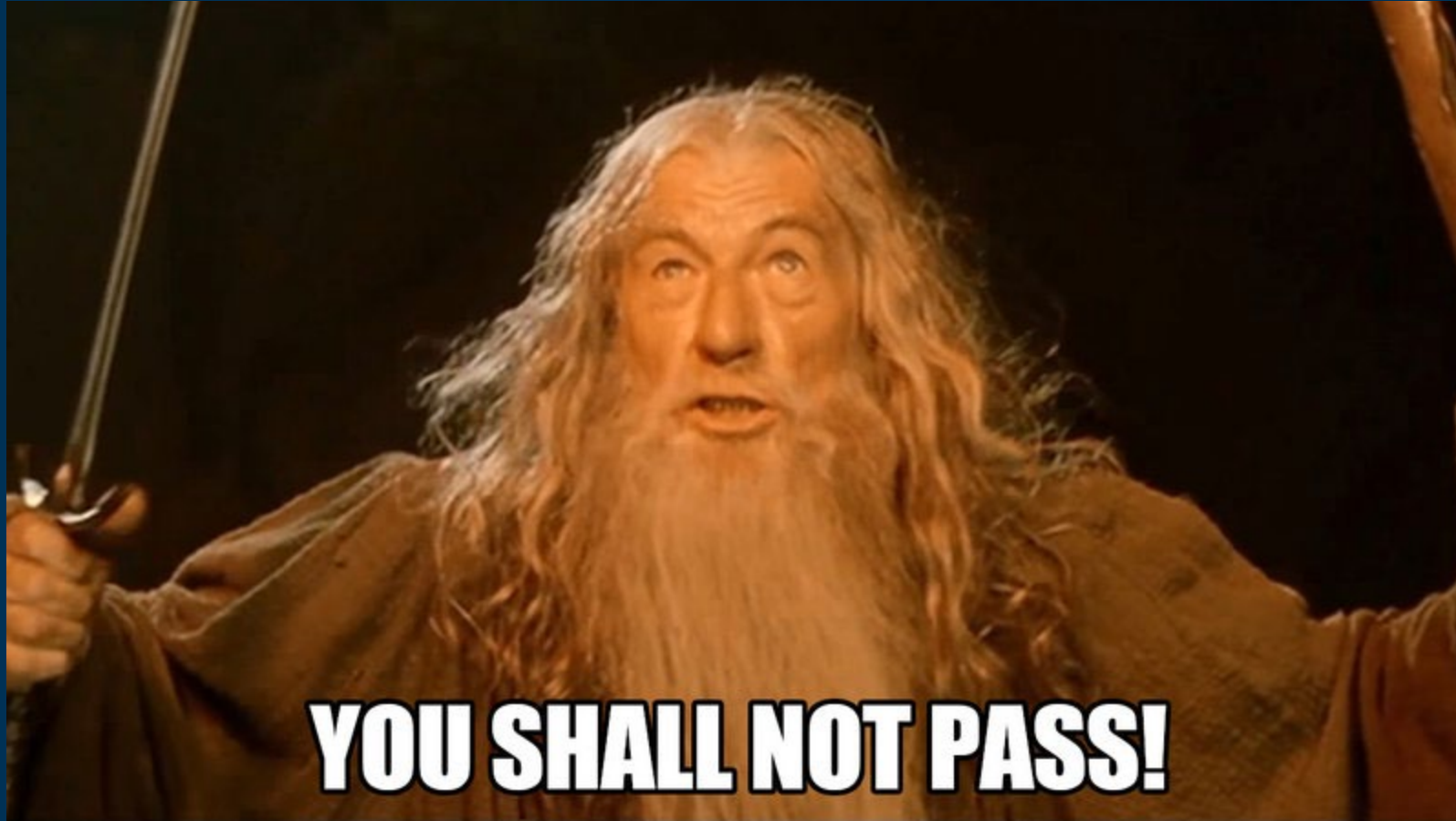


Photo M. Bond



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Quitting is easy- and sets precedent



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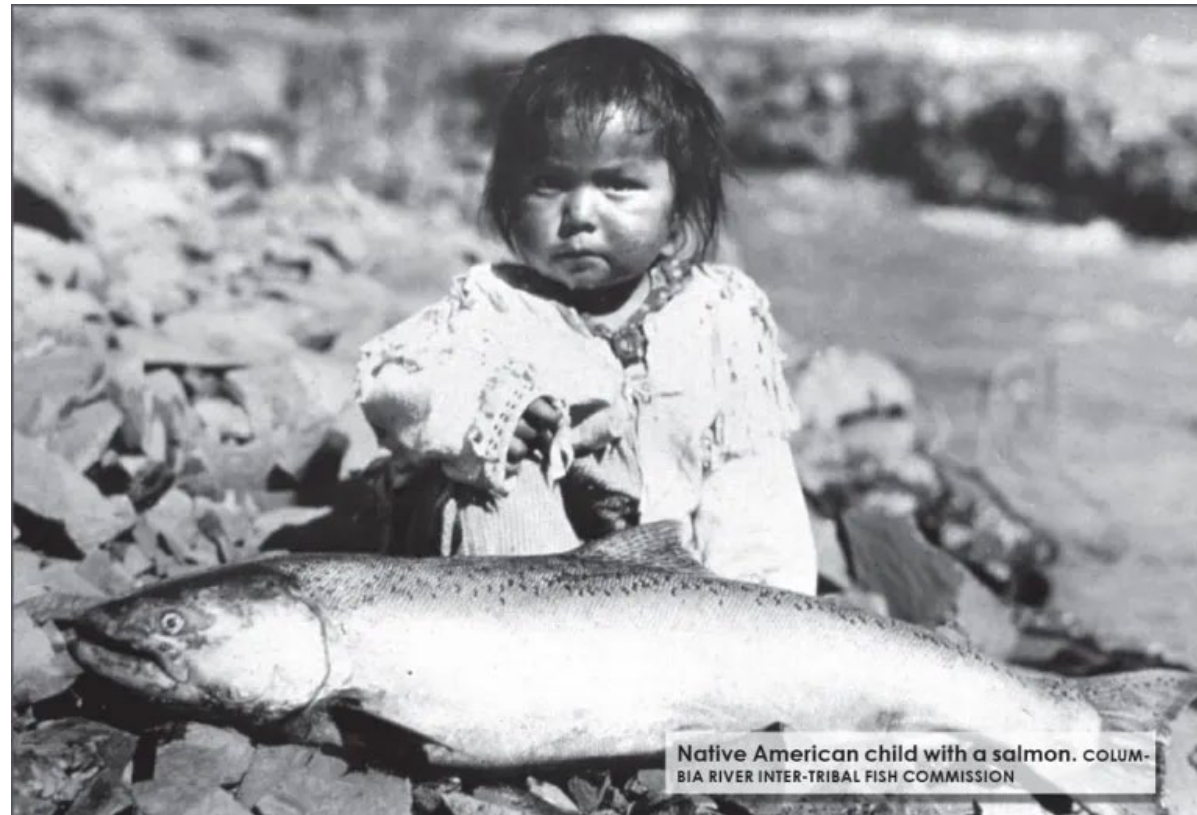
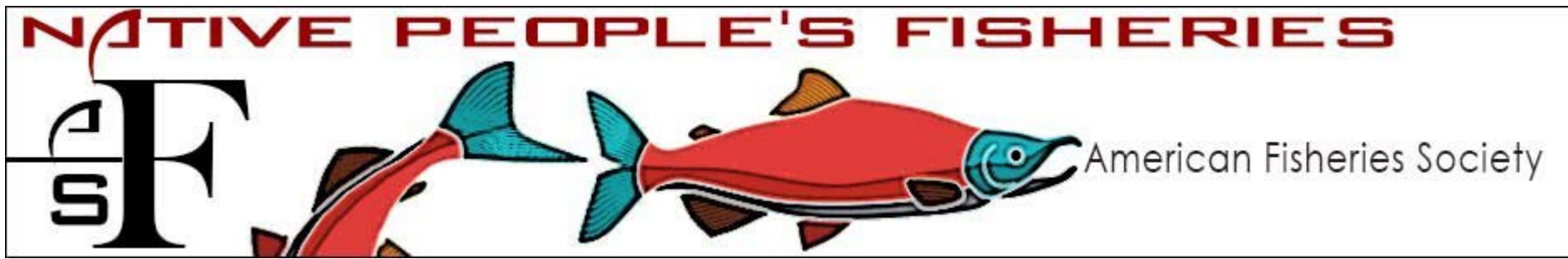
Elwha & Glines Canyon Dams

1992 Removal authorized
2011 Removal begun
2022 Recovery continues

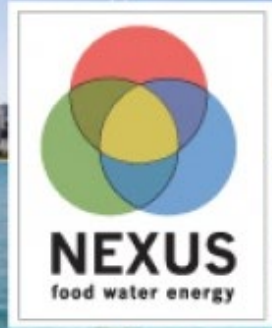
Patience...



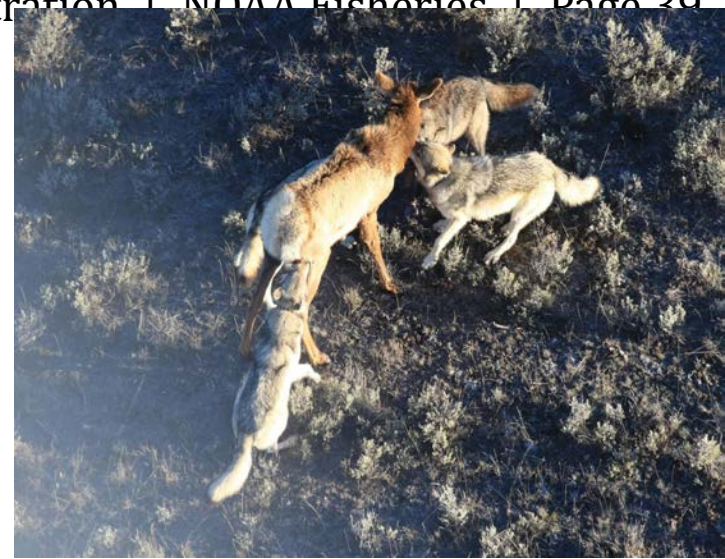
...Native communities protested construction in early 1900's



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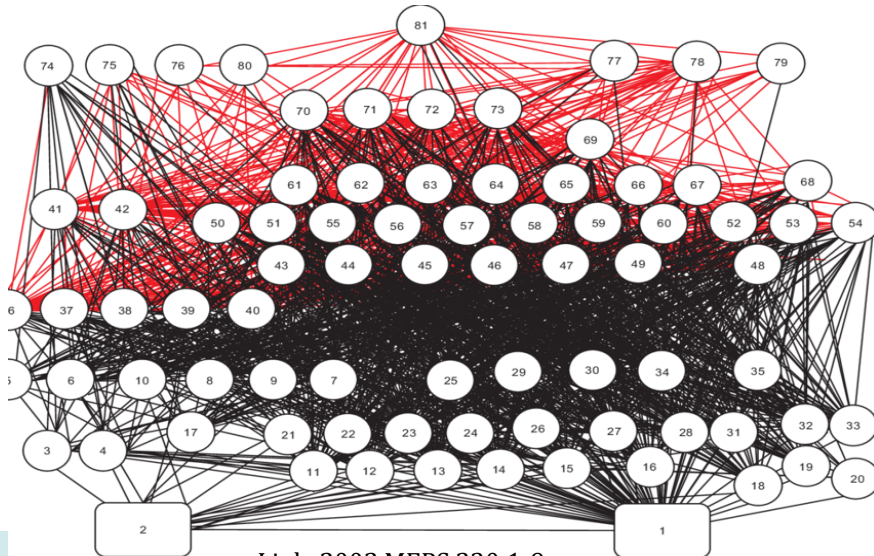
Keystone Species?



Keystone Species?



- What motivates people?



Link, 2002 MEPS 230:1-9



Photo N. Hawkins

Keystone Management Species?

- How do we inspire people to act without overwhelming them?
- How do we break out of the single species stovepipe?
- Salmon are our environmental conscience
 - We act to save them in ways we won't for ourselves....





Leopold
-to keep every cog and wheel is the first precaution of intelligent tinkering.”

Photo- M. Bond



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Science?

- Does data even matter?
- Many (most?) don't believe evidence/data
- Nature always loses to economics

Slide from Doug Smith, Yellowstone NPS



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PROTECTING AND RESTORING CALIFORNIA'S OCEAN ECOSYSTEMS

Margaret Spring

CHIEF CONSERVATION & SCIENCE OFFICER
MONTEREY BAY AQUARIUM

APRIL 21, 2022
SALMONID RESTORATION CONFERENCE



Monterey Bay Aquarium

Freshwater Threats



Dams and overpumping
of rivers



Industrial, urban and
agricultural runoff



Drought and other
climate change impacts

Ocean Threats



Increasing demand driving unsustainable fishing and aquaculture



Land-based pollution, including point and nonpoint source



Climate change compounding stressors

California Leadership



Marine Protected Areas



Greenhouse gas
reductions



Addressing plastic
pollution





**Monterey Bay
Aquarium®**

Our mission is to **inspire
conservation of the ocean.**



Our Unique Role



Climate Change



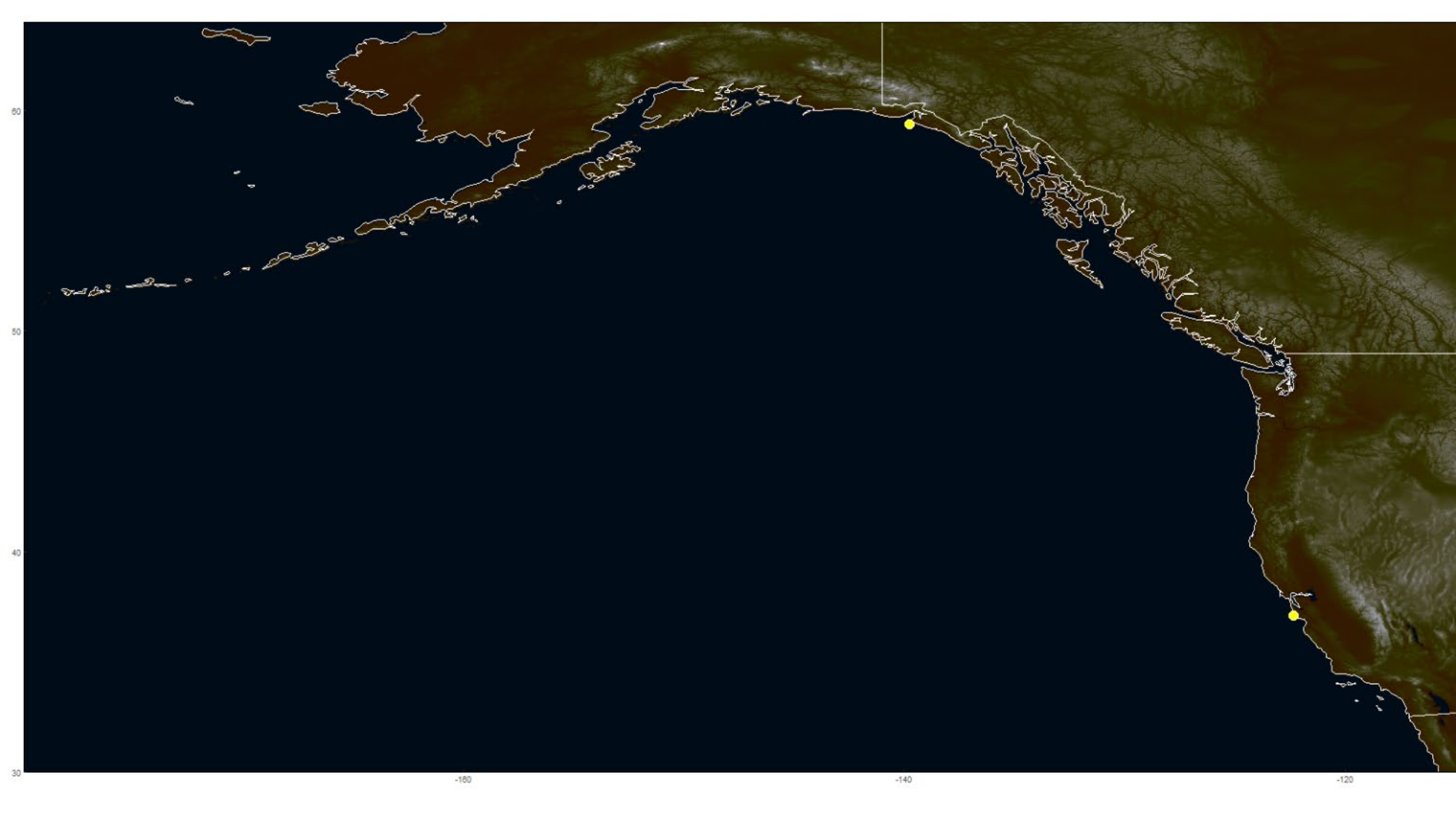
Monterey Bay
Aquarium®

Tracking Ocean Migrations



Monterey Bay
Aquarium®





Summary of Findings

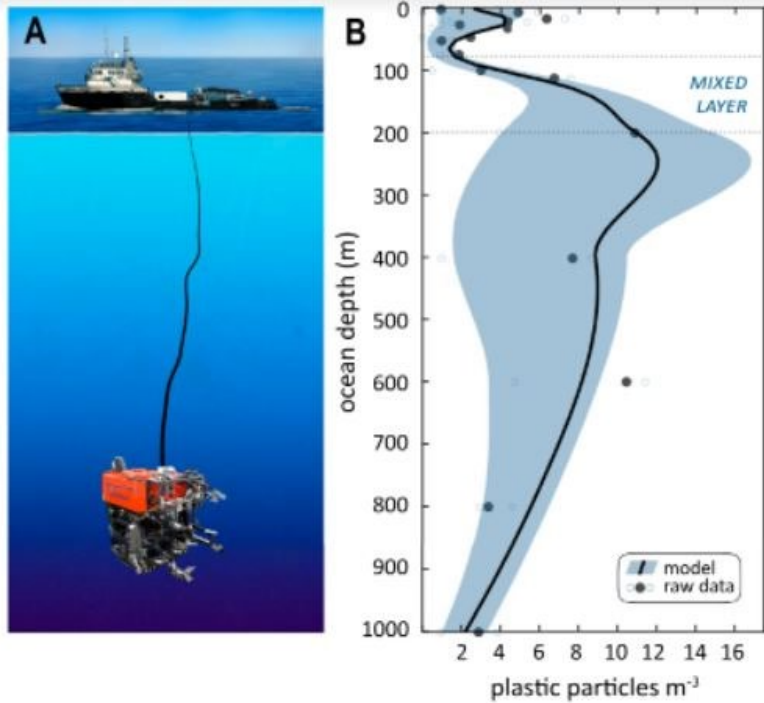
- Steelhead kelts migrate mainly on the continental shelf
- Migrations are highly directed
- Oceanic kelt movements are surface-oriented
- Temperature may limit horizontal and vertical movements
- Californian kelts dive more than Alaskan kelts due to warmer water temperatures

FMHAKI

<https://www.youtube.com/watch?v=OYDnqR3KLzQ>



Plastic Pollution in Monterey Bay



Pervasive at all depths sampled



Found in the bodies of pelagic red crabs and larvacean houses



Can be traced to consumer plastics

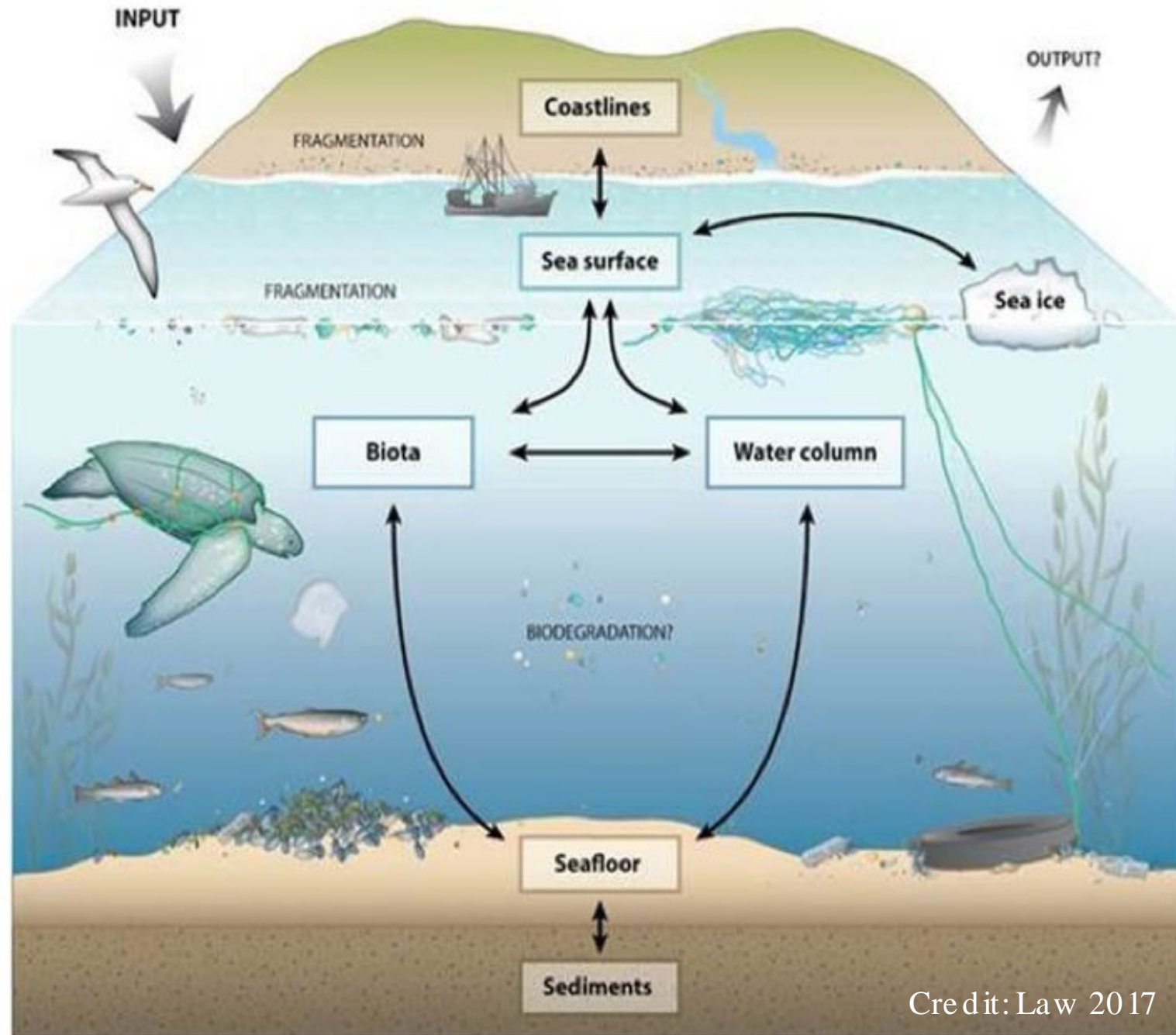
RECKONING WITH THE U.S. ROLE IN

Global Ocean Plastic Waste

This study examines the U.S. role in ocean plastic waste.

- U.S. production, imports and exports
- U.S. waste generation and leakage
- Pathways for transport to ocean
- Distribution and fates once in ocean
- Vision for tracking and monitoring
- Potential interventions for addressing the problem

The distribution of plastic waste in the marine environment is complex and dynamic.



CA Plastic Waste Reduction Initiative



Reduce single-use plastic
at least 25% by 2030



Single-use plastic must
be reusable, recyclable,
or compostable by 2030



Levy a \$0.01 fee per
single-use plastic
package

What Can You Do?



Communicate your findings — and why they matter



Provide scientific input on policies and regulations



Join our Ocean Action email list:
mbayaq.co/oceanaction

THANK YOU!



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