SAFER CONSUMER PRODUCTS

DTSC's Proposal to List Motor Vehicle Tires Containing 6PPD as a Priority Product

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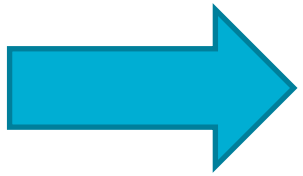
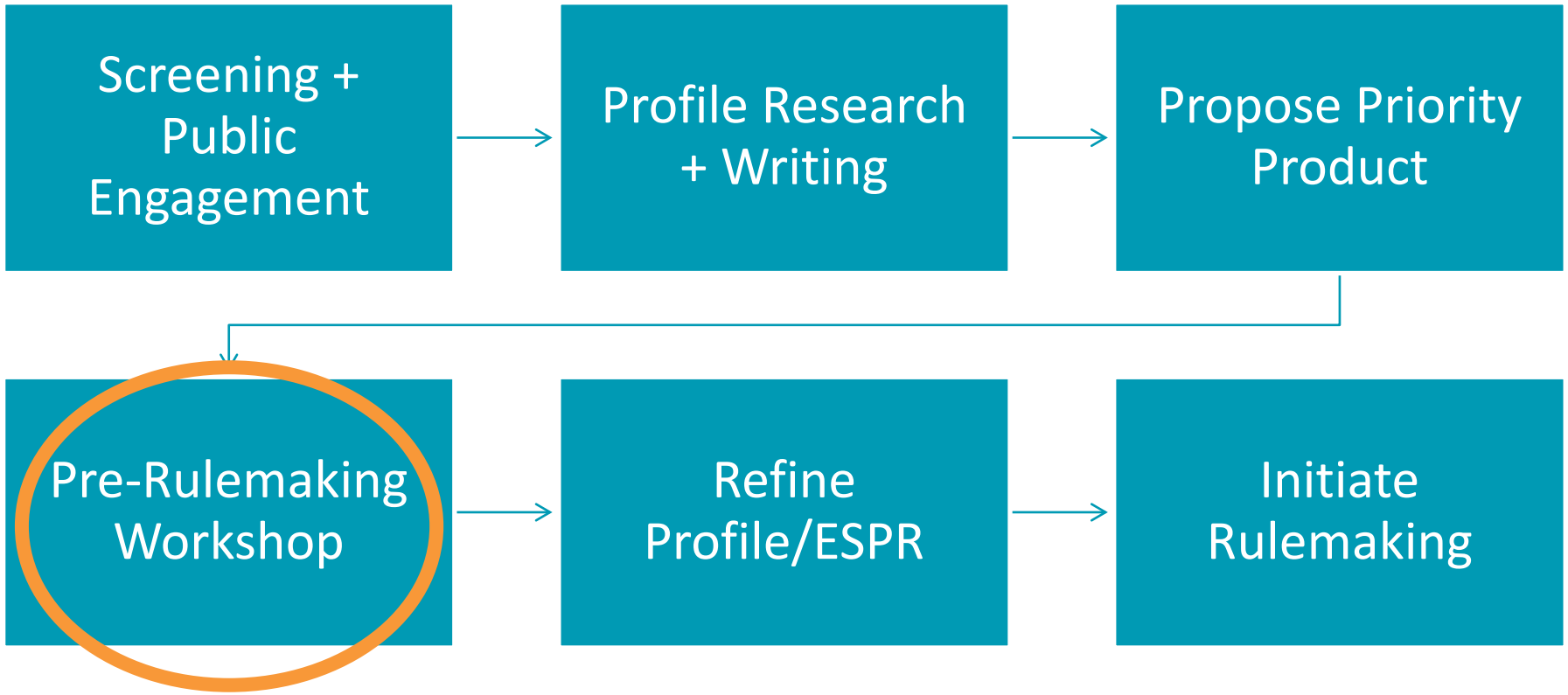
CalEPA

The Safer Consumer Products Framework



Candidate Chemical List	Chemicals listed as **of concern** by authoritative bodies
Priority Products	Product-Chemical combinations that may cause harm
Alternatives Analysis	Manufacturer evaluation of **safer** alternatives
Regulatory Response	Wide range of possible actions to protect public health or the environment

The Product-Chemical Prioritization Process



6PPD AND 6PPD-QUINONE

Mass die-offs of coho salmon in Washington

- Washington state has observed mass pre-spawn die-offs of coho salmon for years (Scholz et al. 2011)
  - Discovered during surveys of habitat restoration efforts
  - Urban Runoff Mortality Syndrome (URMS)

- Die-offs correlated with:
  - Rain events
  - Proximity to roads/impervious surfaces

https://doi.org/10.1371/journal.pone.0028013

Unique impacts to coho salmon

- In the lab, coho died in hours after exposure to road stormwater but not chum.
- Observed impacts:
  - Surface swimming and gaping
  - Sideways or circular swimming
  - Loss of equilibrium
  - Splaying of fins
  - Death
- Not able to reproduce with typical stormwater toxicants

https://fws.maps.arcgis.com/apps/MapSeries/index.html?appid=5dd4a36a2a5148a28376a0b81726a9a4

URMS Causal Agent: 6PPD-quinone

RESEARCH

ECOTOXICOLOGY

A ubiquitous tire rubber–derived chemical induces acute mortality in coho salmon

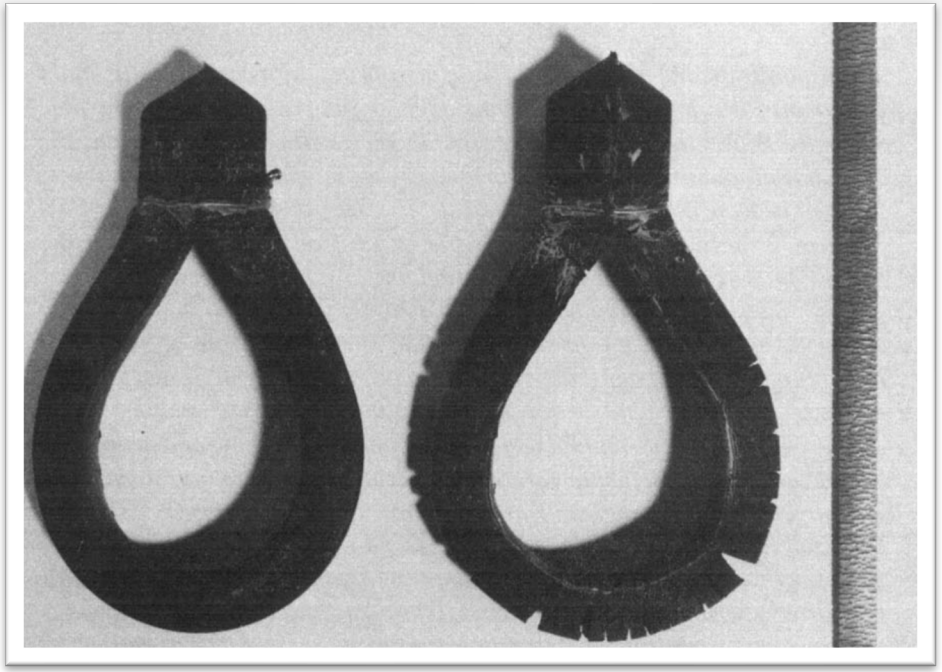
Zhenyu Tian[1,2], Haoqi Zhao[3], Katherine T. Peter[1,2], Melissa Gonzalez[1,2], Jill Wetzel[4], Christopher Wu[1,2], Ximin Hu[3], Jasmine Prat[4], Emma Mudrock[4], Rachel Hettinger[1,2], Allan E. Cortina[1,2], Rajshree Ghosh Biswas[5], Flávio Vinicius Crizóstomo Kock[5], Ronald Soong[5], Amy Jenne[5], Bowen Du[6], Fan Hou[3], Huan He[3], Rachel Lundeen[1,2], Alicia Gilbreath[7], Rebecca Sutton[7], Nathaniel L. Scholz[8], Jay W. Davis[9], Michael C. Dodd[3], Andre Simpson[5], Jenifer K. McIntyre[4], Edward P. Kolodziej[1,2,3]*

In U.S. Pacific Northwest coho salmon (*Oncorhynchus kisutch*), stormwater exposure annually causes unexplained acute mortality when adult salmon migrate to urban creeks to reproduce. By investigating this phenomenon, we identified a highly toxic quinone transformation product of *N*-(1,3-dimethylbutyl)-*N*′-phenyl-p-phenylenediamine (6PPD), a globally ubiquitous tire rubber antioxidant. Retrospective analysis of representative roadway runoff and stormwater-affected creeks of the U.S. West Coast indicated widespread occurrence of 6PPD-quinone (<0.3 to 19 micrograms per liter) at toxic concentrations (median lethal concentration of 0.8 ± 0.16 micrograms per liter). These results reveal unanticipated risks of 6PPD antioxidants to an aquatic species and imply toxicological relevance for dissipated tire rubber residues.

Tian et al. (2021) *Science* 371, no. 6525 https://doi.org/10.1126/science.abd6951

6PPD

- Antidegradant
- Prevents cracking of rubber
- Used since the 1950's or 1960's
- Concentration is 1-2% by weight
- Migrates to the tire surface by design, creates protective film

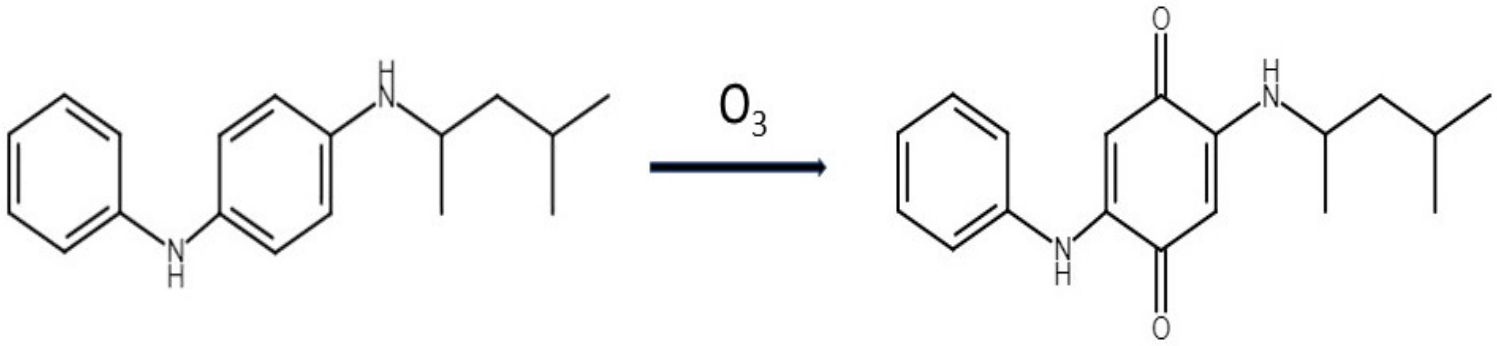


Lewis et al. 1986

Lewis, P.M. *Polymer Degradation and Stability* 15, no. 1 (January 1986): https://doi.org/10.1016/0141-910(86)90004-2

6PPD-quinone

- Previously unknown reaction product of 6PPD and ozone
- Same toxicity to coho as observed from stormwater
- Appears to be more environmentally stable than 6PPD



6PPD **6PPD-quinone**

SCP Prioritization Criteria

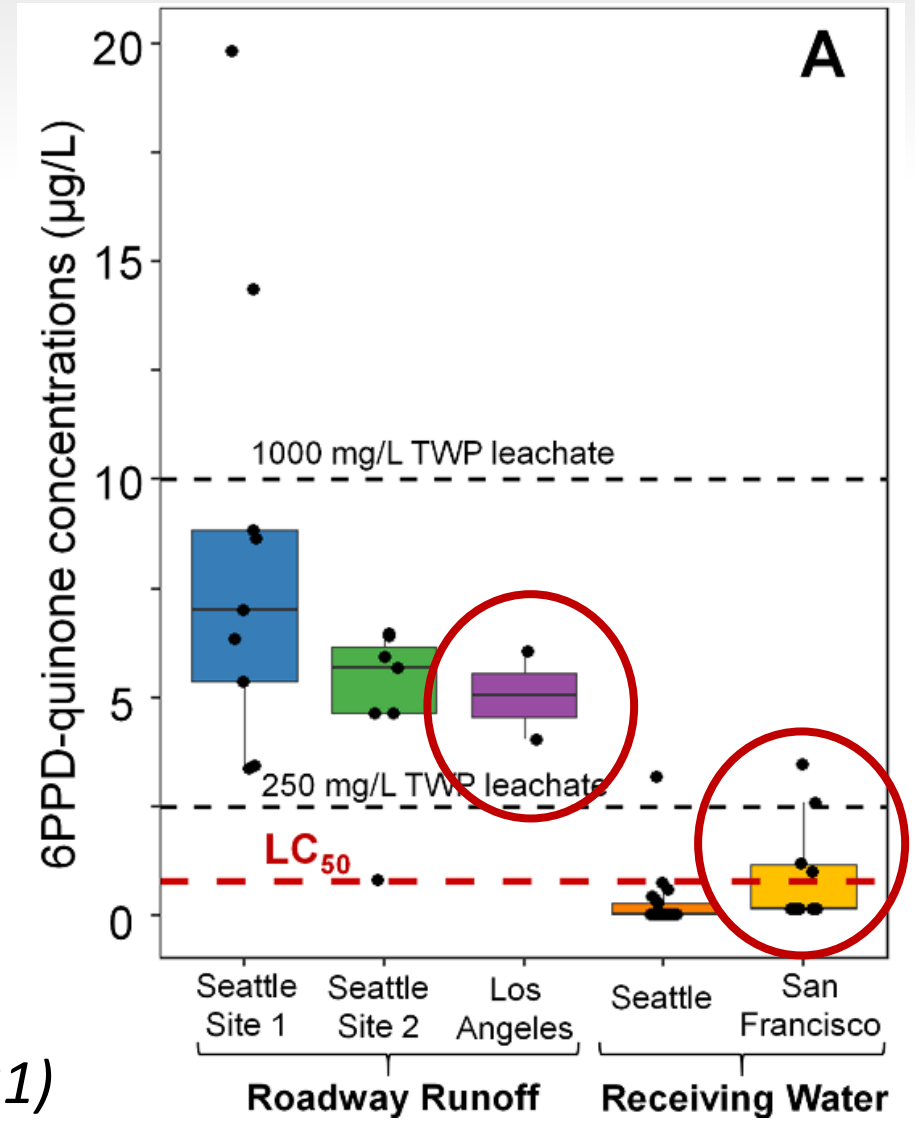
- *Potential* for exposure to 6PPD from motor vehicle tires
- *Potential* for significant or widespread adverse impacts from exposure

Potential for Exposure to 6PPD, 6PPD-quinone

- Used in presumably all tires
  - estimated over 171 million driven on California roads in 2020
- High rates of release of TWP to the aquatic environment
- End-of-life applications may further contribute
- Detections of 6PPD-quinone in California runoff and waterways

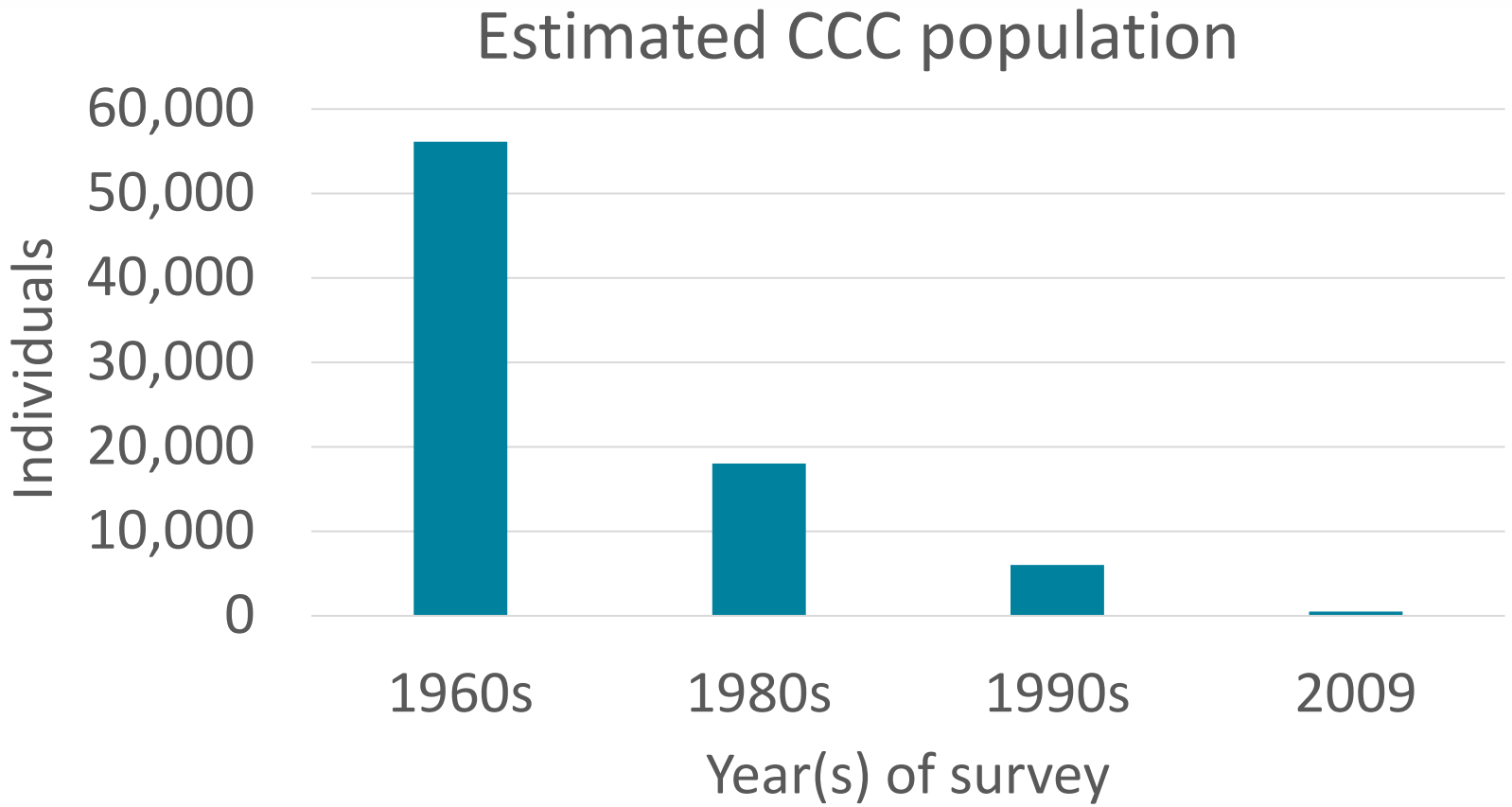
Potential for Significant Adverse Impacts

- 6PPD toxic at multiple trophic levels, can impair wildlife survival, toxic to algae
- 6PPD-quinone acutely toxic to coho at a variety of life stages
- Environmental detections of 6PPD-quinone in California above the LC_{50}



Tian et al. (2021)

Coho have been declining in California

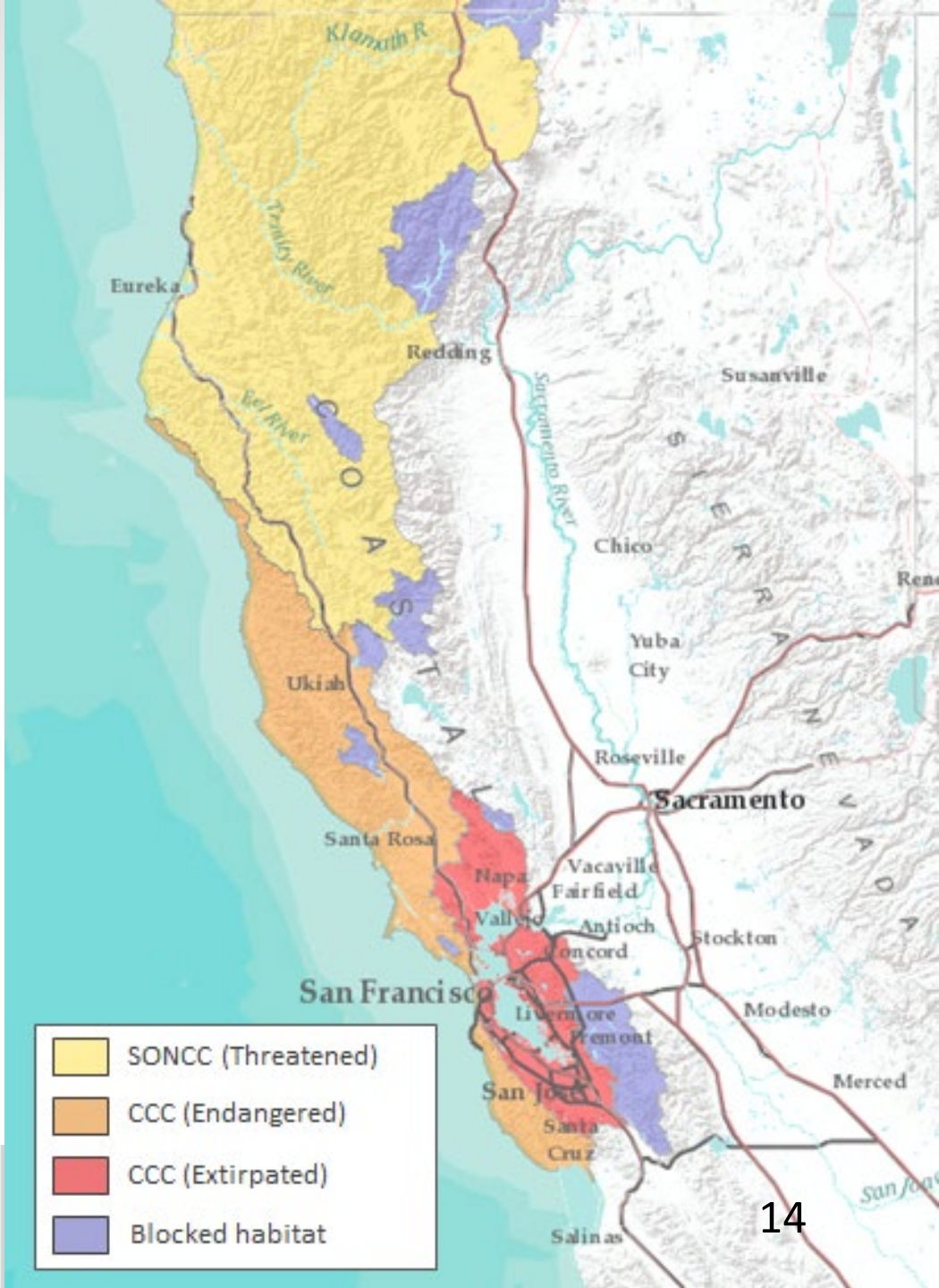


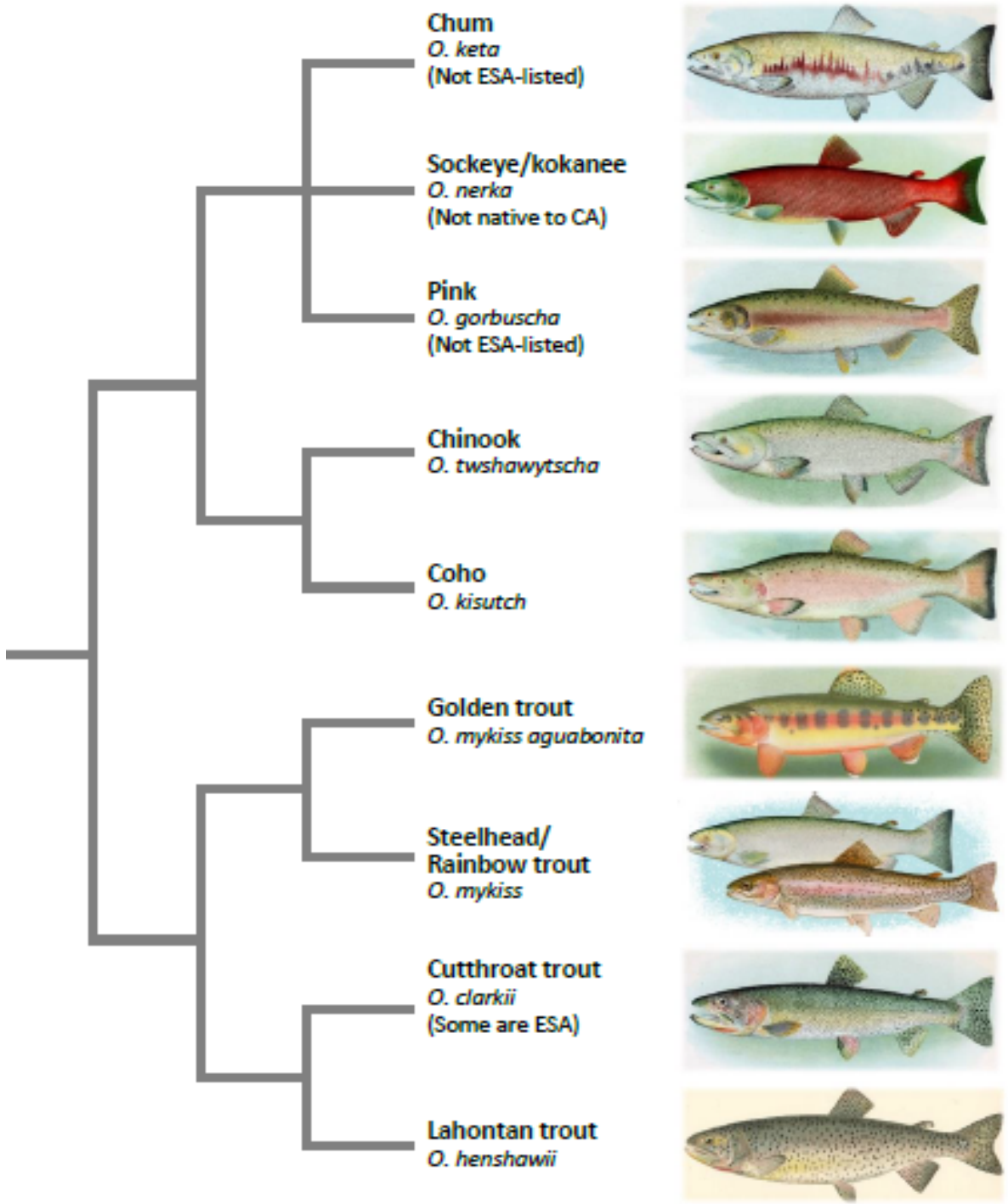
DTSC (2021) Product-Chemical Profile for 6PPD – Discussion Draft 2021

Adverse Impacts to Endangered Species

- Two California populations of coho are either threatened or endangered
- Coho already face a number of additional challenges

DTSC (2021) Product-Chemical Profile for 6PPD – Discussion Draft 2021





6PPD-Quinone May Be Toxic to Other Aquatic Organisms

DTSC (2021) Product-Chemical Profile for 6PPD – Discussion Draft 2021

Adverse Impacts to Human Populations

- Loss of coho has significantly impacted California's Native American tribes
- Loss of core traditional food sources can be tied to loss of culture, increased physical and mental health issues, poverty
- California's Native American tribes and the state have invested millions of dollars in an effort to retain and replenish coho populations

6PPD Alternatives

- Availability of alternatives unknown at this time
- Will be working to encourage development of alternatives
  - Potential workshop focused on 6PPD alternatives next spring
  - Partner Recognition List under development

Data Requests to Stakeholders

- Where and under what conditions 6PPD-quinone forms
- Environmental fate of 6PPD and 6PPD-quinone, including other 6PPD breakdown products
- Toxicity of 6PPD and 6PPD-quinone, including breakdown products
- Presence of 6PPD-quinone in the environment
- Relative contribution of end-of-life applications
- 6PPD alternatives and data on their safety

Draft Product-Chemical Profile Released

- Submit comments via CalSAFER:

  calsafer.dtsc.ca.gov

http://dtsc.ca.gov/scp

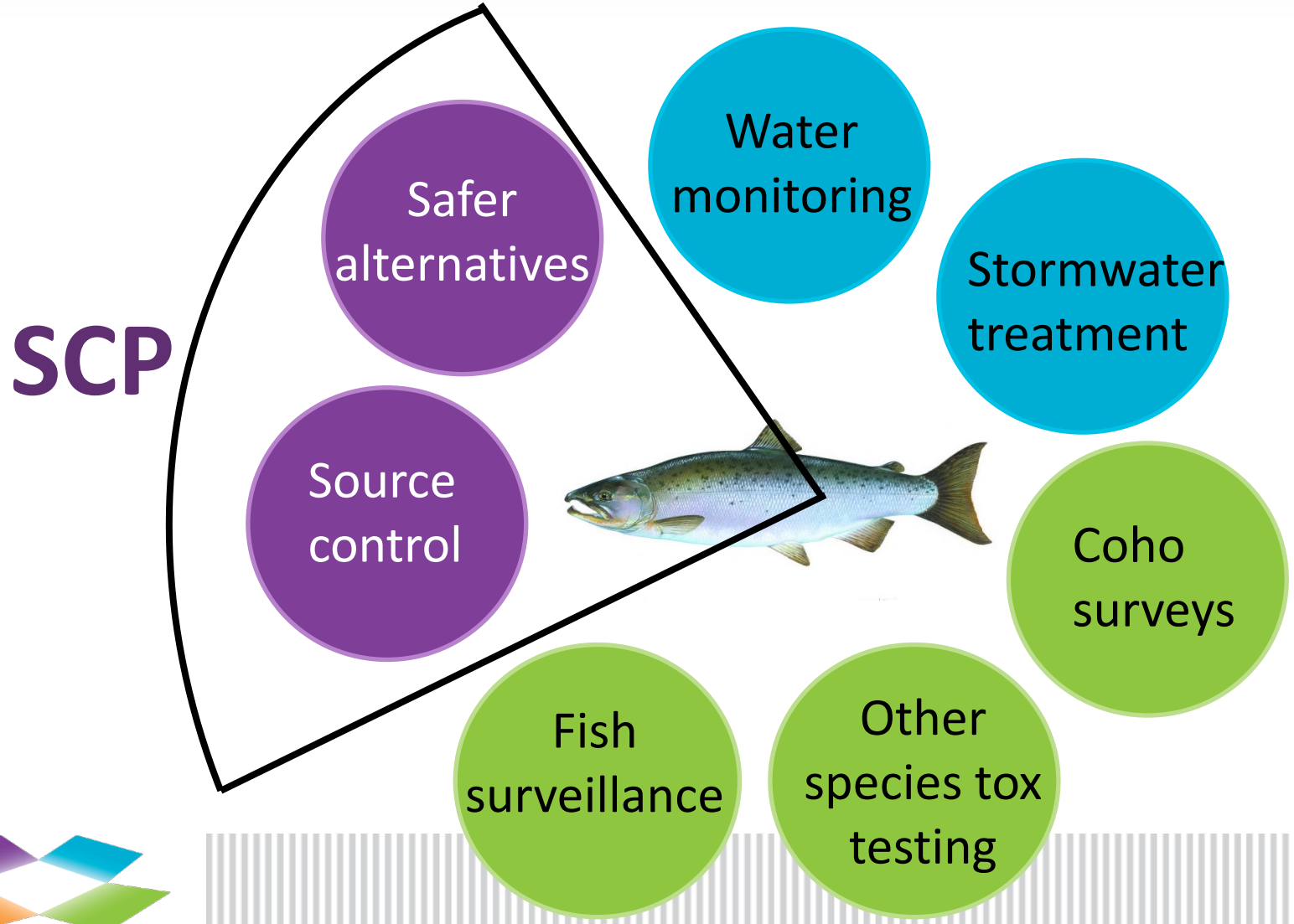
SCP Process Timing

- SCP process is a multi-year process, by design
  - Want to ensure there are alternatives to evaluate
  - AA process requires life cycle evaluation
  - Want to avoid regrettable substitutes
- Looking for ways to expedite the administrative aspects of the process

Possible Timing

- Initiate rulemaking in early 2022
- Regulations go into effect second half of 2022/early 2023
- Preliminary Alternatives Analyses due first half of 2023

Questions surrounding 6PPD and 6PPD-quinone



Coho credit: Timothy Knepp
https://digitalmedia.fws.gov/digital/collection/natdiglib/id/6030/rec/9

Contact

For comments:

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For questions:

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Questions & Answers

- Click Q&A at the bottom of your screen to type in your question.
- Please ask only **one (1) question** at a time.
- We will not be using the chat function.
- From the phone, press ***9** to raise your hand.
- Email: SaferConsumerProducts@dtsc.ca.gov