

November 21, 2023

Karla Nemeth, Director, California Department of Water Resources  
California Department of Water Resources

[deltaconveyancecomments@water.ca.gov](mailto:deltaconveyancecomments@water.ca.gov) via email  
[Lea.Garrison@water.ca.gov](mailto:Lea.Garrison@water.ca.gov)

**Re: Supplemental Comments on the Delta Conveyance Project DEIR**

Dear Director Karla Nemeth and Department of Water Resources:

By this letter, our public interest organizations submit additional supplemental comments on the Department of Water Resources' (DWR) Draft Environmental Impact Report (EIR) for the Delta Conveyance Project.

909 12<sup>th</sup> Street, Suite 202, Sacramento, CA 9581  
(916) 557-1100 FAX (916) 557-9669 [www.sierraclubcalifornia.org](http://www.sierraclubcalifornia.org)

## **TABLE OF CONTENTS**

|                                                                                                                                                                                           |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| INTRODUCTION                                                                                                                                                                              | 3  |
| I. THERE IS ADDITIONAL SIGNIFICANT NEW INFORMATION ABOUT THE WORSENING CLIMATE CHANGE IMPACTS ON WATER SUPPLY AND SEA LEVEL RISE THAT HAS BECOME AVAILABLE SINCE THE DRAFT EIR WAS ISSUED |    |
| A. DWR Does Not Have a Comprehensive, Long-Term Plan for Responding to the Effects of More Severe Future Droughts on the SWP                                                              | 5  |
| B. DWR’s Draft EIR is Oblivious to the Hotter, Drier Future                                                                                                                               | 5  |
| C. The Risks to the Delta Environment and to Project Ratepayers Cry Out for Disclosure in a Revised Draft EIR                                                                             | 7  |
| D. There are Technical Reports that Have Been Published Since the Draft EIR was Issued about the Worsening Climate Change Crisis including Effects on Water Supply and Sea Level Rise     | 7  |
| 1. Record land and ocean temperatures                                                                                                                                                     | 8  |
| (a.) NOAA NCEI Monthly Global Climate Report                                                                                                                                              | 8  |
| (b.) IGCC Annual Update                                                                                                                                                                   | 9  |
| (c.) Acceleration in Global Ocean Heat Accumulation                                                                                                                                       | 10 |
| 2. Accelerating Melting in the Arctic and Antarctic                                                                                                                                       | 11 |
| (a.) State of the Cryosphere 2023 Report                                                                                                                                                  | 11 |
| (b.) Mass Balance of Greenland and Antarctic Ice Sheets Report                                                                                                                            | 12 |
| (c.) Record Low Antarctic Sea Ice Article                                                                                                                                                 | 12 |
| (d.) North Greenland Weakening Ice Shelves Article                                                                                                                                        | 13 |
| (e.) Arctic Sea Ice Loss Affects California Precipitation                                                                                                                                 | 14 |
| 3. Weakening of the Ocean Conveyor Belt                                                                                                                                                   | 14 |
| (a.) Antarctic Overturning Circulation Weakening                                                                                                                                          | 14 |
| (b.) Atlantic Meridional Overturning Circulation Weakening                                                                                                                                | 14 |
| (c.) Effects of collapse Atlantic Meridional Overturning Circulation (AMOC) on Pacific Ocean                                                                                              | 15 |
| 4. IPCC Synthesis Report and Summary on Climate Change                                                                                                                                    | 15 |
| 5. UN Emissions Gap Report 2023                                                                                                                                                           | 18 |
| II. DWR FAILED TO MAKE THE REQUIRED FULL ENVIRONMENTAL DISCLOSURE IN THE DRAFT EIR                                                                                                        | 20 |
| III. THE ADDITIONAL SIGNIFICANT NEW INFORMATION REQUIRES REVISION OF THE DRAFT EIR AND RECIRCULATION FOR PUBLIC REVIEW AND COMMENT                                                        | 22 |
| CONCLUSION                                                                                                                                                                                | 25 |

## INTRODUCTION

These comments follow up the comments our organizations submitted on December 15, 2022, and supplemental comments we submitted on June 29 and October 30, 2023. These supplemental comments provide significant new information regarding environmental impacts of the proposed project that became available after DWR made the subject Draft EIR available for public review on July 27, 2022. The public interest organizations joining in this supplemental comment letter are Sierra Club California, Planning and Conservation League, Environmental Water Caucus, Center for Biological Diversity, California Sportfishing Protection Alliance, California Water Impact Network, AquAlliance, Friends of the River, and Restore the Delta. California Water Research contributed to these comments.

The new information set forth in these supplemental comments and the referenced documents add to the circumstances requiring revision of the Draft EIR and recirculation for public review and comment that our organizations said was required in our previous comments on the Draft EIR. The link to the **13 Exhibits** submitted to DWR with this letter is [Delta Comment Exhibits](#) .

On May 25, 2023, the California State Auditor issued its audit, *Department of Water Resources Its Forecasts Do Not Adequately Account for Climate Change and Its Reasons for Reservoir Releases Are Unclear*. (Auditor Report.) A copy of the *Auditor Report* is provided to DWR with this letter.

On September 8, 2023, the Local Agencies of the North Delta (LAND) submitted supplemental comments on the Delta Conveyance Project Draft EIR addressing the new information about DWR's failure to adequately plan for future hydrologic conditions in California resulting from climate change, set forth in the *Auditor Report*. LAND attached the *Auditor Report* as Exhibit A to their supplemental comments. Our public interest organizations agree with LAND's supplemental comments, and adopt and incorporate LAND's comments by this reference.

If approved, the Delta Conveyance Project-- the Delta water tunnel-- would not become operational before 2040. (DWR **Draft EIR**, Ch. 30, p. 30-20.) The Project would be an expensive long-term project with the previous proposed

version –the California WaterFix--projected to have a 100-year life. (Delta Stewardship Council Staff Draft Determination Regarding Appeals of the Certification of Consistency by the California Department of Water Resources for California WaterFix p. 26, November 8, 2022.)

Despite the long lifespan of the Project, DWR released its Draft EIR when it was continuing “to rely heavily on the historical climate data when developing its forecasts, despite its own acknowledgment more than a decade ago that its forecasting methods needed to better account for the effects of climate change.” (*Auditor Report* p. 1.) DWR had not, and still has not, “developed a long-term plan for the State Water Project [SWP] that aligns with best practices for proactively mitigating or responding to drought.” (*Id.* p. 2.) Moreover, “Such a plan could, for example, take into account the project’s ability to meet water quality and flow standards for the protection of wildlife in the face of more extreme conditions.” (*Id.*)

So, DWR has failed to provide for public review and decision-maker information realistic analysis in its Draft EIR of how bad exports for the Delta Conveyance Project *coupled with* climate change caused worsening droughts, reduced streamflows and increased sea level rise could be for the Delta environment including endangered and threatened fish species. DWR has likewise failed to provide realistic analysis in its Draft EIR for ratepayers of the degree of risk the Project could not operate very much if at all due to worsening conditions resulting from climate change and the State Water Resources Control Board’s September 28, 2023, proposed updates to the Bay-Delta Plan calling for reduced exports in order to increase freshwater flows through the imperiled Delta. The Bay-Delta Plan proposed update was the subject of our October 30, 2023, supplemental comment letter.

As the *Auditor Report* says,

In addition, important requirements related to water quality and flow in the Delta also affect DWR’s operation of the State Water Project. The Legislature has declared that the Delta is a critically important natural resource for the State and the nation, noting that it serves as both the hub of the California water system and the most valuable estuary and wetland ecosystem on the west coast of North and South America. Moreover, the Delta provides habitat to threatened and endangered species, such as the Delta smelt and the Chinook salmon. Given the Delta’s importance, the State Water Project is subject to a number of requirements

to ensure proper flow and water quality in the Delta, such as ensuring that the concentration of salt (salinity) remains below thresholds established to protect agriculture and wildlife. (*Auditor Report* p. 9.)

That is the resource which is at stake here.

**I. THERE IS ADDITIONAL SIGNIFICANT NEW INFORMATION ABOUT THE WORSENING CLIMATE CHANGE IMPACTS ON WATER SUPPLY AND SEA LEVEL RISE THAT HAS BECOME AVAILABLE SINCE THE DRAFT EIR WAS ISSUED**

**A. DWR Does Not Have a Comprehensive, Long-Term Plan for Responding to the Effects of More Severe Future Droughts on the SWP**

A key point in the *Auditor Report* is, “DWR does not have a comprehensive, long-term plan for identifying, mitigating, or responding to the effects of more severe future droughts on the State Water Project.” (*Auditor Report* p. 25.) DWR has not updated its 2010 drought plan “which does not incorporate the assessment of more severe future droughts as FEMA [Federal Emergency Management Agency] and NDMC [National Drought Mitigation Center] recommend.” (*Auditor Report* p. 27.)

DWR’s 2010 drought plan “does not identify how the expected, more severe impacts of drought may specifically strain the State Water Project’s responsibilities to meet water quality and flow standards for the protection of wildlife. It also does not describe whether DWR may need to take new actions to address these more severe impacts or the challenges it might face in doing so.” (*Auditor Report* p. 28.)

**B. DWR’s Draft EIR is Oblivious to the Hotter, Drier Future**

DWR’s Draft EIR is oblivious to California’s recent decline in precipitation and hotter, dryer future.

The *Auditor Report* documented that in 2021, DWR staff contacted the National Weather Service’s California-Nevada River Forecast Center (“CNRFC”) to understand why CNRFC’s runoff forecasts were significantly lower. “CNRFC staff explained to DWR that the difference was likely because CNRFC’s forecasting model accounted for the abnormally dry soil moisture levels in the

State.” (*Auditor Report* p. 17.) In 2022, US Forest Service researchers published a study finding that the missing snow runoff in 2021 was due to a large cumulative deficit in root zone moisture at the start of the 2021 wet season (*Causes of Missing Snowmelt Following Drought, Lapides et. al.*, Sept 2022.)<sup>1</sup>

As temperatures increase, evaporation and transpiration are taking an ever-larger share of precipitation falling in the Sacramento and San Joaquin River watersheds. A 2023 update to Chapter 7 of the IPCC WG1 report on Earth’s Energy Budget, Climate Feedbacks, and Climate Sensitivity found that “[t]he most recent [warming] trends were unprecedented at the time of AR6 and have increased further since then (red markers), showing that human activities are consistently causing global warming recently of more than 0.2°C per decade.” (See below, **Exhibit 2**, *IGCC annual update*, p. 2318, June 8, 2023.)

DWR has not only failed to incorporate new research showing a hotter, dryer future into operational forecasts or longer-term climate modeling, it has failed to address comments that the climate modeling for the Draft EIR obfuscates the hotter, drier climate model projections that are the highest risk. (*California Water Research*, DEIR comments, December 2022.) Our public interest organizations adopt and incorporate California Water Research’s comments by this reference.

It has also been reported that DWR’s runoff forecasts have had major errors during the cooler, wetter year of 2023. At a November 8, 2023 Board meeting, Wheeler Ridge-Maricopa Water District General Manager Sheridan Nicholas reportedly told the board of directors that “the state overestimated the amount of freshwater expected to come into the [D]elta from numerous sources” and that “[i]n order to keep enough fresh flows running through the delta, the state simply stopped pumping into San Luis for several months.” Nicholas said that “Because the state stopped pumping for several months, it potentially has to make up those deliveries to contractors in the next contract year.” (*San Joaquin Valley Water*, November 15, 2023.)<sup>2</sup>

DWR has also consistently failed to address the decline in precipitation in California in the 21<sup>st</sup> Century or consider the discrepancy between observations and the projections of the CMIP5 global climate model projections that it has used for the Draft EIR and other water supply planning.

### **C. The Risks to the Delta Environment and to Project Ratepayers Cry Out for Disclosure in a Revised Draft EIR**

The *Auditor Report* and the thirteen Reports and Articles furnished to DWR as Exhibits to this supplemental comment letter cry out for disclosure to the decision-makers, and the public of the catastrophic damage that could result to the Delta environment from climate change caused reduced stream flows and increased salinity intrusion *coupled with* increased upstream exports if the proposed Delta Conveyance Project were to actually be constructed to divert freshwater flows for exports. Likewise, the reduction in freshwater flows and increased salinity intrusion resulting from climate change *coupled with* the recent Water Board proposed Delta Plan updates pointing out the need to reduce exports to increase freshwater flows creates a risk to ratepayers the Project would take billions of dollars from them to pay for a future inoperable stranded asset.

“We are not in an era of global warming; but as UN Secretary General Guterres says, ‘global boiling.’” (See below, **Exhibit 4**.) “A UN report published Monday [November 20, 2023] showed that even if countries carried out their current emissions- reduction pledges, the world will reach between 2.5 and 2.9 degrees of warming sometime this century.” (Angela Dewan and Laura Paddison, *Scientists sound the alarm as the world briefly smashes through 2-degree warming limit for the first time*, CNN, November 20, 2023.) The new UN Report is **Exhibit 12**, discussed below.

DWR must revise the Delta Conveyance Project Draft EIR to alert decision-makers and the public to the risks worsening climate change poses to the Delta if the Project is *constructed and operates*, and the risk to ratepayers of the Project being a stranded asset if it *cannot operate* because of climate change *coupled with* new requirements to reduce Delta water exports to increase Delta freshwater flows.

### **D. There are Technical Reports that Have Been Published Since the Draft EIR was Issued about the Worsening Climate Change Crisis including Effects on Water Supply and Sea Level Rise**

The *Auditor Report* shows that the effects of climate change on California’s water supply will continue to increase. For example,

Climate researchers project that the effects of climate change will continue to increase, causing greater fluctuation in rainfall patterns and severe weather—including prolonged drought. Hotter temperatures dry out the soil through increased evaporation and reduce the amount of snow in the mountains, both of which can lessen the subsequent spring runoff. At the same time, DWR has projected that rising sea levels could increase the intrusion of salt into the Delta, requiring the release of more water to protect water quality. In an October 2008 report, DWR stated that climate change had already had a profound impact on water resources, and it pledged to play a leadership role in adapting to those impacts. (*Auditor Report* p. 11.)

In fact, DWR has not implemented changes to its forecasting model. And DWR has not adopted a long-term plan to accurately assess the impacts of the increasing effects of climate change on water supply.

There are new Technical Reports and Articles discussing the worsening situation discussed below, at pages 7-19. The layperson reader is advised that subsection D1-5, pages 7-19 is long and includes technical language in quotations from the Reports and Articles. Again, the link to the **13 Exhibits** is [Delta Comment Exhibits](#).

## **1. Record land and ocean temperatures**

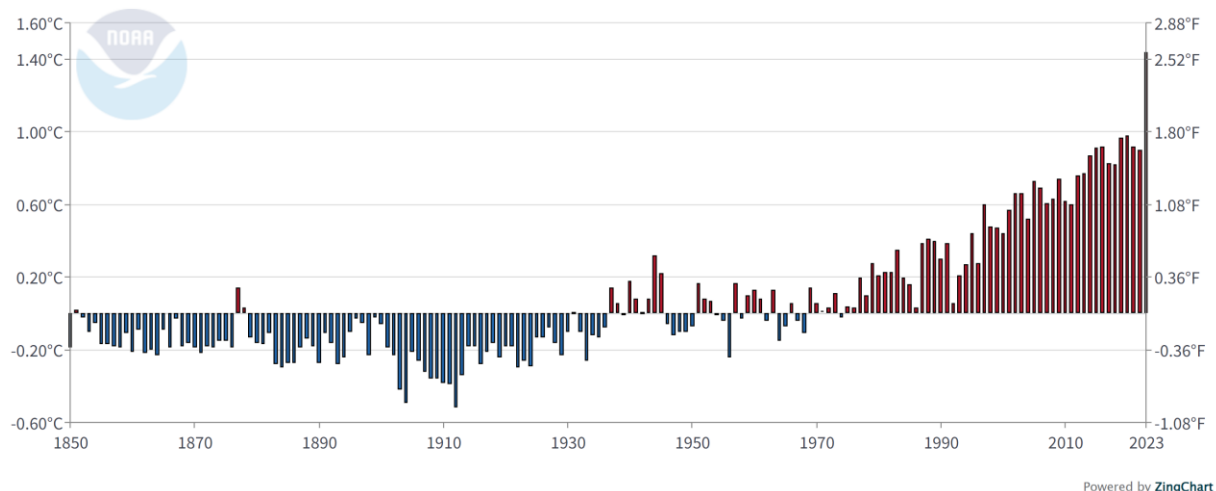
### **(d.) NOAA NCEI Monthly Global Climate Report**

There is a Monthly Global Climate Report for September 2023, published online by the [National Oceanic and Atmospheric Administration](#) (NOAA) National Centers for Environmental Information (NCEI) (*September Report*).<sup>3</sup> A copy of the *September Report* is provided to DWR as **Exhibit 1**. The section September 2023 states in part:

The September global surface temperature was 1.44°C (2.59°F) above the 20th-century average of 15.0°C (59.0°F), making it the warmest September on record... September 2023 was 0.46°C (0.83°F) above the previous record from September 2020, and marks the largest positive monthly global temperature anomaly of any month on record.

## Global Land and Ocean

September Temperature Anomalies



### (b.) IGCC Annual Update

Piers Forster, a lead author of Chapter 7 of the IPCC AR6 WG1 report on Earth's Energy Budget, Climate Feedbacks, and Climate Sensitivity 2021, is leading an effort by an international team of scientists to provide annual updates. The first annual update was published June 8, 2023, titled, *Indicators of Global Climate Change 2022: annual update of large-scale indicators of the state of the climate system and human influence. (IGCC annual update.)*<sup>4</sup> A copy of the *IGCC annual update* is provided to DWR as **Exhibit 2**. The abstract states in part,

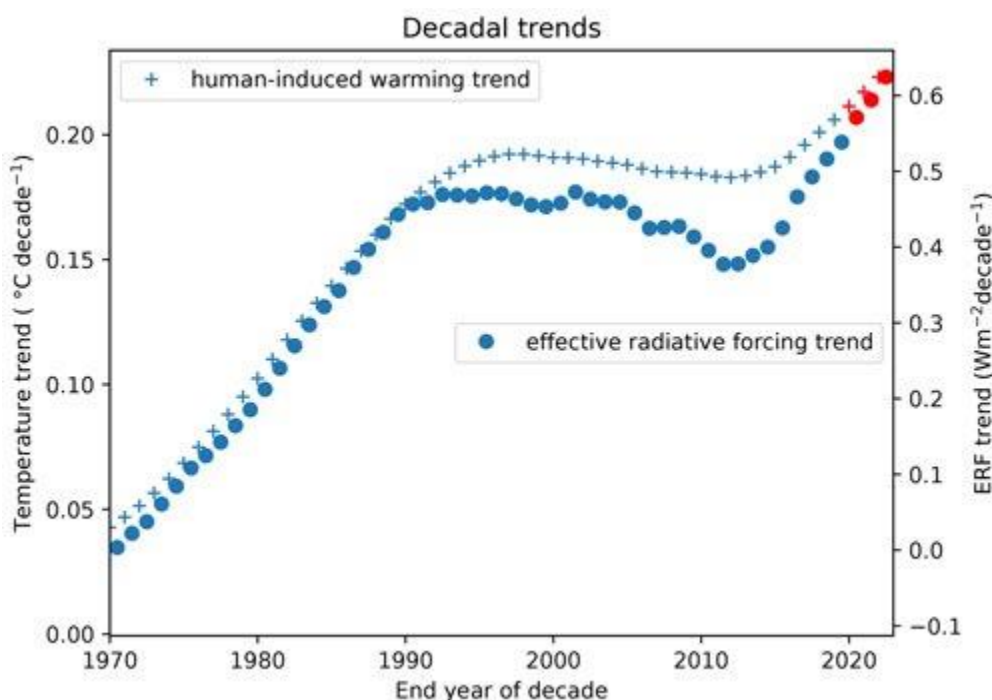
We follow methods as close as possible to those used in the IPCC Sixth Assessment Report (AR6) Working Group One (WGI) report... The purpose of this effort, grounded in an open data, open science approach, is to make annually updated reliable global climate indicators available in the public domain... As they are traceable to IPCC report methods, they can be trusted by all parties involved in UNFCCC negotiations and help convey wider understanding of the latest knowledge of the climate system and its direction of travel.

*The indicators show that human-induced warming reached 1.14 [0.9 to 1.4] °C averaged over the 2013–2022 decade and 1.26 [1.0 to 1.6] °C in 2022. Over the 2013–2022 period, human-induced warming has been increasing at an unprecedented rate of over 0.2 °C per decade. (IGCC annual update p. 2296) (Emphasis added.)*

The *IGCC annual update* also states in the Discussions and conclusions section,

Figure 9 shows decadal trends for the attributed warming and ERF [Effective Radiative Forcing]. The most recent trends were unprecedented at the time of AR6 [Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report] and have increased further since then (red markers), showing that human activities are consistently causing global warming recently of more than 0.2 °C per decade. (*IGCC annual update* p. 2318.)

Figure 9 is reproduced on the next page.

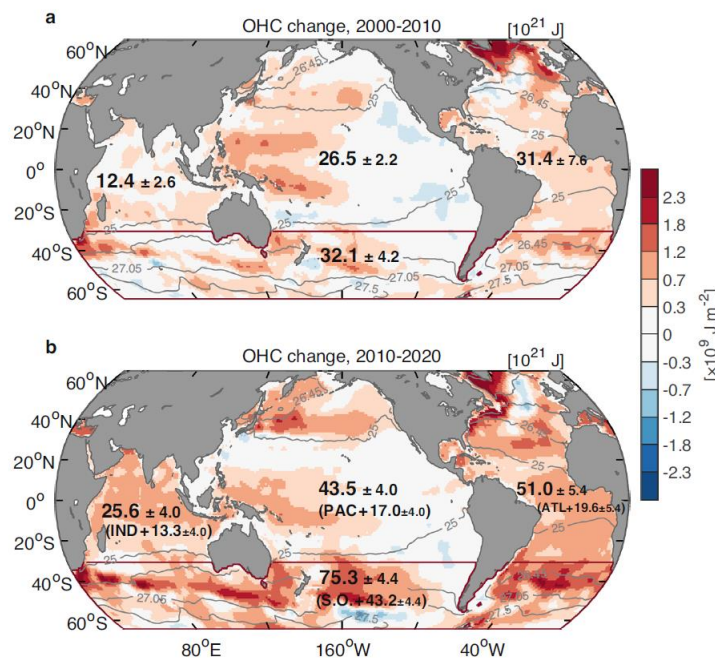


### (c.) Acceleration in Global Ocean Heat Accumulation

Recent research shows accelerated accumulation of heat in the global ocean. There is an article, *Recent acceleration in global ocean heat accumulation by mode and intermediate waters*, published October 28, 2023 (*Recent acceleration*.)<sup>5</sup> A copy is provided to DWR as **Exhibit 3**. The abstract states in part:

Here we analyze historical and recent observations to show that ocean heat uptake has accelerated dramatically since the 1990s, nearly doubling during 2010–2020 relative to 1990–2000. Of the total ocean heat uptake over the Argo era 2005–2020, about 89% can be found in global mode and intermediate water layers, spanning both hemispheres and both subtropical and subpolar mode waters... After factoring out volumetric changes, the combined warming of these layers accounts for ~76% of global ocean warming.

Figure 2 (a) and (b), reproduced from p.4 of *Recent acceleration*, show that the regions with accelerated heat uptake include the North Pacific, Subarctic, and Southern Ocean, all of which have indirect effects on the Delta Conveyance Project, through effects on landfalling atmospheric rivers or acceleration of sea level rise.



## 2. Accelerating Melting in the Arctic and Antarctic

### (d.) State of the Cryosphere 2023 Report

There is the State of the Cryosphere 2023 Report, *Two Degrees is Too High*, published November 16, 2023, by the International Cryosphere Climate

Initiative (*ICCI Report*.)<sup>6</sup> A copy of the *ICCI Report* is provided to DWR as **Exhibit 4**. The opening paragraphs of the *ICCI Report's* preface state,

This year is the year of climate disasters. Global temperatures, including sea surface temperatures are at record high. The sea ice around Antarctica is at an all-time low; and, in the Arctic, icecaps and Iceland's vital glaciers continue to melt. Chile has seen a year of brutal wildfires, intense rains, devastating floods. ***We are not in an era of global warming; but as UN Secretary General Guterres says, "global boiling."*** This year we will come close to reaching 1.5°C of warming, for the first time in human history. (*ICCI Report*, p. v)(Emphasis added.)

The *ICC Report's* Executive Summary explains with respect to ice sheets,

A compelling number of new studies... all point to a threshold for both Greenland and parts of Antarctica well below 2°C, committing the planet to between 12–20 meters sea-level rise if 2°C becomes the new constant Earth temperature. (*ICCI Report* p. 2.)

The *ICCI Report* contains extensive information about accelerating climate change impacts on polar regions that demands the urgent attention of DWR officers, employees, and consultants. Some key references are discussed below.

#### **(b.) Mass Balance of Greenland and Antarctic Ice Sheets Report**

The *ICCI Report* references a report published April 20, 2023, *Mass balance of the Greenland and Antarctic ice sheets from 1992 to 2020* (Mass Balance Report.)<sup>5</sup> A copy is provided to DWR as **Exhibit 5**. The *ICCI Report* summarizes the Mass Balance Report as follows:

Between 1992 and 2022, the Earth's ice sheets lost 7,560 billion tons of ice: enough to cover the entire U. S. with a 1 m thick layer of ice. The seven worst years of ice loss have all occurred in the last decade. If the recent observed acceleration of loss in Greenland were to continue, it would track above the upper range predicted by the IPCC (2021) for this decade. (Summary from *ICCI Report* p. 9.)

#### **(c.) Record Low Antarctic Sea Ice Article**

The *ICCI Report* references an article published in Communications, Earth & Environment on September 13, 2023, *Record low Antarctic sea ice coverage*

indicates a new sea ice state (Record low.)<sup>7</sup> A copy is provided to DWR as **Exhibit 6**. The abstract states,

In February 2023, Antarctic sea ice set a record minimum; there have now been three record breaking low sea ice summers in seven years. Following the summer minimum, circumpolar Antarctic sea ice coverage remained exceptionally low during the autumn and winter advance, leading to the largest negative areal extent anomalies observed over the satellite era. Here, we show the confluence of Southern Ocean subsurface warming and record minima and suggest that ocean warming has played a role in pushing Antarctic sea ice into a new low-extent state. (*Record low* p. 1.)

**(d.) North Greenland Weakening Ice Shelves Article**

New published research includes the article *Rapid disintegration and weakening of ice shelves in North Greenland*, published in Nature Communications on November 7, 2023.<sup>8</sup> A copy of the article is provided to DWR as **Exhibit 7**. The abstract for the article in Nature Communications states,

Here, we show that since 1978, ice shelves in North Greenland have lost more than 35% of their total volume, three of them collapsing completely... Between 2000 and 2020, there was a widespread increase in basal melt rates that closely follows a rise in the ocean temperature... These results suggest that, under future projections of ocean thermal forcing, basal melting rates will continue to rise or remain at high level, which may have dramatic consequences for the stability of Greenlandic glaciers. (Nature Communications 14:6914, p. 1.)

The article was explained in a way understandable by laypersons in an article in the Washington Post, *Greenland's ice shelves hold back sea level rise. There are just 5 left*. (Chris Mooney, Washington Post, November 7, 2023.) The Washington Post explanation includes in selected paragraphs,

The vast floating ice platforms of northern Greenland, unrivaled features of the Northern Hemisphere that keep our seas lower by holding back many trillion tons of ice, are in stark decline, according to new scientific research published Tuesday.

Overall, losses of ice from Greenland have caused about 17 per cent of observed sea level rise globally between the years 2006 and 2018. But it could get worse from here.

While the globe currently contains huge ice sheets in both hemispheres, the latest news-- delivered during a year of record global heat-- further underscores that Greenland's ice sheet has been deeply compromised by planetary warming, with potentially grave future implications.

‘We are heading toward an ice-shelf-free Northern hemisphere,’ Millan said. (Emphasis in original.)

#### **(e.) Arctic Sea Ice Loss Affects California Precipitation**

The accelerated melt of Arctic sea ice could also affect California precipitation. On December 5, 2017, an article was published in Nature Communications; *Future loss of Arctic sea-ice cover could drive a substantial decrease in California's rainfall.*<sup>9</sup> A copy of the Article is provided to DWR as **Exhibit 7a**. The abstract states in part:

In a two-step teleconnection, sea-ice changes lead to reorganization of tropical convection that in turn triggers an anticyclonic response over the North Pacific, resulting in significant drying over California. These findings suggest that the ability of climate models to accurately estimate future precipitation changes over California is also linked to the fidelity with which future sea-ice changes are simulated.

### **3. Weakening of the Ocean Conveyor Belt**

#### **(a.) Antarctic Overturning Circulation Weakening**

The *ICCI Report* references an article published in Nature on March 29, 2023, *Abyssal ocean overturning slowdown and warming driven by Antarctic meltwater.*<sup>10</sup> A copy of the Article is provided DWR as **Exhibit 8**. The summary of the article in the *ICCI Report* states:

Increasing meltwater discharge from Antarctica could reduce the strength of the Antarctic overturning circulation by more than 40% by 2050, potentially leading to the collapse of this important ocean conveyor system. The resulting subsurface warming would lead to further ice shelf collapse, ice sheet loss and resulting sea-level rise in a region that is already vulnerable. (*ICCI Report* p. 9.)

#### **(b.) Atlantic Meridional Overturning Circulation (AMOC) Weakening**

The *ICCI Report* references an article published in Nature Communications on July 25, 2023, *Warning of a forthcoming collapse of the Atlantic meridional overturning circulation.*<sup>11</sup> A copy of the article is provided to DWR as **Exhibit 9**. The abstract states in part,

The Atlantic meridional overturning circulation (AMOC) is a major tipping element in the climate system and a future collapse would have severe impacts on the climate in the North Atlantic region... Predictions based on observations rely on detecting early-warning signals, primarily an increase in variance (loss of resilience) and increased autocorrelation (critical slowing down), which have recently been reported for the AMOC. Here we provide statistical significance and data-driven estimators for the time of tipping. We estimate a collapse of the AMOC to occur around mid-century under the current scenario of future emissions.

**(c.) Effects of collapse Atlantic Meridional Overturning Circulation (AMOC) on Pacific Ocean**

The effects of an AMOC collapse on the Pacific Ocean were evaluated in a June 2022 publication in Nature Climate Change, *Interbasin and interhemispheric impacts of a collapsed Atlantic Overturning Circulation.* (Interbasin.)<sup>12</sup> A copy of the article is provided to DWR as **Exhibit 10**.

In *Interbasin*, the authors describe model experiments with the Community Earth System 2 climate model. The experiments showed that the collapse of the Atlantic Meridional Overturning Circulation could have major impacts on the Pacific Ocean, and indirectly on California precipitation:

However, as the AMOC slows down a synchronous cooling commences in the equatorial Pacific, maturing by around year 30, evolving to La Niña-like conditions. This in turn weakens the Aleutian Low, which is a teleconnection that is known to occur during La Niña events. The equatorial Pacific cooling is associated with a strong intensification of the Pacific trade winds which drive enhanced equatorial upwelling and westward advection of cool waters, as well as a spin up of the shallow tropical overturning cells. (*Interbasin*, p. 559, citations omitted.)

**4. IPCC Synthesis Report and Summary on Climate Change**

There is the Intergovernmental Panel on Climate Change (IPCC),

CLIMATE CHANGE 2023, Synthesis Report, Summary for Policymakers published March 20, 2023 (IPCC Summary).<sup>13</sup> A copy of the IPCC Summary is provided to DWR as **Exhibit 11**. Item A.1 under the heading A. Observed Warming and its Causes states,

**Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850-1900 in 2011-2020. Global greenhouse gas emissions have continued to increase, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and among individuals (*high confidence*). {2.1, Figure 2.1, Figure 2.2} (IPCC Summary p. 4) (Emphasis in original.)**

Item A. 2 states,

**Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred. Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. This has led to widespread adverse impacts and related losses and damages to nature and people (*high confidence*). Vulnerable communities who have historically contributed the least to current climate change are disproportionately affected (*high confidence*). {2.1, Table 2.1, Figure 2.2, Figure 2.3} (Figure SPM.1)(IPCC Summary p. 5)(Emphasis in original.)**

Item A.2.3 states,

Climate change has caused substantial damages, and increasingly irreversible losses, in terrestrial, *freshwater*, cryospheric, and *coastal and open ocean ecosystems* (*high confidence*). *Hundreds of local losses of species have been driven by increases in the magnitude of heat extremes (high confidence)* with mass mortality events recorded on land and in the ocean (*very high confidence*). Impacts on some ecosystems are approaching irreversibility such as the impacts of hydrological changes resulting from the retreat of glaciers, or the changes in some mountain (medium confidence) and Arctic ecosystems driven by permafrost thaw (*high confidence*). {2.1.2, Figure 2.3} (Figure SPM.1) (IPCC Summary p. 5) (Emphasis added.)

Under the heading B. Future Climate Change, Risks, and Long-Term Responses, Item B.2.2, states,

Risks and projected adverse impacts and related losses and damages from climate change will escalate with every increment of global warming (very high confidence). They are higher for global warming of 1.5°C than at present, and even higher at 2°C (high confidence). Compared to the AR5, global aggregated risk levels<sup>37</sup> (Reasons for Concern<sup>38</sup>) are assessed to become high to very high at lower levels of global warming due to recent evidence of observed impacts, improved process understanding, and new knowledge on exposure and vulnerability of human and natural systems, including limits to adaptation (high confidence). Due to unavoidable sea level rise (see also B.3), risks for coastal ecosystems, people and infrastructure will continue to increase beyond 2100 (high confidence). {3.1.2, 3.1.3, Figure 3.4, Figure 4.3} (Figure SPM.3, Figure SPM.4)(*IPCC Summary* p. 15.)

Item B.3 of the *IPCC Summary* states,

The likelihood and impacts of abrupt and/or irreversible changes in the climate system, including changes triggered when tipping points are reached, increase with further global warming (high confidence). As warming levels increase, so do the risks of species extinction or irreversible loss of biodiversity in ecosystems including forests (medium confidence), coral reefs (very high confidence) and in Arctic regions (high confidence). At sustained warming levels between 2°C and 3°C, the Greenland and West Antarctic ice sheets will be lost almost completely and irreversibly over multiple millennia, causing several metres of sea level rise (limited evidence). The probability and rate of ice mass loss increase with higher global surface temperatures (high confidence). {3.1.2, 3.1.3} (*IPCC Summary* p. 18.)

Item B.4.1 of the *IPCC Summary* states,

The effectiveness of adaptation, including ecosystem-based and most water-related options, will decrease with increasing warming. The feasibility and effectiveness of options increase with integrated, multi-sectoral solutions that differentiate responses based on climate risk, cut across systems, and address social inequities. As adaptation options often have long implementation times, long-term planning increases their efficiency. (high confidence) {3.2, Figure 3.4, 4.1, 4.2} (*IPCC Summary* p. 19.)

## 5. UN Emissions Gap Report 2023

There is the United Nations Environment Programme (2023), *Emissions Gap Report 2023: Broken Record – Temperatures hit new highs, yet world fails to cut emissions (again)*.. Nairobi. <https://doi.org/10.59117/20.500.11822/43922>, published November 20, 2023. A copy of the UN Emissions Gap Report is provided to DWR as **Exhibit 12**.<sup>14</sup>

Inger Andersen, Executive Director, UN Environment Programme, explains in the first 2 paragraphs of the Report's Forward,

Humanity is breaking all the wrong records when it comes to climate change. Greenhouse gas emissions reached a new high in 2022. In September 2023, global average temperatures were 1.8°C above pre-industrial levels. When this year is over, according to the European Union's Copernicus Climate Change Service, it is almost certain to be the warmest year on record.

The 2023 edition of the Emissions Gap Report tells us that the world must change track, or we will be saying the same thing next year – and the year after, and the year after, like a broken record. The report finds that fully implementing and continuing mitigation efforts of unconditional nationally determined contributions (NDCs) made under the Paris Agreement for 2030 would put the world on course for limiting temperature rise to 2.9°C this century. Fully implementing conditional NDCs would lower this to 2.5°C. Given the intense climate impacts we are already seeing, neither outcome is desirable. (UN Emissions Gap Report p. XV.)

The UN Report's Executive Summary includes alarming new information,

The world is witnessing a disturbing acceleration in the number, speed and scale of broken climate records. At the time of writing, 86 days have been recorded with temperatures exceeding 1.5°C above pre-industrial levels this year. Not only was September the hottest month ever, it also exceeded the previous record by an unprecedented 0.5°C, with global average temperatures at 1.8°C above pre-industrial levels. These records were accompanied by devastating extreme events, which the Intergovernmental Panel on Climate Change (IPCC) has warned us are merely a meek beginning. (UN Emissions Gap Report p. XVI.)

And,

As this report shows, not only temperature records continue to be broken – global GHG emissions and atmospheric concentrations of carbon dioxide (CO<sub>2</sub>) also set new records in 2022. Due to the failure to stringently reduce emissions in high-income and high-emitting countries (which bear the greatest responsibility for past emissions) and to limit emissions growth in low- and middle-income countries (which account for the majority of current emissions), unprecedented action is now needed by all countries. (*Id.*)

The UN Report adds,

If current policies are continued, global warming is estimated to be limited to 3°C. Delivering on all unconditional and conditional pledges by 2030 lowers this estimate to 2.5°C, with the additional fulfilment of all net-zero pledges bringing it to 2°C

A continuation of the level of climate change mitigation efforts implied by current policies is estimated to limit global warming to 3°C (range: 1.9–3.8°C) throughout the century with a 66 per cent chance. Warming is expected to increase further after 2100 as CO<sub>2</sub> emissions are not yet projected to reach net-zero levels. (UN Emissions Gap Report p. XXII.)

It is good to hope that the countries on the planet will act to drastically reduce greenhouse gas emissions to limit climate change. Hope, however, is not a plan. There is a substantial risk that current policies will be maintained. There is enormous, powerful opposition to cutting back on fossil fuels. The UN Report shows that there is a 66 per cent chance that global warming will be to 3°C this century under current policies. The “*Broken Record, Temperatures hit new highs, yet world fails to cut emissions (again)*” Report by the United Nations and the other 12 Exhibits and the *Auditor Report* must be taken into account by DWR in planning a long lifespan Project such as the Delta Conveyance Project.

It will be a clear violation of the CEQA requirement that “an agency must use its best efforts to find out and disclose all that it reasonably can” in an EIR if DWR does not prepare a revised Draft EIR disclosing the enormity of the climate change risk to the Delta environment *coupled with* actually diverting the freshwater flows for the Delta Conveyance Project. Disclosure is also required to Project ratepayers that the Project may not operate much if at all given worsening climate change *coupled with* the Water Board’s recent Bay-Delta Plan updates

showing that exports must be reduced to increase freshwater flows through the Delta.

## II. DWR FAILED TO MAKE THE REQUIRED FULL ENVIRONMENTAL DISCLOSURE IN THE DRAFT EIR

Our organizations pointed out in our December 15, 2022, comment letter that DWR failed to make the required full environmental disclosure in its Draft EIR. (Sierra Club California et al. Comment Letter, pp. 15-16.)

The title of CEQA Guideline § 15151 is “Standards for Adequacy of an EIR.”<sup>15</sup> The last sentence of CEQA Guideline section 15151 states, “The courts have looked not for perfection but for adequacy, completeness, *and a good faith effort at full disclosure.*” (Emphasis added.) “‘While foreseeing the unforeseeable is not possible, *an agency must use its best efforts to find out and disclose all that it reasonably can.*’ (Guidelines, § 15144.)” (*Banning Ranch Conservancy v. City of Newport Beach* (2017) 2 Cal. 5<sup>th</sup> 918, 938) (Emphasis added.)

The National Oceanic and Atmospheric Administration (NOAA) Application Guide for the 2022 Sea Level Rise Technical Report explains, “when planning a project with a long lifespan (beyond 2050) with a low tolerance for risk, choosing the higher SLR [sea level rise] scenarios that are less likely to be exceeded, would result in greater risk avoidance.” (p. 24.)

As our organization said in our December 15, 2022, comments, DWR’s Draft EIR claims climate change,

is not considered an environmental impact under CEQA.” (**Draft EIR**, Ch. 4, p. 4-3.) Thus, Chapter 30 on Climate Change, does “not determine the level of significance of change.” (*Id.*) “[N]o CEQA significance conclusions are presented for potential impacts [after 2040], and no potential measures are recommended to reduce potential impacts” after 2040. (**Draft EIR**, Ch. 4, pp. 4-5, -6.) DWR’s hydrologic modeling primarily focused on conditions in 2040. (**Draft EIR**, Ch. 30, Climate Change, pp. 30-2, -24, -25.)

That means DWR’s Draft EIR fails to include any consideration of climate change impacts when the project is projected to actually begin operations and diverting enormous quantities of water in the face of reduced freshwater flows and increasing sea level rise.

According to the Draft EIR, the project would become operational in 2040. (**Draft EIR**, Ch. 30, p. 30-20.) So, DWR's Draft EIR fails to disclose the combination of climate change and Delta Conveyance Project operations to worsen and exacerbate surface water conditions in the already impaired Delta. (Sierra Club California et al. Comment Letter, p. 13.)

The new information about worsening climate change makes even clearer the failure of DWR's Draft EIR to disclose the risks posed to surface water conditions in the Delta and to listed fish species by the combination of climate change and Delta Conveyance Project operations.

### **III. THE ADDITIONAL SIGNIFICANT NEW INFORMATION REQUIRES REVISION OF THE DRAFT EIR AND RECIRCULATION FOR PUBLIC REVIEW AND COMMENT**

The *Auditor Report* about DWR's inadequate response to climate change impacts on water constitutes significant new information that must be added to DWR's Delta Conveyance Project (DCP) Draft EIR. The new Technical Reports discussed in these Supplemental Comments show that we are in a climate change crisis.

The new information in the *Auditor Report* as shown above is that "climate researchers project that the effects of climate change will continue to increase, causing greater fluctuation in rainfall patterns and severe weather --including prolonged drought." (*Auditor Report* p. 11.)

The new climate change information shows that new significant environmental impacts would result from the Project, there would be a substantial increase in the severity of environmental impacts resulting from the Project, and there are significant risks to Delta water quality, listed fish species, and public health that are not disclosed in DWR's Draft EIR. There are also significant risks that if the Project is constructed it may not be able to operate very much or at all. The new information including these risks must be added to the EIR.

The courts have held with respect to climate change that CEQA requires public agencies to ensure their analyses "stay in step with the evolving scientific knowledge in state regulatory schemes." (*Cleveland National Forest Foundation v. San Diego Assn. of Governments* (2017) 3 Cal.5<sup>th</sup> 497, 504; *County of Butte v. Department of Water Resources* (2023) 90 Cal.App.5<sup>th</sup> 147, 161.) An agency's

approach that may be legally adequate at one point in time may not “necessarily be sufficient going forward.” (*Cleveland National Forest Foundation*, 3 Cal.5<sup>th</sup> 497, 504.)

So, DWR must revise the Draft EIR to include the significant new information and recirculate the revised Draft EIR for public review and comment in order to comply with CEQA. (Pub. Res. Code § 21092.1; CEQA Guideline § 15088.5(a); *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4<sup>th</sup> 412, 447-449 (potentially significant impact of reduced river flows on aquatic species, including migrating salmon.)<sup>16</sup>

Our organizations December 15, 2022, comment letter pointed out that DWR claimed its first objective for the Delta Conveyance Project was to address the consequences of climate change. (Sierra Club California et al. Comment Letter, pp. 13-15.) Despite that objective, DWR said in its Draft EIR that climate change “is not considered an environmental impact under CEQA.” (*Id.* p. 13 quoting **Draft EIR**, Ch. 4, p. 4-3.) Our December 15, 2022, comment letter continued, “Thus, Chapter 30 on Climate Change, does ‘not determine the level of significance of change.’ (*Id.*) ‘[N]o CEQA significance conclusions are presented potential impacts’ after 2040. (**Draft EIR**, Ch. 4, pp. 4-5, 6.) DWR’s hydrologic modeling primarily focused on conditions in 2040. (**Draft EIR**, Ch. 30, Climate Change, pp. 30-2, -24, -25.)” (Sierra Club California et al. Comment Letter, p. 13, December 15, 2022.)

Our organizations December 15, 2022, comment letter explained,

According to the Draft EIR, the project would become operational in 2040. (**Draft EIR**, Ch. 30, p. 30-20.) So, DWR’s Draft EIR fails to disclose the combination of climate change and Tunnel Project operations that would worsen and exacerbate surface water conditions in the already impaired Delta. The Draft EIR says, ‘After the initial inspection, tunnel inspections could be completed once every 10 years for the first 50 years and every 5 years after 50 years from initial operation.’ (**Draft EIR**, Ch. 3, p. 3-27.) The massive and expensive Tunnel Project is expected to operate an exceptionally long time. The Draft EIR, however, includes no assessment of environmental impacts during operations in the face of ever worsening climate change caused conditions. (Sierra Club California et al. Comment Letter, p. 13, December 15, 2022.)

The new climate change information in the Technical Reports and Articles that are Exhibits to this comment letter add to the information and circumstances requiring revision of the Draft EIR.

Our organizations October 30, 2023, supplemental comment letter explained that DWR must revise the Draft EIR to include the significant new information contained in the State Water Resources Control Board (Water Board) Draft *Staff Report/Substitute Environmental Document in Support of Potential Updates to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary for the Sacramento River and its Tributaries, Delta Eastside Tributaries, and Delta (Staff Report/ SED.)* (Sierra Club et al. Supplemental Comment Letter October 30, 2023.) Among the issues raised in that supplemental comment letter that must be addressed in a Revised Draft EIR, our organizations pointed out,

The *Staff Report/SED* raises the possibility the proposed Delta Conveyance Project could become a stranded asset; with billions of dollars of ratepayers' money being used to pay for a Project that cannot be used or cannot be used very much because of the requirement to increase, not reduce, Delta outflows. That makes the need for the public to have an accurate benefit-cost analysis while reviewing a revised Draft EIR to be able to compare the risks of the Delta Conveyance Project with conservation, recycling, desalination, and other alternatives imperative. (Sierra Club California et al. Supplemental Comment Letter p. 15, October 30, 2023.)<sup>17</sup>

Our organizations explained the need to address the effects of project operations on water quality and public health including worsening harmful algal blooms in our comment letter of December 15, 2022 (Sierra Club California et al. Comment Letter, pp. 49-53), and in our supplemental comment letters of June 29, 2023 (Sierra Club California et al. Supplemental Comment Letter, pp. 6-9, 19-20), and of October 30, 2023's (Sierra Club Supplemental California et al. Comment Letter, pp. 5-7, 14.)

DWR must prepare a Revised Draft EIR to *disclose* and evaluate the effects that worsening climate change *coupled* with Delta Conveyance Project operations pose to surface water, water supply, listed fish species, and public health including worsening harmful algal blooms.

The Revised Draft EIR must also *disclose* and assess the risk that worsening climate change *coupled* with updated Water Board requirements to reduce exports in order to increase freshwater flows through the Delta may result in a constructed, expensive Delta Conveyance Project that may not be able to operate over the long-term starting in 2040 much if at all.

Our organizations pointed out in previous comment letters that DWR's Draft EIR violated the CEQA requirement to include the required range of reasonable alternatives. (Sierra Club California et al. Comment Letter, pp. 17-31, December 15, 2022); (Sierra Club California et al. Supplemental Comment Letter, pp. 12-13, 20-21, June 29, 2023); Sierra Club California et al. Supplemental Comment Letter, pp. 10-11, 14, October 30, 2023.) For example, DWR confined the Draft EIR to nine variations of Tunnel alternatives; "the same Delta Conveyance Project dressed up in different outfits." (Sierra Club California et al. Comment Letter, p 18, December 15, 2022.) DWR's Draft EIR failed to include any alternatives that should have been included under related regulatory policies set forth in the Delta Reform Act, California Endangered Species Act, and the Climate Change Legislation. (*Id.* pp. 19-24.)

The new information set forth in the *Auditor Report* and new Technical Reports *coupled* with information set forth in the Water Board's *Staff Report/SED* adds overwhelming support to the CEQA requirement that DWR's Draft EIR must be revised to address significant new information.

There are major uncertainties facing the Project including worsening climate change impacts on water supply and sea level rise, *coupled with* the need to reduce exports in order to increase freshwater flows through the Delta set forth in the Water Board's *Staff Report/SED*. And then there is the continued refusal of DWR to provide a benefit cost evaluation of the Project during the review period for the Draft EIR. If the project is constructed but cannot be operated much if at all, untold billions of dollars will have been taken from ratepayers to pay the contractors chosen to construct a massive stranded asset.

As pointed out earlier in this letter, when planning a project with a long lifespan beyond 2050, with a low tolerance for risk, choosing higher sea level rise scenarios that are less likely to be exceeded results in greater risk avoidance. (NOAA Application Guide p. 24.)

Central Valley Project (CVP) big agriculture contractors have *not* chosen to participate in the Delta Conveyance Project. The CVP contractors – in contrast to residential and small business ratepayers--have the financial ability to hire their own experts to evaluate Project risks and conduct their own benefit cost analysis. It is not unreasonable to suspect that DWR is attempting to deceive the public and residential and small business ratepayers if it does *not* issue a Revised Draft EIR *disclosing* the new information about the risks facing both the Delta and Delta residents and users, *and* ratepayers, if this Project is approved and constructed.

“The principle is fundamental that ‘[d]eceipt may be negative as well as affirmative; it may consist of suppression of that which it is one’s duty to declare as well as the declaration of that which is false.’” (*Lingsch v. Savage* (1963) 213 Cal.App.2d 729, 735.) In any event, DWR’s Draft EIR without being revised and recirculated for public review *is the opposite* of the “good faith effort at full disclosure” required by CEQA.

## CONCLUSION

The new significant information set forth in the Exhibits to this supplemental comment letter add to the requirement that DWR prepare a revised Draft EIR and recirculate it for public review and comment. The contact for this supplemental comment letter is E. Robert Wright, Counsel, Sierra Club California (916) 557-1104 or [bwrightatty@gmail.com](mailto:bwrightatty@gmail.com) . We will do our best to answer any questions you may have.

Sincerely,



E. Robert Wright, Counsel  
Sierra Club California



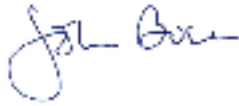
Brandon Dawson, Director  
Sierra Club California



Howard Penn, Executive Director  
Planning and Conservation League



Conner Everts, Facilitator  
Environmental Water Caucus



*John Buse, Senior Counsel  
Center for Biological Diversity*



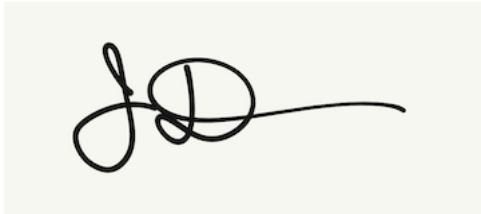
*Carolee Krieger, Executive Director  
California Water Impact Network*



*Barbara Vlamis, Executive Director  
AquAlliance*



*Chris Shutes, Executive Director  
California Sportfishing Protection  
Alliance*



*Jann Dorman, Executive Director  
Friends of the River*



*Barbara Barrigan-Parrilla, Executive  
Director, Restore the Delta*



*Deirdre Des Jardins, Director  
California Water Research*

cc. [deltaconveyance@water.ca.gov](mailto:deltaconveyance@water.ca.gov)  
[Thomas.Gibson@water.ca.gov](mailto:Thomas.Gibson@water.ca.gov)  
[Kathryn.Icelow@water.ca.gov](mailto:Kathryn.Icelow@water.ca.gov)  
[Diane.Riddle@waterboards.ca.gov](mailto:Diane.Riddle@waterboards.ca.gov)  
[Paige.Uttley@wildlife.ca.gov](mailto:Paige.Uttley@wildlife.ca.gov)  
[Edmund.Yu@deltacouncil.ca.gov](mailto:Edmund.Yu@deltacouncil.ca.gov)  
[DeltaCouncilSB@deltacouncil.ca.gov](mailto:DeltaCouncilSB@deltacouncil.ca.gov)  
[DLL-DCP-EIS@usace.army.mil](mailto:DLL-DCP-EIS@usace.army.mil)  
[Zachary.M.Simmons@usace.army.mil](mailto:Zachary.M.Simmons@usace.army.mil)

[Deborah.L.Lewis2@army.mil](mailto:Deborah.L.Lewis2@army.mil)  
[Chan.Janice@epa.gov](mailto:Chan.Janice@epa.gov)  
[Gordon.Stephanies@epa.gov](mailto:Gordon.Stephanies@epa.gov)  
[amanda.cranford@noaa.gov](mailto:amanda.cranford@noaa.gov)  
[evan.sawyer@noaa.gov](mailto:evan.sawyer@noaa.gov)  
[jana\\_Affonso@fws.gov](mailto:jana_Affonso@fws.gov)

### **Exhibits on the link and provided to DWR:**

- 1 NOAA NCEI Monthly Global Climate Report for September 2023
- 2 Indicators of Global Climate Change (IGCC) 2022: annual update
- 3 Recent acceleration in global ocean heat accumulation
- 4 State of the Cryosphere 2023 Report
- 5 Mass Balance of Greenland and Antarctic Ice Sheets
- 6 Record Low Antarctic Sea Ice
- 7 Rapid disintegration and weakening of ice shelves in North Greenland
- 7a Future loss of Arctic sea-ice cover could drive a substantial decrease in California's rainfall
- 8 Abyssal ocean overturning slowdown and warming driven by Antarctic meltwater
- 9 Warning of a forthcoming collapse of the Atlantic meridional overturning circulation
- 10 Interbasin and interhemispheric impacts of a collapsed Atlantic Overturning Circulation
- 11 IPCC Climate Change 2023, Synthesis Report
- 12 UN Emissions Gap Report

### **Endnotes**

---

<sup>1</sup> Lapides, Dana A., W. Jesse Hahm, Daniella M. Rempe, John Whiting, and David N. Dralle. 2022. Causes of Missing Snowmelt Following Drought. *Geophysical Research Letters*. 49(19):e2022GL100505. doi:10.1029/2022GL100505. [accessed 2023 Jan 27]. <https://onlinelibrary.wiley.com/doi/abs/10.1029/2022GL100505..>

<sup>2</sup> Lemus, Sonia. 2023. MEETING NOTES: Wheeler Ridge-Maricopa Water Storage District directors frustrated by state's "miscalculation" of carry over water. SJV Water. [accessed 2023 Nov 20]. <https://sjvwater.org/meeting-notes-wheeler-ridge-maricopa-water-storage-district-directors-frustrated-by-states-miscalculation-of-carry-over-water/>.

<sup>3</sup> NOAA National Centers for Environmental Information. 2023. "Monthly Global Climate Report for September 2023." National Centers for Environmental Information (NCEI) Climate Monitoring. October 2023. <https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202309>. (Exhibit 1).

---

<sup>4</sup> Forster, Piers M., Christopher J. Smith, Tristram Walsh, William F. Lamb, Robin Lamboll, Mathias Hauser, Aurélien Ribes, et al. 2023. “Indicators of Global Climate Change 2022: Annual Update of Large-Scale Indicators of the State of the Climate System and Human Influence.” *Earth System Science Data* 15 (6): 2295–2327. <https://doi.org/10.5194/essd-15-2295-2023>. **(Exhibit 2).**

Complete list of authors: Piers M. Forster, Christopher J. Smith, Tristram Walsh, William F. Lamb, Robin Lamboll, Mathias Hauser, Aurélien Ribes, Debbie Rosen, Nathan Gillett, Matthew D. Palmer, Joeri Rogelj, Karina von Schuckmann, Sonia I. Seneviratne, Blair Trewin, Xuebin Zhang, Myles Allen, Robbie Andrew, Arlene Birt, Alex Borger, Tim Boyer, Jiddu A. Broersma, Lijing Cheng, Frank Dentener, Pierre Friedlingstein, José M. Gutiérrez, Johannes Gütschow, Bradley Hall, Masayoshi Ishii, Stuart Jenkins, Xin Lan, June-Yi Lee, Colin Morice, Christopher Kadow, John Kennedy, Rachel Killick, Jan C. Minx, Vaishali Naik, Glen P. Peters, Anna Pirani, Julia Pongratz, Carl-Friedrich Schleussner, Sophie Szopa, Peter Thorne, Robert Rohde, Maisa Rojas Corradi, Dominik Schumacher, Russell Vose, Kirsten Zickfeld, Valérie Masson-Delmotte, and Panmao Zhai

<sup>5</sup> Li, Zhi, Matthew H. England, and Sjoerd Groeskamp. 2023. “Recent Acceleration in Global Ocean Heat Accumulation by Mode and Intermediate Waters.” *Nature Communications* 14 (1): 6888. <https://doi.org/10.1038/s41467-023-42468-z> **(Exhibit 3).**

<sup>6</sup> ICCI, 2023. *State of the Cryosphere 2023 – Two Degrees is Too High*. International Cryosphere Climate Initiative (ICCI), Stockholm, Sweden. 62 pp. **(Exhibit 4.)** The scientific reviewers are:

**The Hope of Low Emission Pathways and Cryosphere:** Julie Brigham-Grette, University of Massachusetts Amherst, Andrea Dutton, University of Wisconsin-Madison, Matthew Gidden, IIASA, Joeri Rogelj, IPCC CLA AR5, SR1.5 and AR6, Imperial College, London, Martin Siebert, University of Exeter, Michiel Schaeffer, GAI, IPCC AR5, Drew Shindell, IPCC CLA SR1.5, Duke University.

**Ice Sheets and Sea-level Rise:** Richard B. Alley, Pennsylvania State University, IPCC AR2, AR3, AR4, Jonathan Bamber, University of Bristol, IPCC AR6 WG1, AR5, Review Editor, AR4 Review Editor, Julie Brigham-Grette, University of Massachusetts-Amherst, Robert DeConto, University of Massachusetts-Amherst, IPCC, SROCC, Andrea Dutton, University of Wisconsin-Madison, IPCC SROCC, Carlota Escutia, Spanish High Council for Scientific Research and University of Granada, Carl-Friedrich Schleussner, Climate Analytics, Martin Siebert, University of Exeter, Michael Schaeffer, IPCC AR5 LA, Global Center on Adaptation, IPCC, AR5, Chris Stokes, Durham University, [Roderik van de Wal, Utrecht University, IPCC AR3, AR4, AR5, Review Editor, SROCC]

**Mountain Glaciers and Snow:** Carolina Adler, Mountain Research Initiative, Lead Author IPCC, AR6 WGII and SROCC, Gudfinna Adalgeirsdottir, University of Iceland, IPCC AR6, Daniel Farinotti, ETH-Zurich, WSL, Matthias Huss, ETH-Zurich, WSL, Regine Hock, University of Oslo, Norway, University of Alaska, Fairbanks, IPCC AR4, SROCC coordinating Lead Author, AR6, Miriam Jackson, ICIMOD, IPCC AR6, Georg Kaser, University of Innsbruck, IPCC AR4, AR5, SROCC, and AR6 Review Editor, Michael Lehning, EPFL, IPCC SROCC, Ben Marzeion, University of Bremen, IPCC AR5, SROCC, AR5, and AR6 WG1, Fabien Maussion, University of Bristol, Ben Orlove, Columbia University, IPCC SROCC, AR6 WG2, David Rounce, Carnegie Mellon University, Heidi Sevestre, University of Svalbard, Heidi Steltzer, Fort Lewis College, IPCC SROCC, Philippus Wester, IPCC AR6 WG2

**Permafrost:** Benjamin W. Abbott, Brigham Young University, Julia Boike, Alfred Wegener Institute (AWI), Sarah Chadburn, University of Exeter, Gustaf Hugelius, Bolin Centre for Climate Research, Stockholm University, Hugues Lantuit, AWI, Susan Natali, Woodwell Climate Research Center, Paul Overduin, AWI, Vladimir Romanovsky, University of Alaska-Fairbanks, Christina Schadel, Woodwell Climate Research Center, Ted Schuur, IPCC LA SROCC, Northern Arizona University, Merritt Turetsky, INSTAAR / University of Guelph

**Sea Ice:** Jennifer Francis, Woodwell Climate Research Center, Ronald Kwok, Polar Science Center, Applied Physics Laboratory, University of Washington, Robbie Mallett, University of Manitoba, Walt Meier, National Snow and Ice Data Center, Dirk Notz, University of Hamburg, Germany, Martin Sommerkorn, IPCC SROCC CLA, WWF-Arctic Julianne Stroeve, University College London/University of Manitoba/NSIDC, Paul Wassmann, UiT - The Arctic University of Norway (emeritus)

**Polar Ocean Acidification, Warming and Freshening:** Nina Bednaršek, National Institute of Biology, Slovenia, Richard Bellerby, East China Normal University/Norwegian Institute for Water Research, Elise S. Droste, Alfred Wegener Institute (AWI) Helmholtz Centre for Polar and Marine Research, Sam Dupont, University of Gothenburg,

---

Helen S. Findlay, Plymouth Marine Laboratory, Humberto E. Gonzalez, University Austral of Chile/Fondap IDEAL, Sian Henley, University of Edinburgh, Peter Thor, Swedish Meteorological and Hydrological Institute (SMHI), Paul Wassmann, UiT – The Arctic University of Norway (Emeritus)  
**Chapter Editors (ICCI):** James Kirkham (Ice Sheets, Sea Ice, Mountain Glaciers and Snow), Lydie Lescarmontier (Polar Oceans), Amy Imdieke (Permafrost), Morgan Seag (Mountain Glaciers and Snow).

<sup>7</sup> Purich, Ariaan, and Edward W. Doddridge. 2023. “Record Low Antarctic Sea Ice Coverage Indicates a New Sea Ice State | Communications Earth & Environment.” *Communications Earth & Environment* 4 (1): 314. <https://doi.org/10.1038/s43247-023-00961-9>. **(Exhibit 6).**

<sup>8</sup> Millan, R., E. Jager, J. Mouginit, M. H. Wood, S. H. Larsen, P. Mathiot, N. C. Jourdain, and A. Bjørk. 2023. “Rapid Disintegration and Weakening of Ice Shelves in North Greenland.” *Nature Communications* 14 (1): 6914. <https://doi.org/10.1038/s41467-023-42198-2>. **(Exhibit 7).**

<sup>9</sup> Cvijanovic, Ivana, Benjamin D. Santer, Céline Bonfils, Donald D. Lucas, John C. H. Chiang, and Susan Zimmerman. 2017. “Future Loss of Arctic Sea-Ice Cover Could Drive a Substantial Decrease in California’s Rainfall.” *Nature Communications* 8 (1): 1947. <https://doi.org/10.1038/s41467-017-01907-4>. **(Exhibit 7a).** The article was published 5 years before DWR issued the Draft EIR. It is included because it shows how the accelerating melting of Arctic sea ice has affected or can affect precipitation in California.

<sup>10</sup> Li, Qian, Matthew H. England, Andrew McC Hogg, Stephen R. Rintoul, and Adele K. Morrison. 2023. “Abyssal Ocean Overturning Slowdown and Warming Driven by Antarctic Meltwater.” *Nature* 615 (7954): 841–47. <https://doi.org/10.1038/s41586-023-05762-w>. **(Exhibit 8).**

<sup>11</sup> Ditlevsen, Peter, and Susanne Ditlevsen. 2023. “Warning of a Forthcoming Collapse of the Atlantic Meridional Overturning Circulation.” *Nature Communications* 14 (1): 4254. <https://doi.org/10.1038/s41467-023-39810-w>. **(Exhibit 9).**

<sup>12</sup> Orihuela-Pinto, Bryam, Matthew H. England, and Andréa S. Taschetto. 2022. “Interbasin and Interhemispheric Impacts of a Collapsed Atlantic Overturning Circulation.” *Nature Climate Change* 12 (6): 558–65. <https://doi.org/10.1038/s41558-022-01380-y>. **(Exhibit 10).**

<sup>13</sup> IPCC, 2023: Summary for Policymakers. In: *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, Hoesung Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 1-34, doi: 10.59327/IPCC/AR6-9789291691647.001. [https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC\\_AR6\\_SYR\\_SPM.pdf](https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf). **(Exhibit 11).**

The Core Writing Team for the Synthesis Report was: Hoesung Lee (Chair), Katherine Calvin (USA), Dipak Dasgupta (India/USA), Gerhard Krinner (France/Germany), Aditi Mukherji (India), Peter Thorne (Ireland/United Kingdom), Christopher Trisos (South Africa), José Romero (Switzerland), Paulina Aldunce (Chile), Ko Barrett (USA), Gabriel Blanco (Argentina), William W. L. Cheung (Canada), Sarah L. Connors (France/United Kingdom), Fatima Denton (The Gambia), Aïda Diongue-Niang (Senegal), David Dodman (Jamaica/United Kingdom/Netherlands), Matthias Garschagen (Germany), Oliver Geden (Germany), Bronwyn Hayward (New Zealand), Christopher Jones (United Kingdom), Frank Jotzo (Australia), Thelma Krug (Brazil), Rodel Lasco (Philippines), June-Yi Lee (Republic of Korea), Valérie Masson-Delmotte (France), Malte Meinshausen (Australia/Germany), Katja Mintenbeck (Germany), Abdalah Mokssit (Morocco), Friederike E. L. Otto (United Kingdom/Germany), Minal Pathak (India), Anna Pirani (Italy), Elvira Poloczanska (United Kingdom/Australia), Hans-Otto Pörtner (Germany), Aromar Revi (India), Debra C. Roberts (South Africa), Joyashree Roy (India/Thailand), Alex C. Ruane (USA), Jim Skea (United Kingdom), Priyadarshi R. Shukla (India), Raphael Slade (United Kingdom), Aimée Slangen (The Netherlands), Youba Sokona (Mali), Anna A. Sörensson (Argentina), Melinda Tignor (USA/Germany), Detlef van Vuuren (The Netherlands), Yi-Ming Wei (China), Harald Winkler (South Africa), Panmao Zhai (China), Zinta Zommers (Latvia).

---

<sup>14</sup> The UN Emissions Gap Report authors and other contributors are:

## Chapter 1

Authors: Anne Olhoff (CONCITO – Denmark’s green think tank, Denmark) and John Christensen (UNEP-CCC, Denmark)

## Chapter 2

Lead authors: William F. Lamb (Mercator Research Institute on Global Commons and Climate Change, Germany; University of Leeds, United Kingdom of Great Britain and Northern Ireland) and Minal Pathak (Ahmedabad University, India)

Contributing authors: Lucas Chancel (World Inequality Lab, Paris School of Economics, France), Monica Crippa (European Commission, Joint Research Centre [JRC], Italy), Giacomo Grassi (European Commission, JRC, Italy), Diego Guizzardi (European Commission, JRC, Italy), Jing Meng (University College London, United Kingdom), Glen P. Peters (CICERO Center for International Climate Research, Norway) and Julia Pongratz (Ludwig-Maximilians University Munich, Germany)

## Chapter 3

Lead authors: Takeshi Kuramochi (NewClimate Institute, Germany), Michel den Elzen (PBL Netherlands Environmental Assessment Agency, the Netherlands) and Taryn Fransen (World Resources Institute, United States of America)

Contributing authors: Jesse Burton (University of Cape Town and E3G, South Africa), Ioannis Dafnomilis (PBL Netherlands Environmental Assessment Agency, the Netherlands), Ipek Gençsü (ODI, United Kingdom), Archie Gilmour (ODI, United Kingdom), Mariana Gutiérrez Grados (Climate Transparency, Germany), Frederic Hans (NewClimate Institute, Germany), Sarah Heck (Climate Analytics, Germany), Niklas Höhne (NewClimate Institute, Germany), Camilla Hyslop (Oxford University, United Kingdom), Anna Kanduth (Canadian Climate Institute, Canada), Ben King (Rhodium Group, United States of America), Hannah Kolus (Rhodium Group, United States of America), Ho-Mi Lee (Korea Energy Economics Institute, Republic of Korea), Jared Lewis (Climate Resource, Australia), Swithin Lui (NewClimate Institute, Germany), Natasha Lutz (Oxford University, United Kingdom), Andrew Marquard (University of Cape Town, South Africa), Silke Mooldijk (NewClimate Institute, Germany), Leonardo Nascimento (NewClimate Institute, Germany), Analuz Presbítero (Iniciativa Climática de México [ICM], Mexico), Jazmín Rocco Predassi (Farn, Argentina), Joeri Rogelj (Imperial College London, United Kingdom; International Institute for Applied Systems Analysis [IIASA], Austria), Clea Schumer (World Resources Institute, United States of America), Alister Self (Climate Resource, Australia), Kentaro Tamura (Institute for Global Environmental Strategies [IGES], Japan) and Jorge Villarreal (ICM, Mexico)

Data contributors: Johannes Gütschow (Potsdam Institute for Climate Impact Research, Germany), Christopher Henderson (World Resources Institute, United States of America), Elena Hooijschuur (PBL Netherlands Environmental Assessment Agency, the Netherlands), Kimon Keramidas (European Commission, JRC, Spain), Mia Moisiu (NewClimate Institute, Germany), Mika Pflüger (Climate Resource, Germany) and Claire Stockwell (Climate Analytics, Germany)

## Chapter 4

Lead authors: Joeri Rogelj (Imperial College London, United Kingdom; IIASA, Austria), Michel den Elzen (PBL Netherlands Environmental Assessment Agency, the Netherlands) and Joana Portugal-Pereira (Graduate School of Engineering [COPPE], Universidade Federal do Rio de Janeiro, Brazil)

Contributing authors: Taryn Fransen (World Resources Institute, United States of America), Jarmo Kikstra (Imperial College London, United Kingdom), Robin Lamboll (Imperial College London, United Kingdom), Malte Meinshausen (University of Melbourne, Australia) and Isabela Schmidt Tagomori (PBL Netherlands Environmental Assessment Agency, the Netherlands)

Data contributors: Ioannis Dafnomilis (PBL Netherlands Environmental Assessment Agency, the Netherlands) and Kimon Keramidas (European Commission, JRC, Spain)

## Chapter 5

Lead authors: Jesse Burton (University of Cape Town and E3G, South Africa) and Greg Muttitt (International Institute for Sustainable Development [IISD], United Kingdom)

Contributing authors: Fatima Denton (United Nations University Institute for Natural Resources in Africa, Ghana), Sivan Kartha (Stockholm Environment Institute, United States of America), Narasimha Rao (Yale School of the Environment, Yale University, United States of America), Joeri Rogelj (Imperial College London, United Kingdom; IIASA, Austria), Saritha Sudharmma Vishwanathan (Indian Institute of Management Ahmedabad, India; National Institute for Environmental Studies, Japan), Dan Tong (Tsinghua University, China), Marta Torres Gunfaus (IDDRI, France) and William Wills (Centro Brasil no Clima, Brazil; Eos Consulting, Brazil)

## Chapter 6

Lead authors: Narasimha Rao (Yale School of the Environment, Yale University, United States of America) and Yacob Mulugetta (University College London, United Kingdom)

Contributing authors: Jesse Burton (University Cape Town and E3G, South Africa), Joisa Dutra Saraiva (Getulio Vargas Foundation [FGV], Brazil), Ashwin Gambhir (Prayas Energy Group, India), Jessica Omukuti (University of Oxford, United

---

Kingdom), Nadia S. Ouedraogo (United Nations Economic Commission for Africa [UNECA], Ethiopia), Setu Pelz (IIASA, Austria), Fei Teng (Tsinghua University, China) and Meron Tesfamichael (University College London, United Kingdom)

## Chapter 7

Lead authors: Oliver Geden (German Institute of International and Security Affairs, Germany), Mai Bui (Imperial College London, United Kingdom), Matthew Gidden (IIASA, Austria) and Mercedes Bustamante (Universidade de Brasília, Brazil)

Contributing authors: Holly Buck (State University of New York at Buffalo, United States of America), Sabine Fuss (Mercator Research Institute on Global Commons and Climate Change, Germany), Jan Minx (Mercator Research Institute on Global Commons and Climate Change, Germany), Gregory Nemet (University of Wisconsin-Madison, United States of America), Joana Portugal-Pereira (COPPE, Universidade Federal do Rio de Janeiro, Brazil), Gaurav Ganti (Climate Analytics, Germany), Stephanie Roe (World Wide Fund for Nature [WWF], United States of America), Steve Smith (University of Oxford, United Kingdom), and Julia Pongratz (University of Munich and Max Planck Institute for Meteorology, Germany)

## Reviewers

Muna Alamoodi (Ministry of Climate Change and Environment, United Arab Emirates), Jesica Lelynn Andrews (UNEP Finance Initiative), Oluleke Babayomi (Shandong University), Juliane Berger (German Environment Agency), Marie Blanche Ting (UNEP-CCC), Pierre Boileau (UNEP), Olivier Bois von Kursk (IISD), Raymond Brandes (UNEP), Ruta Bubniene (Secretariat of the UNFCCC), David Carlin (UNEP Finance Initiative), Rob Dellink (Organisation for Economic Co-operation and Development [OECD]), Subash Dhar (UNEP-CCC), Paul Dowling (European Commission), Swati Dsouza (International Energy Agency [IEA]), Simon Evans (Carbon Brief), Ivetta Gerasimchuk (IISD), Niklas Hagelberg (UNEP), Yasuko Kameyama (University of Tokyo), Maarten Kappelle (UNEP), Alaa Al Khourdajie (Imperial College London), Thaddeus Idi Kiplimo (UNEP), Andrea Klaric (European Commission), Gabriel Labbate (UNEP), Kate Larsen (Rhodium Group), Gerd Leipold (Climate Transparency), Jian Liu (UNEP), Bert Metz (independent), Bavelyne Mibei (UNEP), Shonali Pachauri (IIASA), María Paz Cigaran (Libélula), Balakrishna Pisupati (UNEP), Dan Plechaty (ClimateWorks Foundation), Rula Qalyoubi (UNEP), Mark Radka (independent), Zoltán Rakonczay (European Commission), Andy Reisinger (Independent), Jade Roberts Maron (UNEP), Yann Robiou du Pont (Climate Energy College, Utrecht University), Gregor Semieniuk (University of Massachusetts Amherst), Yuli Shan (University of Birmingham), Katia Simeonova (independent), Jim Skea (Imperial College London/IPCC), Youba Sokona (IPCC), Masahiro Sugiyama (University of Tokyo), Oksana Tarasova (WMO), Iman Ustadi (Office of the UAE Special Envoy for Climate Change, United Arab Emirates), José Maria Valenzuela (University of Oxford), Chris Vivian (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection [GESAMP]), Adrien Vogt-Schilb (Inter-American Development Bank [IDB]), Daniel Wetzler (IEA), Zhao Xiusheng (Tsinghua University), Maya Zenko Ulezic (European Commission) and Jinhua Zhang (UNEP)

## Chief scientific editors

Anne Olhoff (CONCITO – Denmark’s green think tank), John Christensen (UNEP-CCC), Simon Maxwell (independent) and Navroz Dubash (Centre for Policy Research)

## Secretariat, production and coordination

Anne Olhoff (CONCITO – Denmark’s green think tank), Julia Rocha Romero (UNEP-CCC), Kaisa Uusimaa (UNEP) and Maarten Kappelle (UNEP)

## Media and launch support

UNEP Communication Division and UNEP-CCC communication team

## Design and layout

Weeks.de Werbeagentur GmbH (figures), Strategic Agenda (layout) and Beverley McDonald, UNEP (cover design)

## Translation of the executive summary and language editing

Strategic Agenda

## Thanks also to:

Siska Adriani Ringbo (UNEP-CCC), Angeline Djampou (UNEP), Dany Ghafari (UNEP), Selma Hedges (UNEP), Andrea Hinwood (UNEP), Christian Ibsen (CONCITO – Denmark’s green think tank), Jason Jabbour (UNEP), Jarl Krausing (CONCITO – Denmark’s green think tank), Thomas Laursen (UNEP-CCC), Anita Mujumdar (UNEP), Pia Riis Kofoed-Hansen (UNEP-CCC), Ignacio Sánchez Díaz (UNEP), Pinya Sarasas (UNEP), Ying Wang (UNEP) and Edoardo Zandri (UNEP)

The 2023 edition of the Emissions Gap Report is supported by the Environment Fund, UNEP’s core financial fund. UNEP would like to thank the ClimateWorks Foundation, the Danish Ministry of Foreign Affairs, the Dutch Ministry of Economic Affairs and Climate Policy, and the German Government and its International Climate Initiative (IKI), for their support for the production of the Emissions Gap Report 2023.

<sup>15</sup> The CEQA Guidelines are codified at 14 Cal. Code Regs § 15000 et seq.

---

<sup>16</sup> Our organizations quoted the cited CEQA statute and CEQA Guidelines sections in our supplemental comment letters of October 30, 2023, (Sierra Club California et al. comment letter pp. 11-12) and June 29, 2023, (Sierra Club California et al. comment letter pp.13-14.)

<sup>17</sup> Our organizations have explained the need for DWR to provide a benefit-cost analysis for the public to review during a review period on a revised Draft EIR. (Sierra Club California et al. Comment Letter, pp. 56-6 December 15, 2022.).