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Title

Signs of Optimism Beyond 2020

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<https://escholarship.org/uc/item/2q20m68c>

Journal

San Francisco Estuary and Watershed Science, 18(4)

ISSN

1546-2366

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Publication Date

2020

DOI

10.15447/sfews.2020v18iss4art1

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Signs of Optimism Beyond 2020

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SFEWS
Volume 18 | Issue 4 | Article 1

<https://doi.org/10.15447/sfew.2020v18iss4art1>

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The year 2020 is one we are unlikely to forget. This is the year when a global pandemic and an economic collapse added to and accentuated longer-standing issues associated with changing technologies and escalating social and economic inequalities. Extreme weather events across the country reminded us, especially here in California, that the effects of a warming earth are upon us. A tumultuous presidency ended, leaving behind a science establishment uncertain about what lies ahead (e.g., Langlin 2020).

For our readership and authors these challenges together meant dramatic changes in the way we work, the way we meet, and the way we teach. It added new challenges to finding job opportunities and funding, and to conducting research and writing papers. Social media and the press have discussed anecdotal accounts of the impact of these events on science and scientists. A survey of scientists in Europe and North America showed about a 10% drop in hours worked overall after the onset of the pandemic (Myers et al. 2020). A decline in time devoted to research was experienced most by female scientists, those in the bench sciences (i.e., much of aquatic science), and “especially scientists with young children.” Publications in scientific journals represent the end products of a supply chain that is subject to this string of challenges. Such disruptions add to the concern about disappearance of journals from the internet (Kwon 2020). It is only natural that our readers might be interested in the status of *SFEWS*.

We are happy to report that, to date, *SFEWS* has suffered no detectable overall effect from the challenges of the last 10 months. First of all, the stability and resilience of *SFEWS* is reinforced by our publication on the platform provided by the University of California’s Digital Library and our 17-year history of consistent publication. Most journals that disappear from the internet are young and not associated with permanent platforms. So far, neither overall readership nor submissions declined noticeably in 2020. In 2020, we published 18 articles, well within the range of the last 5 years. In 2019, we averaged 4,420 requests for articles per month; in 2020, it was 4,300. In October 2020, as the pandemic

progressed, we had 5,641 requests for articles. There also was no discernable downward trend in views after February of 2020, when disruptions took hold. We do not have any data about underlying effects on careers, but it is evident that *SFEWS*'s overall continuity remains intact. For this we must thank our dedicated audience, authors, reviewers, and associate editors—all of whom have stayed the course in Bay-Delta science publishing through these difficult times. All of them remain the heart of this enterprise. Most of all I thank my long-time partner in this enterprise, the Managing Editor of *SFEWS*, Lauren Muscatine, and her dedicated copy and layout editors, Mary Beth Sanders and Sheila Chandrasekhar. Every quarter they have turned manuscripts into a journal that meets the highest professional standards; working through the challenges of 2020 without missing a beat.

We also renewed our contract with the Delta Stewardship Council (DSC) in 2020. This is no small thing in an economically challenging year. Again, we very much appreciate the hard work of the Delta Science Program on our behalf, as well as the DSC and the University of California via the Muir Institute for their recognition of our value. We will continue to work at living up to the high standards you all expect from us.

Formidable challenges lie ahead. This year it became even more obvious that climate change as a threat multiplier is taking us into uncharted territory. Environmental changes—including extreme events—may be more rapid, pervasive, uncertain, and increasing at an accelerating rate (Delta Independent Science Board 2020). California has already experienced 4 years in a row of mega wildfires with five of six largest recorded wildfires since 1932 occurring in 2020. Changes in temperature and precipitation patterns will require challenging adaptations in one of the most complex combinations of ecosystems and water supply systems in the world. California's problems are a precursor of wicked combinations of environmental problems growing worldwide, from which there is no running. Former Governor Jerry Brown, now Co-Chair of UC Berkeley's California-China Climate Institute, gave a series of press interviews in 2020 relating to public responses to scientific evidence of increasing impacts from climate change (e.g., Wilson 2020). He cited those who say about California: *"We are getting out of here—we are going someplace else."* His reply reflects the hard reality:

"There are going to be problems everywhere... This is the new normal. The fact is, we have a global crisis that has been mounting and the scientists have been telling us about. For the most part, it's been ignored. Now we have graphic examples... It's been predicted and it's happening. This is part of the new long-term experience."

California has often led the way in defining trends and experimenting with solutions to what become global issues; for better or for worse, we might add. Why should the 2020s be any different?

Despite the challenges to the science workforce, the COVID-19 pandemic reinforced to the public the value of science in addressing our greatest challenges. The cover of *Science Magazine* (October 10, 2020) stated “Science looms large” in addressing COVID-19. The frequent calls from politicians and the public to “listen to the science” in constructing pandemic policy could be viewed as renewed respect for using science to inform policy. Cynics might suggest this is also a way to evade responsibility for difficult political decisions. But large investments in epidemiology and virology, as well as vaccine and therapeutics research built from a solid infrastructure of knowledge in these fields, has led to unusually rapid advances in addressing the disease. The power of investing in science was never more evident. As knowledge of COVID-19 and the pandemic grew during the last year it was also rapidly incorporated into understandable suggestions for policy and advice to the public. Some findings were prematurely incorporated into advice and policy, and subsequently reversed. But rather than eroding trust of science, that seemed to increase respect for careful processes (e.g., peer review). When decision-makers ignored robust science, they paid a political price.

Many in the press (both popular and scientific) have drawn parallels between the pandemic and climate change. This year’s disasters remind us that time is running short. Now is the time to be proactive about climate change so we are not caught in the reactive mode that has contributed to the COVID-19 challenges. Just as it seems we need to start now training more fire-fighters, more and better forest managers, and more healthcare workers (Wilson 2020), we also need to support that same urgency in training more scientists. Dr. Daniel Swain, a climate change expert from UCLA, suggests that we need new solutions or we face even greater climate-driven disasters (Kaplan 2020). He notes that if natural disasters become exponentially worse with every degree of warming, the future will become exponentially safer with every degree of warming humanity manages to avert. “It means there is no point in the future at which it becomes pointless or hopeless to take action,” Swain said. “From here forward, everything we do is important.”

A model formula for dealing with future environmental change can be built from what we have learned from the COVID-19 experience. The pandemic illustrated how an acceleration of cutting-edge science and growth in understanding of a challenge can yield new solutions. However, with regard to environmental change, it is increasingly important that we ask, *are we doing the science that will yield new solutions?* Have we adequately invested in the science and scientific infrastructure (including training) relevant to adapting to increasingly rapid environmental change? Are we making our findings available and clear so that policy-makers and the public “understand the connection between the science being done and the policies they want to make,” to quote a 2019 interview with DSC Chair Susan Tatayon (*Estuary Pearls* 2020). Do those of us who are influencers have the network to stay informed of advances, proposed solutions, and choices?

The California public, state and federal agencies, and foundations have invested sufficiently to keep our scientific efforts in ecosystem restoration, climate change,

and water issues alive since 2000. While much appreciated, those investments are small compared to what is at stake as future challenges unfold, and trivial compared to what has been invested this year alone in pandemic research. But have we convinced a tax-wary California public or legislature that investments in understanding and adapting to environmental change are as worthy as investments in COVID-19 have been? Have we made a convincing case that these investments can be well spent? Can we think proactively rather reactively about our challenges, and have we been bold enough in our thinking?

Just as every scientist and policy influencer thinks about these questions in preparing for the future, so should we as a scientific journal. Over the years our papers have contributed to Bay-Delta policy issues (Luoma and Muscatine 2019). In the last year, aspects of the salmonids and Delta Smelt life cycles were a theme of more than half of our articles; drought management, climate change and water diversions, invasive species, and long-term monitoring were other relevant subjects. We are increasingly attempting to speak directly to policy-makers and the informed public. Three years ago, we began publishing essays and policy analyses in many journal issues. The essays are short discussions of timely policy-relevant topics designed for the interested public and policy-makers. We are also publishing short readable summaries of the outcomes of relevant workshops, many of which in the past were left unpublished. This year, our essays discussed the tools that are available to address different resource-management issues and data management. Also, we published a summary of a workshop on salmon disease. We encourage our readers to continue submitting ideas for essays, summaries, or policy analyses (without advocating particular policies), along with the research that remains at our core.

This year, we also linked with the San Francisco Estuary Partnership's *Estuary Magazine* to publish in *Estuary Pearls*. *Pearls* editions give synopses of salient points from each article in a previous issue of *SFEWS*. They are brilliantly written for the public by independent writers and guided by editors Cariad Hayes Thronson and Ariel Okamoto, in collaboration with each article's authors. Please look for these in the issue of *Estuary Magazine* that follows each of our quarterly *SFEWS* issues, and pass them on to other interested parties.

Despite the challenges, there are new signs that the future looks optimistic for Bay-Delta science in California and, as a result, for *SFEWS*. In the near term, issues of *SFEWS* that are in the pipeline or planned include a 6-year update on the state of Bay-Delta science, and collaborative studies on issues like entrainment of Delta Smelt and outcomes from recent multi-agency adaptive management experiments, to name a few. After several years' hiatus, multi-million-dollar solicitations for research were reinitiated in 2018 through hard work from the Delta Science Program team led by John Callaway and co-sponsored by the California Department of Fish and Wildlife. This effort, now repeated in 2020, is co-sponsored by the US Bureau of Reclamation with proposals due February 2021. The level of funding raises hope that investments across the scientific community will grow and bring with it the training, knowledge, publications, and thoughtful

insights necessary to accelerate our attack on the challenges that lie ahead. The tenure of the next Lead Scientist for the DSP, Dr. Laurel Larsen, just commenced in September 2020. She has proposed an exciting new agenda for the Delta Science Program—one well suited to accelerate relevant science to prepare for a challenging future (Maven's Notebook c2020).

In 2015, Paolo Bacigalupi published *The Water Knife*, a fictional account of a future where solutions to water issues in the western US went wrong. Kim Stanley Robinson's 2020 book, *Ministry for the Future*, is a fictional dystopic account of the challenges facing a global ministry dedicated to preparing for climate change. Drama happens more slowly and with subtlety in real life compared to these fictional accounts, and therefore wicked problems are more difficult to address. But both fictional works point to what can happen if we do not think boldly, now, about how we address the complex mix of old and new challenges we face. Quoting former Governor Brown again:

"... it's going to take, yes, listening to the scientists, but experiencing the toxic air, experiencing the flooding, the fires, the political upheaval... One thing we know, things are going to get worse, there's going to be more suffering, more costs, and at some point on that trajectory the political will (is going to) crystalize and the government will make the heroic effort required to tackle (these) problems.... if you check in in 10 years, we'll be way beyond what they're even thinking today, although maybe in a different way."

Perhaps it is time for each of us to think about how we can contribute to assuring that this period of public trust in science and Governor Brown's optimism are justified. We will work to do our part at *San Francisco Estuary and Watershed Science*. Stay safe!

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