SCCWRP's fact sheet series

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Commission Meeting

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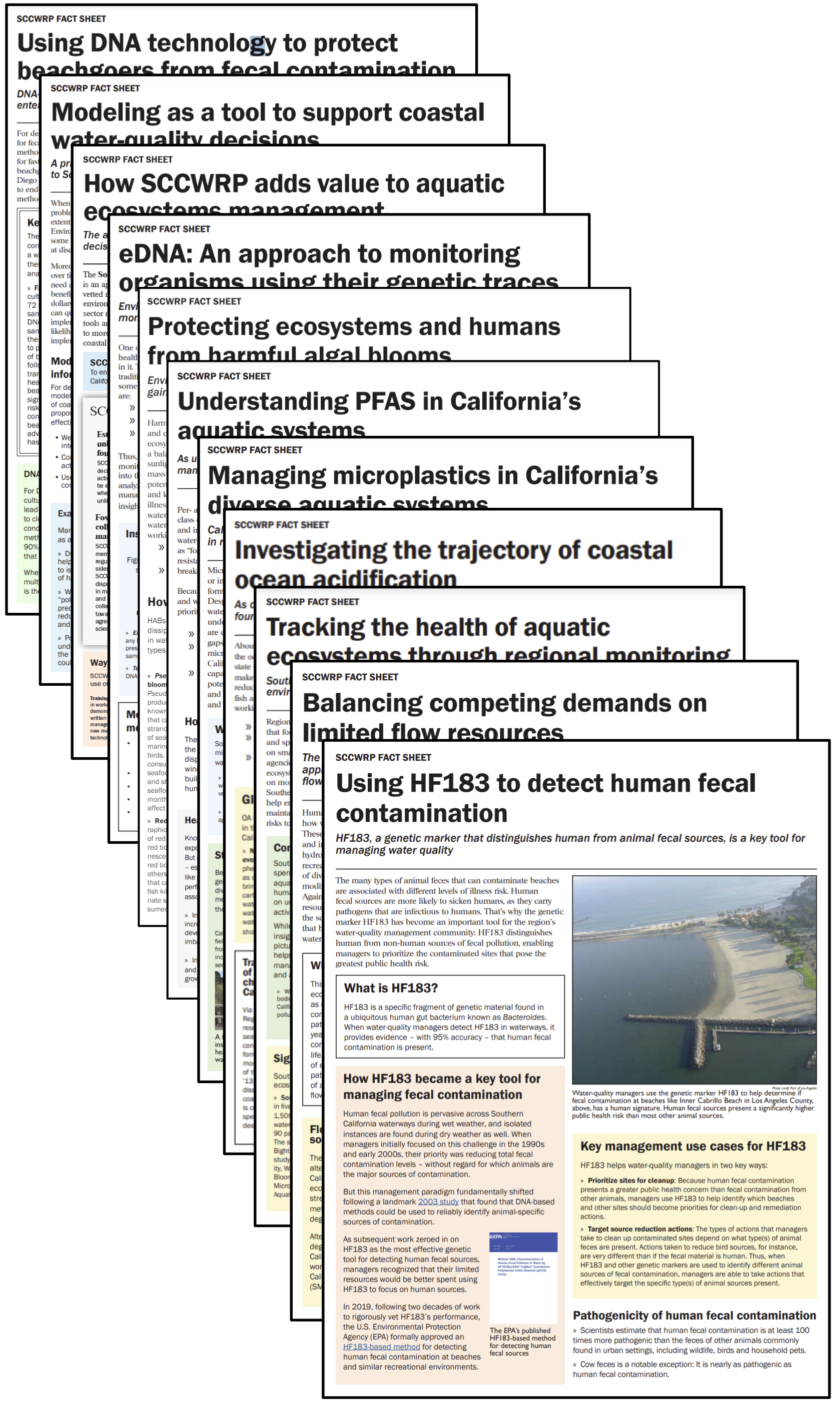
Background

- In December, you decided to wind down production of our fact sheets
  - Going forward, we'll only produce fact sheets upon Commission request
- You asked that we finish the 2 fact sheets already in production
  - Both fact sheets are ready for your review today



11 published fact sheets

- Rapid beach testing methods
- Water-quality modeling
- SCCWRP's value
- eDNA
- Regional monitoring
- Harmful algal blooms
- PFAS
- Microplastics
- Ocean acidification
- Ecohydrology
- HF183

Climate Solutions fact sheet

- You reviewed this fact sheet in December and asked for minor edits
  - CTAG has signed off on the changes

- Can we get approval today?
  - CTAG recommends approval

Climate Solutions fact sheet (draft)

SCCWRP FACT SHEET

DRAFT

Making aquatic ecosystems resilient for a changing climate

Environmental managers are pursuing multiple types of solutions to help aquatic ecosystems cope in the face of climate change

Climate change poses a pervasive and intensifying threat to the health of aquatic ecosystems, manifesting as a range of environmental stresses that is affecting the ability of water bodies to support diverse plant and animal communities. To mitigate these stresses, Southern California's environmental management community is pursuing multiple solutions intended to make aquatic ecosystems more resilient in the face of climate change – a concept known as **climate resiliency**.

How the effects of climate change are manifesting

Climate change is responsible for causing and exacerbating multiple types of stresses on Southern California's aquatic ecosystems, including changes in water quality, water quantity (e.g., drought, flooding), increasing temperatures, and rainfall patterns. This fact sheet highlights three of these stresses; each corresponds to a subsequent section of the fact sheet highlighting potential climate solutions for offsetting the three stresses:

- **Changes in stream flow patterns**: A combination of climate-induced changes to rainfall patterns and changes in the timing of snowpack melt is causing streams to experience alterations to seasonal flow patterns. These flow changes adversely affect aquatic life, particularly when exacerbated by climate-driven increases in stream temperature. The flow changes also are affecting human recreation activities.
- **Rising sea levels**: As global climate change causes polar ice to melt and ocean water to expand as it warms, sea levels are rising. Southern California's low-lying coastal wetlands are at risk: About half of these ecologically important habitat areas are projected to become permanently submerged by 2100.
- **Ocean acidification**: The ocean is absorbing about one-third of carbon dioxide emissions from the atmosphere, which is causing seawater pH to drop via a phenomenon known as ocean acidification. As a result, minerals in seawater that shell-forming organisms depend on are becoming less available – which, in turn, is triggering shell dissolution and could lead to biodiversity losses if vulnerable marine populations collapse. Meanwhile, as climate change causes the ocean to warm, coastal waters are becoming more conducive to proliferations of ecologically disruptive harmful algal blooms, which – via complex ocean biogeochemical cycling processes – can further exacerbate coastal ocean acidification conditions.

Photo credit: Kirk Gilligan

An endangered Ridgeway's rail tending to its nest is surrounded by high tide. Wetlands are among the aquatic ecosystems where researchers are exploring solutions for how to enhance resiliency in the face of a changing climate.

CLIMATE SOLUTIONS FOR

Changes in stream flow patterns

Researchers are exploring multiple potential solutions for minimizing and offsetting climate-triggered changes to stream flow patterns. These solutions are being designed to mimic and complement natural features:

» **Flow controls**: Researchers are studying how to divert, impound and augment flows in streams – with a goal to re-create more natural flow patterns under future climate conditions.

» **Habitat restoration**: Researchers are exploring how to restore the physical habitat of streams to promote more natural flow patterns, including by adding native vegetation, constructing naturalistic side channels, and making changes to channel form that do not compromise the channel's flood control functions.

» **Changes in groundwater management practices**: Because routine groundwater pumping activities have the potential to adversely affect how water flows in adjacent surface-level streams, researchers are exploring how to adjust groundwater management practices in ways that will minimize disruptions to flowing surface waters and support more natural flow regimes in light of future changes in projected rainfall patterns.

Cell Bioassays fact sheet

- You are seeing this fact sheet for the first time
  - CTAG has signed off, after spending 2 quarters working on it
- Can we get approval today?
  - CTAG recommends approval

Cell Bioassays fact sheet (draft)

SCCWRP FACT SHEET

DRAFT

Detecting chemical contaminants via cell bioassays

Cell bioassays have the potential to pick up where traditional contaminant detection and measurement methods leave off

Protecting humans, wildlife and fish from chemical contamination in aquatic environments is a complex management challenge. First, aquatic managers rely on chemistry-based methods to directly monitor specific chemicals; this approach focuses on chemicals that are acutely toxic and trigger severe biological consequences. Second, managers supplement chemical-by-chemical monitoring with toxicology testing, which measures how organisms in a laboratory are affected by cumulative exposure to aquatic contamination.

Although toxicology testing has provided foundational insights into the biological consequences of cumulative contamination exposure, traditional toxicology methods are limited to detecting mortality and impaired growth and reproduction – relatively coarse insights. Traditional toxicology methods also are costly and time-intensive. These limitations have paved the way for the latest advance in toxicology testing: **cell bioassays**.

Cell bioassays enable aquatic samples to be screened for hundreds and perhaps thousands of chemical contaminants that can adversely affect humans, fish and wildlife.

What are cell bioassays?

Cell bioassays are a toxicology testing method for rapidly detecting a wide range of contaminants, including carcinogens, immunosuppressants and endocrine disruptors, that can trigger more subtle, nonlethal health effects. Because cell bioassays monitor for changes at the cellular level, they can detect biological effects that are less pronounced, with results available faster than traditional toxicology and at a lower cost.

Traditional toxicology vs. cell bioassays

Cell bioassays are a valuable complement to traditional toxicology methods, expanding the universe of chemicals that can be monitored.

Traditional toxicology	Cell bioassays
Detects presence of contaminants that cause mortality, impaired growth and impaired reproduction	Detects presence of broad classes of contaminants that cause cellular-level changes linked to cancer, immunosuppression and endocrine disruption
Not sensitive enough to detect low levels of contaminants	Can detect contaminants present at low levels
Uses whole, living organisms	Uses specially engineered, laboratory-grown cells
Typically $1,000+ per test	Typically hundreds of dollars per test (up to ~$1,000)
Mid-sized lab can test ~15 samples consecutively	Mid-sized lab can test ~50-100 samples consecutively
Typically takes days to weeks to get results	Typically takes hours (up to two days) to get results

How cell bioassays fit into California's CEC management strategy

California needs a strategy for monitoring the tens of thousands of **contaminants of emerging concern** (CECs) commonly found in aquatic environments that are poorly understood and largely unregulated. Cell bioassays are envisioned as a cost-effective, scalable first line of defense for monitoring a wide range of CECs. Under this new management strategy, which California has begun piloting, aquatic samples are screened for chemical contaminants alongside existing, chemical-specific monitoring methods. Then, depending on findings, more labor-intensive testing methods – including traditional toxicology testing – may be conducted to validate and confirm the findings of cell bioassay testing.