Freshwater Cyanotoxin Workshop: Klamath River Case History

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Yurok Ancestral Territory and the Yurok Indian Reservation
Yurok Culture is Strongly Linked to the Klamath River
THE KLAMATH: MAP OF A THREATENED RIVER

Iron Gate Dam
river mile: 190
constructed: 1962

Fall Creek Dam
river mile: 192
constructed: 1903

The Karuk dip net fishery at Ishi Pishi Falls is one of the last surviving traditional fisheries in America.

Salmon cooked traditionally over a fire pit.

Keno Dam
river mile: 233
constructed: 1931

J.C. Boyle Dam
river mile: 225
constructed: 1958

Link River Dam
river mile: 254
constructed: 1921

Dip nets are made the same way today as they have been for thousands of years.

Scene from a Klamath Tribal village in the Upper Basin after a successful day harvesting fish.

Anglers search for an elusive steelhead.

DAMMED TO END

Unreachable fish

Steelhead trout

Widespread distribution in Klamath Basin once again thriving in Upper Basin, extirpated in the lower Klamath Basin.

Coho salmon on the brink of extinction in the lower Klamath Basin.

Chinook salmon on the brink of extinction in the lower Klamath Basin.

Extinct salmon runs were once the mainstay of the Klamath River.

Sharp-eyed steelheads can still be seen in the upper Klamath River.
Microcystis aeruginosa colony
Impacts To Tribal Members

- River posted to mouth 2007 & 2012
- YTEP has received 9 reports from Tribal Members experiencing rashes and flu like symptoms since 2005
- Perception that risk exists alters behavior = Environmental Justice Issue
- Cultural Beneficial Use documented on KR by State of CA
- Yurok Beneficial Uses & Environmental Justice Survey 2008 documented effects of BGA on cultural and subsistence practices
WQ Monitoring Detects a Problem

- In 2005 USFWS, Karuk and Yurok Tribes detected microcystis in water samples after Klamath River turns bright green.
Initial Yurok Response
Scientific Data Collection (2005)

**Water Sampling**

- Algae ID and counts (cells/ml)
- Microcystin analysis (micrograms/Liter)
- Increased sampling frequency and locations

**Fish Tissue Sampling**

- 4 Adult Chinook salmon – livers and fillets 2 from Yurok Reservation and 2 from Iron Gate Dam Hatchery (ND)

- 2 Steelhead – Fillets ND livers one adult (trace) and one ½ pounder (0.54μg/g)
PUC Settlement

- Creates multi-agency Klamath River BGA Workgroup with $450K
- Funded monitoring above, in and below Reservoirs 2006
- $175K Funded Dr. Pia Moisander from UCSC to perform research in reservoirs to look at limiting factors
- Monthly conference calls discuss:
  - Monitoring Plans
  - Coordination of Monitoring – Temporal and Spatial
  - Current Conditions and Postings
- Discussions on methods – Lab and Field algae ID and toxin method and sample preparation guest speakers
Klamath Hydro-electric Settlement Agreement (KHSA)  2009 - Present

- $500K/year for public health and comprehensive
- Public health sampling for posting in reservoirs and river
- Sample in reservoirs until posted
- Sample in river weekly once MSAE is detected
- PacifiCorp, Karuk and Yurok circulate public health memos to KR BGA workgroup list serve

http://kbmp.net/blue-green-algae-tracker
KHSA Interim Measure 15: Baseline Water Quality Monitoring Sites 2011
Published Studies

- Technical Memorandum Summary of 2005 Toxic Microcystis aeruginosa Trends in Copco and Iron Gate Reservoirs on the Klamath River, CA. Jacob Kann, Ph.D. Aquatic Ecosystem Sciences LLC and Susan Corum Karuk Tribe
- Kann, J. 2006. Microcystis aeruginosa Occurrence in the Klamath River System of Southern Oregon and Northern California. Report for the Yurok Tribe Environmental Program and Fisheries Department, Klamath, CA by Aquatic Ecosystem Sciences, Ashland, OR. 26 p. (1.4 Mb)
- Technical Memorandum Toxigenic Microcystis aeruginosa bloom dynamics and cell density/chlorophyll a relationships with microcystin toxin in the Klamath River, 2005-2008. Jacob Kann, Ph.D. Aquatic Ecosystem Sciences LLC and Susan Corum Karuk Tribe
- Technical Memorandum Microcystin Bioaccumulation in Klamath River Freshwater Mussel Tissue: 2009 Results. Jacob Kann, Ph.D. Aquatic Ecosystem Sciences LLC, Susan Corum Karuk Tribe, Ken Fetcho Yurok Tribe
- Technical Memorandum Preliminary 2010 Microcystin Bioaccumulation Results for Klamath River Salmonids. Jacob Kann, Ph.D. and Lisa Bowater, Crystal Bowman and Grant Johnson
- Nutrient limitation of Microcystis aeruginosa in northern California Klamath River reservoirs Pia H. Moisander, Mari Ochiai, Andrew Lincoff. Harmful Algae (04 May 2009)
- Diversity of Microcystis aeruginosa in the Klamath River and San Francisco Bay delta, California, USA (Citations: 1)PH Moisander, PW Lehman, M Ochiai, S Corum. Journal: Aquatic Microbial Ecology - AQUAT MICROB ECOL, vol. 57, pp. 19-31, 2009
- Final Report to the U.S. Environmental Protection Agency on Cyanotoxin Accumulation in Fish and Freshwater Mussels of the Klamath River Water Quality Cooperative Agreement CP 96941301 State Water Resources Control Board Division of Water Rights
Remaining Issues

- Long term funding for monitoring and research
- Health Effect Documentation
- Past Hum Co. press release stated that no documented health effects to humans has occurred
- Humboldt County Health Officer Dr. Ann Lindsay to the Del Norte Medical Society Bulletin requesting that illnesses be reported to Humboldt County Environmental Health Specialist – vacant position
- YTEP wrapping up EPA STAR grant to look at contamination in ecosystem and organisms to determine if risks exist to Tribal Members = linkages to health of Tribal Members?
- Interim Environmental Justice Issues = dams WQ impacts affects CUL beneficial uses due to unique association with the River ongoing exposures, latest concerns over algaecide applications in Copco
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