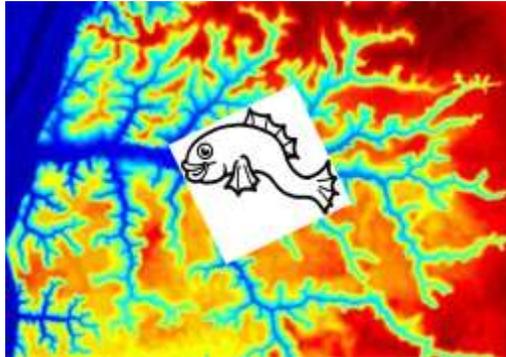


Climate-Aquatics Blog #62: More Bits about the How, What, When, & Where of Aquatic Thermalscapes...



Hi Everyone,

After a brief respite, the blog is back & it's time to push through the final four-teen (or so) we'll use to tell the fish climate story. A brief forecast of the ground we'll cover—a few blogs on thermalscapes across landscapes to warm us up again, fish flows across those landscapes, things that could be done to impede/facilitate those movements, climate refugia & conservation strategies, & developing high-quality high-resolution information for decision making by being big data bums, stream techno-geeks, and crowd-sourcers. That's sourcer not Sorcerer—though there may be a future time when the twain shall seem indistinguishable.

In rapid order then, here are this blog's offerings to whet those thermal palettes...

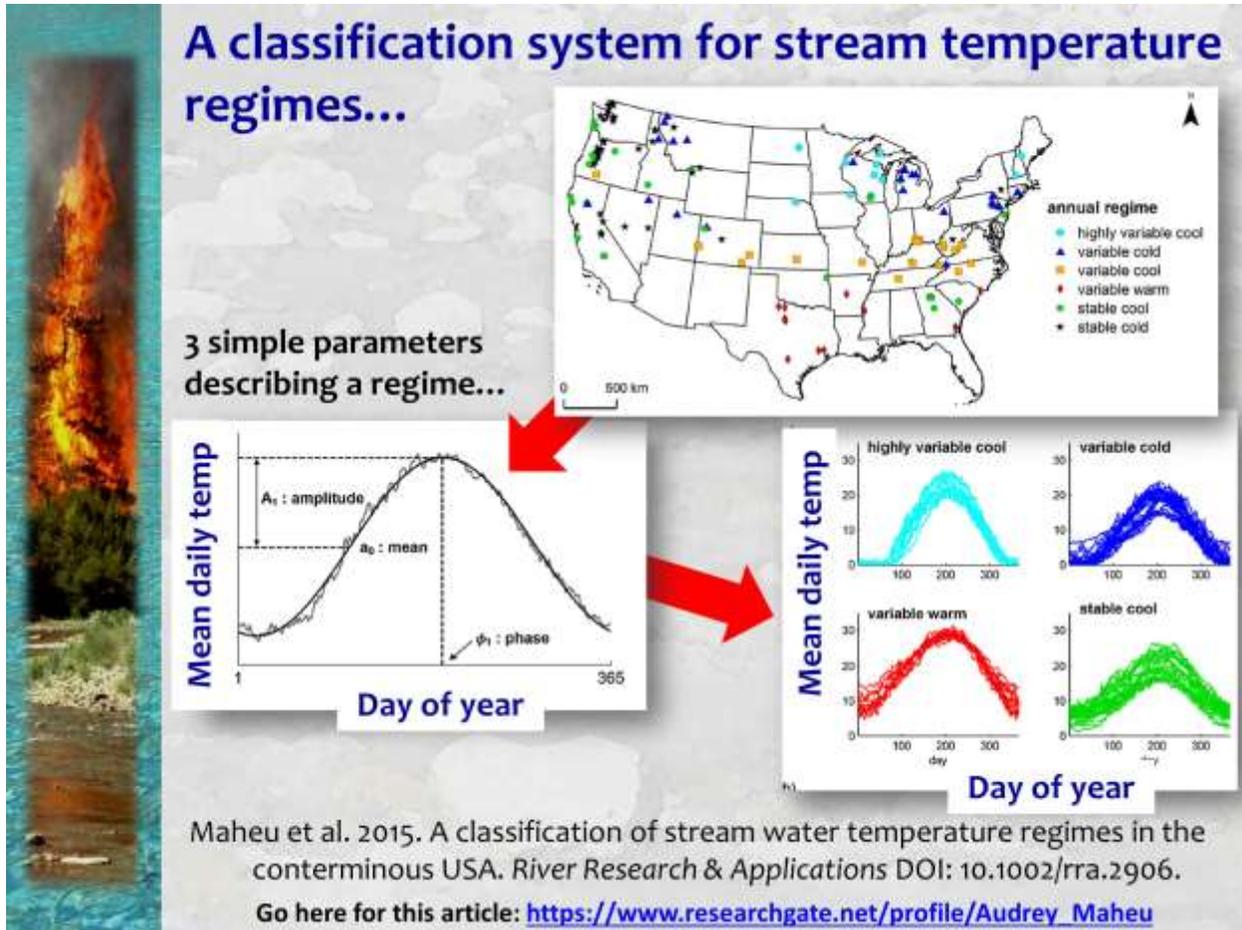
1. Can it be so? at long last Maheu & colleagues (graphic 1: study accessible here: https://www.researchgate.net/profile/Audrey_Maheu) propose a broad classification scheme for stream temperature regimes. Much/most/all of the robust body of thought that's been developed for flow regimes over almost 3 decades pertains equally well to thermal regimes...bout time temperature gets its due so thank you Maheu.
2. An old man of the stream thermal world (Hi Joe!) looks beneath the surface to discern the potential importance of intermittent tributaries for maintaining cold-water plumes in warmer rivers during warm periods (graphic 2; study accessible here: https://www.researchgate.net/profile/Joseph_Ebersole2)
3. Further north where hot rivers aren't quite as common (at least not yet), Lisi & colleagues apply a novel isotopic analysis to measure the relative contributions of rain & snow to stream flow, then use that information to understand why some streams are more/less sensitive to climate forcing than others (graphic 3; study hyperlinked here: <http://www.southwestsalmon.org/wp-content/uploads/2015/04/Lisi-et-al.-JGRL-2014-proofs.pdf>)
4. & who doesn't like big free data? The bigger the better I say so thanks to Sharma & colleagues for doing much gruntwork to compile a global dataset on lake temperatures (graphic 4; study hyperlinked here: <http://www.nature.com/articles/sdata20158>). Easy,

open access to quality datasets will greatly accelerate the rate at which valuable information is created to guide conservation investments.

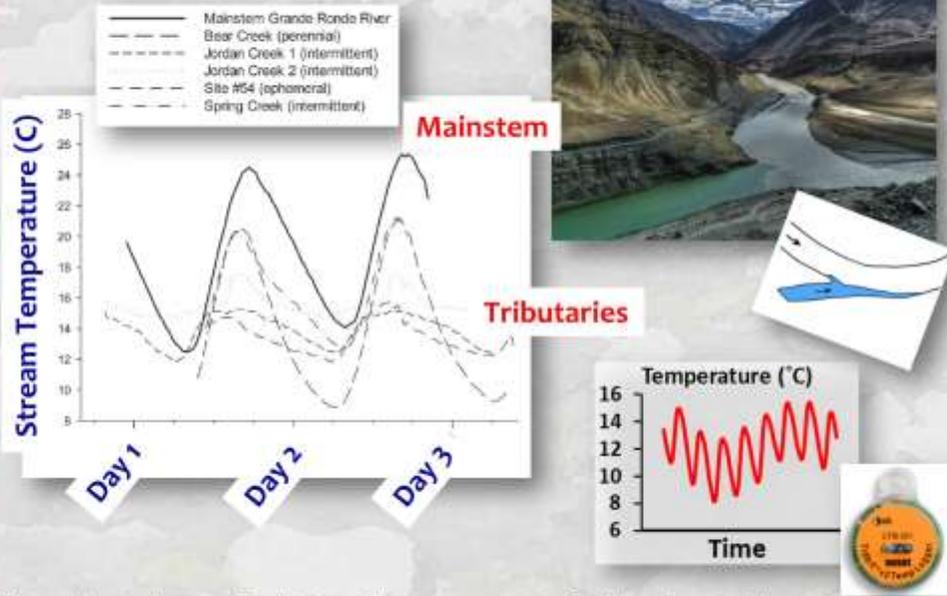
That's it for now, back in a few weeks.
Dan



Now Tweeting at [Dan Isaak@DanIsaak](https://twitter.com/DanIsaak)



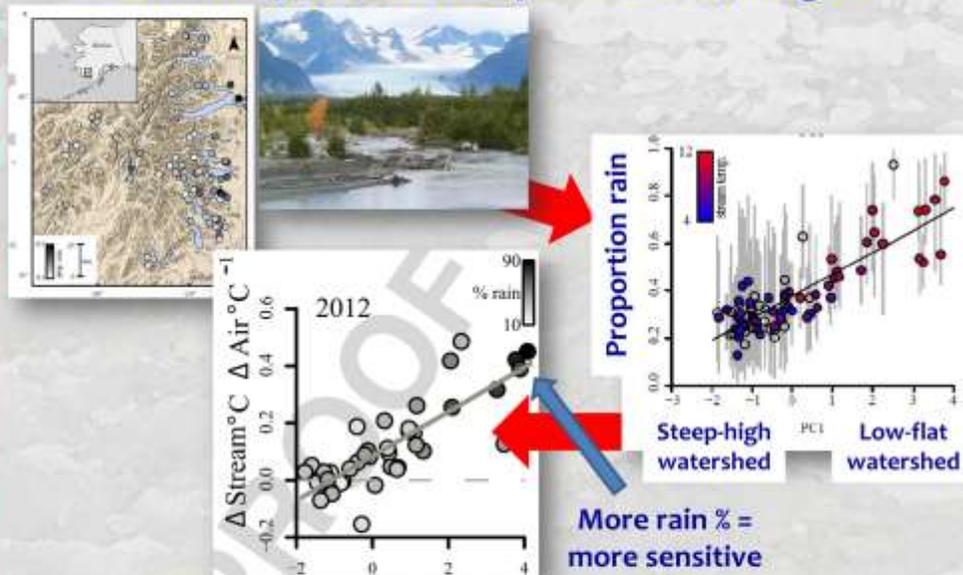
Cold-water Patches at Tributary Confluences



Ebersole et al. 2015. Predicting the occurrence of cold-water patches at tributary confluences with warm rivers. *Freshwater Science*. 2015. 34:111-124.

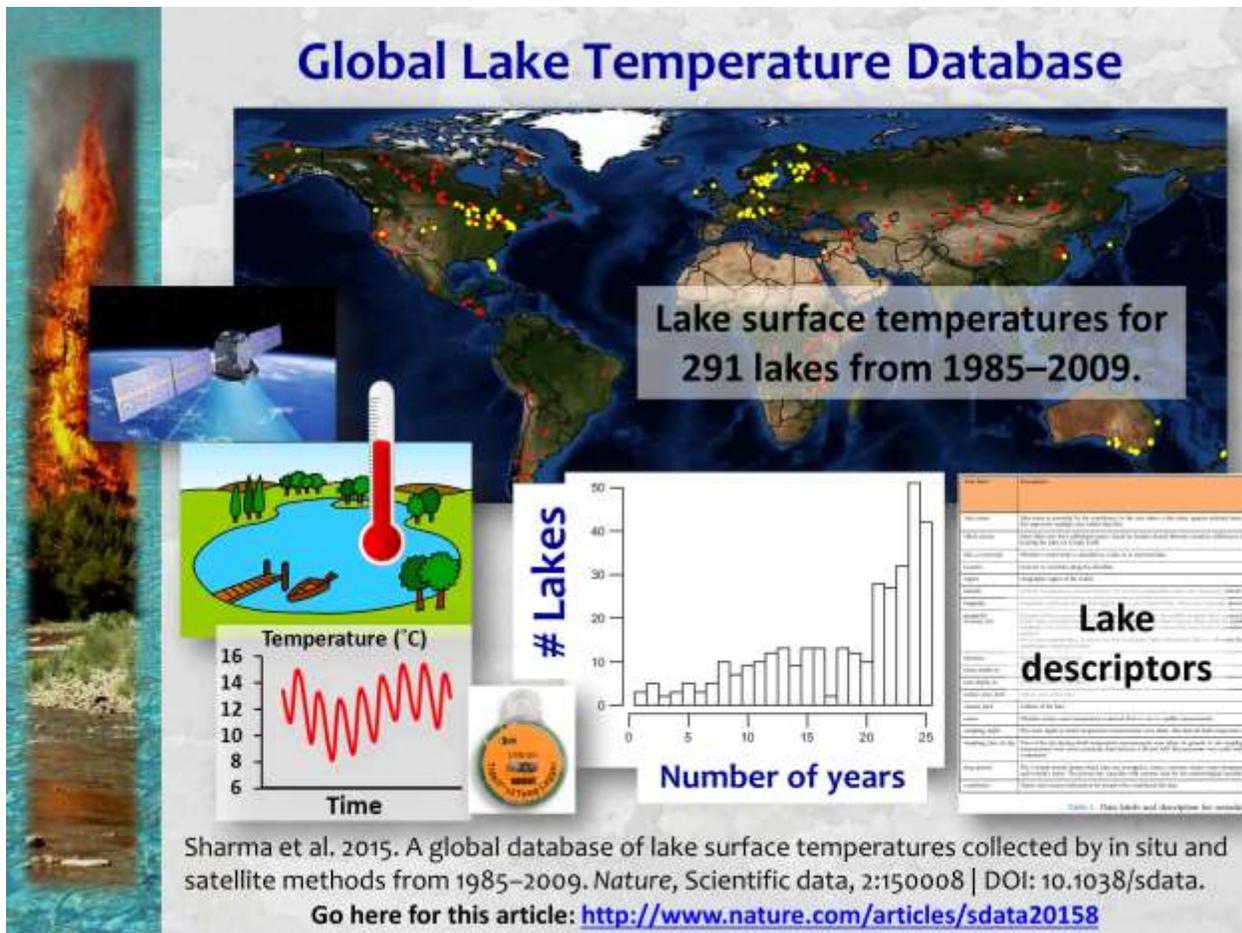
Go here for this article: https://www.researchgate.net/profile/Joseph_Ebersole2

Isotopes Reveal Snow:Rain Fraction & Stream Sensitivity to Air Temperature Changes



Lisi et al. 2015. Watershed geomorphology and snowmelt control stream thermal sensitivity to air temperature. *Geophysical Research Letters* 42, doi:10.1002/2015GL064083.

Go here for this article: <http://www.southwestsalmon.org/wp-content/uploads/2015/04/Lisi-et-al.-JGRL-2014-proofs.pdf>



Welcome to the Climate-Aquatics Blog. For those new to the blog, previous posts with embedded graphics can be seen by clicking on the hyperlinks at the bottom or by navigating to the blog archive webpage here: (http://www.fs.fed.us/rm/boise/AWAE/projects/stream_temp/stream_temperature_climate_aquatics_blog.html). The intent of the Climate-Aquatics Blog is to provide a means for the 9,214 (& growing) field biologists, hydrologists, anglers, students, managers, and researchers currently on this mailing list across North America, South America, Europe, and Asia to more broadly and rapidly discuss topical issues associated with aquatic ecosystems and climate change. Messages periodically posted to the blog highlight new peer-reviewed research and science tools that may be useful in addressing this global phenomenon. Admittedly, many of the ideas for postings have their roots in studies my colleagues & I have been conducting in the Rocky Mountain region, but attempts will be made to present topics & tools in ways that highlight their broader, global relevance. I acknowledge that the studies, tools, and techniques highlighted in these missives are by no means the only, or perhaps even the best, science products in existence on particular topics, so the hope is that this discussion group engages others doing, or interested in, similar work and that healthy debates & information exchanges occur to facilitate the rapid dissemination of knowledge among those concerned about climate change and its effects on aquatic ecosystems.

If you know others interested in climate change and aquatic ecosystems, please forward this message to them. If you do not want to be contacted again in the future, please reply to that effect and you will be de-logged.

Previous Blogs...

Climate-Aquatics Overviews

Blog #1: [Climate-aquatics workshop science presentations available online](#)

Blog #2: [A new climate-aquatics synthesis report](#)

Climate-Aquatics Thermal Module

Blog #3: [Underwater epoxy technique for full-year stream temperature monitoring](#)

Blog #4: [A GoogleMap tool for interagency coordination of regional stream temperature monitoring](#)

Blog #5: [Massive air & stream sensor networks for ecologically relevant climate downscaling](#)

Blog #6: [Thoughts on monitoring air temperatures in complex, forested terrain](#)

Blog #7: [Downscaling of climate change effects on river network temperatures using inter-agency temperature databases with new spatial statistical stream network models](#)

Blog #8: [Thoughts on monitoring designs for temperature sensor networks across river and stream basins](#)

Blog #9: [Assessing climate sensitivity of aquatic habitats by direct measurement of stream & air temperatures](#)

Blog #10: [Long-term monitoring shows climate change effects on river & stream temperatures](#)

Blog #11: [Long-term monitoring shows climate change effects on lake temperatures](#)

Blog #12: [Climate trends & climate cycles & weather weirdness](#)

Blog #13: [Tools for visualizing local historical climate trends](#)

Blog #14: [Leveraging short-term stream temperature records to describe long-term trends](#)

Blog #15: [Wildfire & riparian vegetation change as the wildcards in climate warming of streams](#)

Blog #23: [New studies describe historic & future rates of warming in Northwest US streams](#)

Blog #24: [NoRRTN: An inexpensive regional river temperature monitoring network](#)

Blog #25: [NorWeST: A massive regional stream temperature database](#)

Blog #26: [Mapping thermal heterogeneity & climate in riverine environments](#)

Blog #40: [Crowd-sourcing a BIG DATA regional stream temperature model](#)

Blog #60: [Bonus Blog: New report describes data collection protocols for continuous monitoring of temperature & flow in wadeable streams](#)

Blog #61: [Significant new non-American stream temperature climate change studies](#)

Climate-Aquatics Hydrology Module

Blog #16: [Shrinking snowpacks across the western US associated with climate change](#)

Blog #17: [Advances in stream flow runoff and changing flood risks across the western US](#)

Blog #18: [Climate change & observed trends toward lower summer flows in the northwest US](#)

Blog #19: [Groundwater mediation of stream flow responses to climate change](#)

Blog #20: [GIS tools for mapping flow responses of western U.S. streams to climate change](#)

Blog #21: [More discharge data to address more hydroclimate questions](#)

Blog #22: [Climate change effects on sediment delivery to stream channels](#)

Climate-Aquatics Cool Stuff Module

Blog #27: [Part 1, Spatial statistical models for stream networks: context & conceptual foundations](#)

Blog #28: [Part 2, Spatial statistical models for stream networks: applications and inference](#)

Blog #29: [Part 3, Spatial statistical models for stream networks: freeware tools for model implementation](#)

Blog #30: [Recording and mapping Earth's stream biodiversity from genetic samples of critters](#)

Blog #53: [DNA Barcoding & Fish Biodiversity Mapping](#)

Climate-Aquatics Biology Module

Blog #31: [Global trends in species shifts caused by climate change](#)

Blog #32: [Empirical evidence of fish phenology shifts related to climate change](#)

Blog #33: [Part 1, Fish distribution shifts from climate change: Predicted patterns](#)

Blog #34: [Part 2, Fish distribution shifts from climate change: Empirical evidence for range contractions](#)

- Blog #35: [Part 3, Fish distribution shifts from climate change: Empirical evidence for range expansions](#)
- Blog #36: [The “velocity” of climate change in rivers & streams](#)
- Blog #37: [Part 1, Monitoring to detect climate effects on fish distributions: Sampling design and length of time](#)
- Blog #38: [Part 2, Monitoring to detect climate effects on fish distributions: Resurveys of historical stream transects](#)
- Blog #39: [Part 3, Monitoring to detect climate effects on fish distributions: BIG DATA regional resurveys](#)
- Blog #41: [Part 1, Mechanisms of change in fish populations: Patterns in common trend monitoring data](#)
- Blog #42: [BREAKING ALERT! New study confirms broad-scale fish distribution shifts associated with climate change](#)
- Blog #56: [New studies provide additional evidence for climate-induced fish distribution shifts](#)
- Blog #43: [Part 2, Mechanisms of change in fish populations: Floods and streambed scour during incubation & emergence](#)
- Blog #44: [Part 3, Mechanisms of change in fish populations: Lower summer flows & drought effects on growth & survival](#)
- Blog #45: [Part 4, Mechanisms of change in fish populations: Temperature effects on growth & survival](#)
- Blog #46: [Part 5, Mechanisms of change in fish populations: Exceedance of thermal thresholds](#)
- Blog #47: [Part 6, Mechanisms of change in fish populations: Interacting effects of flow and temperature](#)
- Blog #48: [Part 7, Mechanisms of change in fish populations: Changing food resources](#)
- Blog #49: [Part 8, Mechanisms of change in fish populations: Non-native species invasions](#)
- Blog #50: [Part 9, Mechanisms of change in fish populations: Evolutionary responses](#)
- Blog #51: [Part 10, Mechanisms of change in fish populations: Extinction](#)
- Blog #52: [Review & Key Knowable Unknowns](#)

Climate-Aquatics Management Module

- Blog #54: [Part 1, Managing with climate change: Goal setting & decision support tools for climate-smart prioritization](#)
- Blog #55: [Part 2, Managing with climate change: Streams in channels & fish in streams](#)
- Blog #57: [Identifying & protecting climate refuge lakes for coldwater fishes](#)
- Blog #58: [Part 3, Managing with climate change: Maintaining & improving riparian vegetation & stream shade](#)
- Blog #59: [Part 4, Managing with climate change: Keeping water on the landscape for fish \(beaverin' up the bottoms\)](#)