Climate Change & the Future of Freshwater Fisheries

Dan Isaak, US Forest Service
Rocky Mountain Research Station
The New Reality

20th Century Observed Trend

+0.6 °C during 20th Century
The Probable Future Reality

21st Century Projected Trend

By 2050

0.6 °C ... so far

2.5 °C

1.0 °C
Our Constituents are Cold-Blooded & Confined...
Faster Changes Will be the “New Normal”

- Climate Change
- Urbanization & Population Growth
- Fisheries
- Biodiversity
Navigating Uncharted Waters Takes Vision, Adaptability, & Teamwork

Some Doors Will Close,
Others Will Open…
Creative/Innovative/Out-of-the Box Thinkers & Leaders

Novel solutions come from synergies among disparate things

“Read & think broadly”

• Important fish questions/issues
• What does new technology make possible?
• World & natural history
• Human nature/psychology
• How does the world around you operate?
Super Communicators

Writing/Speaking/Inter-Personal

& Teambuilders/Networkers

Leverage resources/skills within/among agencies/people

• Climate change is too big for any one, or any one agency.
Good Teammates & Selfless Role Players

Someone throws the ball, someone catches the ball

Digital revolution enables hyperconnectivity & precise workflow
Information Creation is Required at Unprecedented Scales & Resolution

Regional stream temperature model

NorWeST

National Stream Internet Network Geostatistics

45,000,000 temperature records

5,500,000 stream kilometers
Proficiency in Specialized Technical Skills

- Remote Sensing
- Websites & visualization Tools
- GeoSpatial analysis
- High-performance computing
- Climate, weather, GCM data availability
- Digital sensors

BIG DATA
We Don’t Hire “fish biologists” Anymore
The other skills are at least as important

Technical teams (4 - 10 people)
• Fish biologist
• Hydrologist
• Fluvial Geomorphologist
• Database engineer
• Data technicians
• Geospatial analyst
• Web-designer
• Spatial ecologists
• Statisticians

Traditional skills get you on the hiring list, nontraditional skills get you hired
Recently rewrote the position job description for our professional research support staff so part of the training requirements now are GIS, databases, writing computer code
Lifelong, Motivated Learners
Best people often self-taught

Started with traditional skills, but evolved & diversified...

...harder now if just starting without training
Diversity is Good, but...

...being “Best” at Something Important Makes you Essential to an Organization
Find & Team With Other “Best” People

“Never doubt that a small group of thoughtful, committed, citizens can change the world. Indeed, it is the only thing that ever has.”
— Margaret Mead

• Many organizations still in denial
• Many organizations feel helpless
• Cultures change from within
Climate Change & Your Career

What do you want to accomplish in 30 years? (It goes by quickly...)

Achieving Strategic Goals Requires Tactical Actions
Commit to Quality & Building Something
Long-term Monitoring is Difficult but Essential

River Loire, France (1880 – 2003)

Collecting Data is Fun...
Archiving it & Maintaining a Monitoring Program are Not
Commit to Quality & Building Something

Are you investing in/pushing yourself? (challenges are how you grow)

Leadership/mentoring others/continuing education...

Don’t let complacency creep in...
At the end of the day, I don't know if anything I've said is all that different from other speakers or that's different from the evolution of workforce in modern day economy or excellent business practices.

Lessons are Universal

Climate Change is Just another Context
& a Huge Opportunity
Today’s Decisions Make Tomorrow’s World

Onus or Opportunity?

Human Land Use & Water Development

Future Fisheries

Biodiversity / Life on Earth

Future Fisheries
No one really knows where it's headed, but have decades of warming baked in. Climate Change & Careers Take Time, Commitment to Excellence, & Self-Sacrifice are going to require excellence, commitment, and teamwork at a new level. And an element of faith too, because no one really knows where this is headed, and for our generation and maybe next, we have to be content with knowing we're fighting the good fight even if we don't see how it ends...

Don’t Rush but be in a Hurry...