

The Water Out There!



Linking observation (hydrologic impacts) and trends to actions – to address or mitigate risk

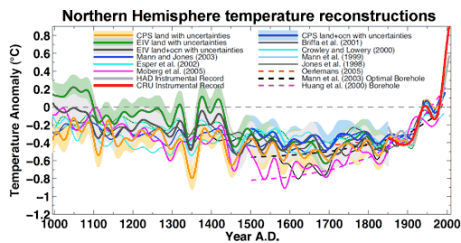
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Water Resource Specialist, Urban Systems
October 28, 2015



Overview

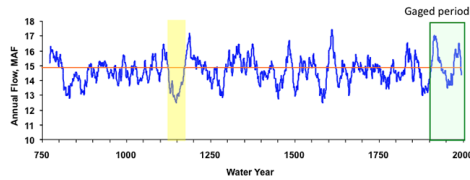
- Current climate
- Natural vs Anthropogenic impacts to water
- Events
- Channel Indicators
- Data
- Conclusions
- Recommendations

Our Changing Climate

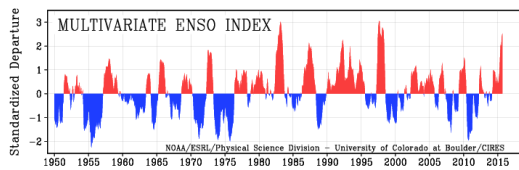


Streamflow Colorado River at Lees Ferry, Az

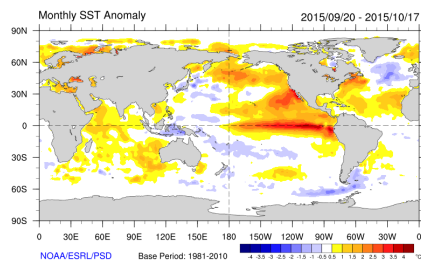
• Meko et al. 2007



ENSO and Pacific Ocean



ENSO and Pacific Ocean



Natural System vs Anthropogenic Impacts

- Water quality and quantity



Natural System

- Snow dominated
- Rain on snow dominated
- Rain dominated
- Channel instability
- Peak flow
- Water quality and quantity



Anthropogenic Impacts

- Mining, Forestry, Recreation, Agriculture, Urbanization
 - Linear features – roads, pipelines, railways
- Climate change

Mission Creek June 2013

- Rain event

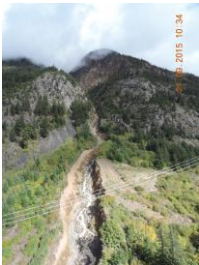


September 20 Birken Debris Flow

BC Hydro Transmission Lines Safety Plan
Drought
Anomalous mm/day rain event



Birken



Mara Slopes

- Natural and Anthropogenic
- Debris flow events
- Events ~30 years
- Part of cleaning the system of accumulated material
- Hummingbird, Sicamous, Cooke Creek



Insects - MPB

- Extensive logging
- ~80% ECA



Post Wildfire – watershed impacts

- Drought event
- Post wildfire
 - Hydrophobic (water repellant) soils
 - Terrain stability
 - Increased sediment loads
 - Water quality
 - Surface erosion



Post Wildfire - Okanagan

- October 22 rain event
- 12-20 mm in 20-45 mins
- Flooding and debris – significant erosion
- Rambler Creek
 - debris deposited up to 200 meters downstream



Forestry and Roads

- ECA
 - Peak flows, timing, water quality
- Culverts and bridges
 - New water ways
 - Undersized
 - Erosion
- Roads
 - gradient,
 - Running surface



Recreation and cattle

- Loss of riparian



Impacts due to Urbanization

- Smith Creek – Spring 2014
- Vancouver – increase trend in sub-hourly intensities



Fans

- Human interactions
- Weather events
- Watershed activities

Channel stability Indicators

- Natural and anthropogenic
 - Active/Stable
 - robust
 - Moss
 - Bank erosion
 - Aggraded/degraded channels
 - LWD
 - Boom and bust





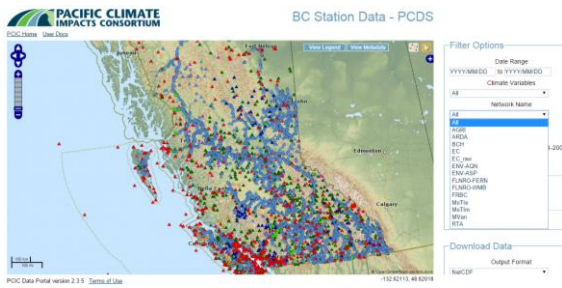




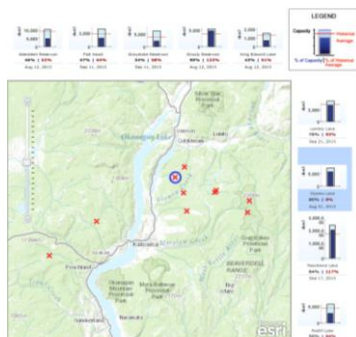
Incomplete or missing data

- Decommissioning of hydrometric and climate stations
- OBWB initiative
- Out of date records



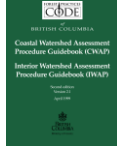


Reservoir Levels



Conclusions

- Change is certain
 - Cumulative effects of natural and anthropogenic
 - Challenge to separate
- A lot of improvement over the years
 - Research, FPC
 - Dam Safety
- Uncertainty with future climate



Recommendations

- Research
 - Winkler Extension Note
- Wildfire mapping
- Fuel load management – Interface fires
- Proper road and water design
- Long term forestry plans - ~50 years
- Hazards and risks
- Cumulative effects
- Water purveyors
 - Increase reservoir capacity
 - Maintain works

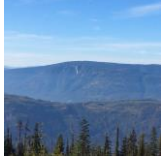


Rubber Deflector

- Rubber belting, attached to and reinforced by timbers,
- help divert water off a gently sloping forest road.
- allow equipment to pass over without interference.
- The area receiving water from a rubber deflector should be stabilized with cobblestone to prevent erosion at the lower tip of the deflector.



Questions



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