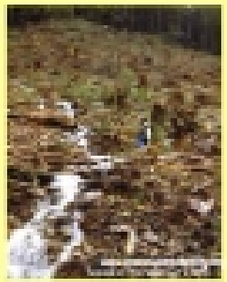
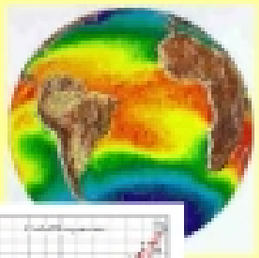
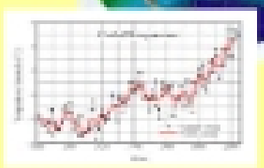
Thermal Pollution

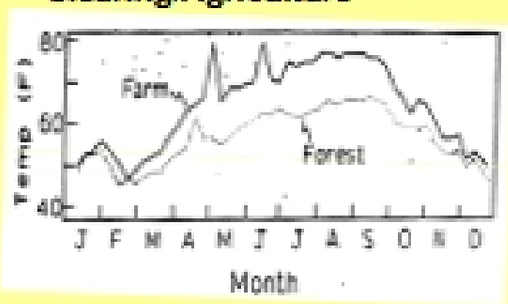



Sources of Thermal Pollution

- Thermoelectric power generation & Industry
  - Coal/oil-fired plants
  - Nuclear plants
- Water needs dictate coastal, estuarine, large river sites
- Often intermittent in operation: problems for organisms

- Land-use practices
  - Logging
  - Clearing/Agriculture



  - Damming & Reservoirs (e.g. Vinson)
  - Grazing (e.g. Li et al.

Global Climate Change

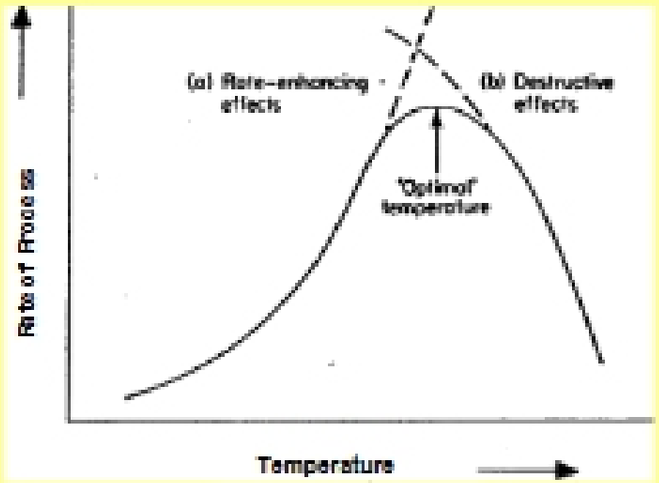
Global Climate Change

Wagner, F.H. (Editor). 2003. Rocky Mountain/Great Basin Regional Climate-Change Assessment. Report for the U.S. Global Change Research Program. Utah State University, Logan, UT: IV + 240 p.

Projections for 2080-2100 for Rocky Mountain-Great Basin area

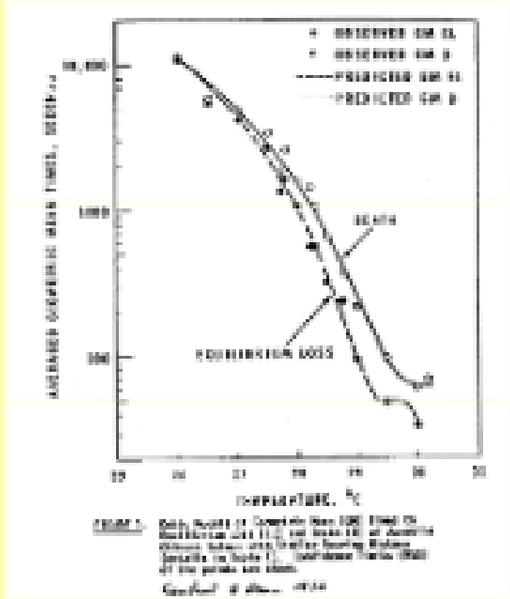
	GCM Model	
	HadCM2	CGCM1
Temperature		
Spring	+2.5 C (4.5 F)	
Summer		+5 C (9 F)
Winter	+4.5 C (8.1 F)	+9 C (14 F)
Annual Precipitation	+54 -119%	+59 -184%

Biological Effects of Temperature



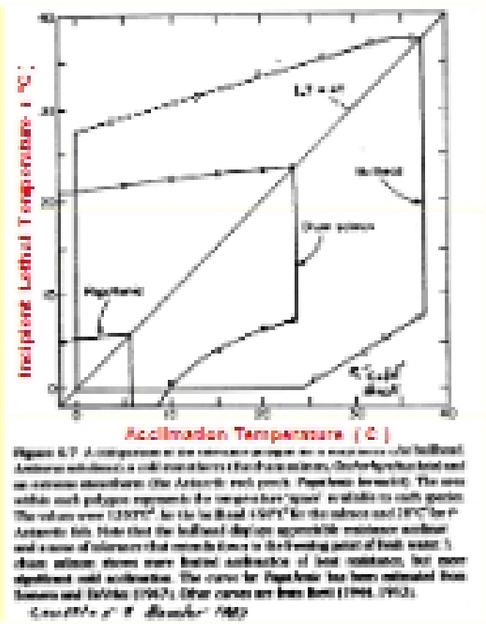
Lethal Effects

Survival Time of Chinook Salmon



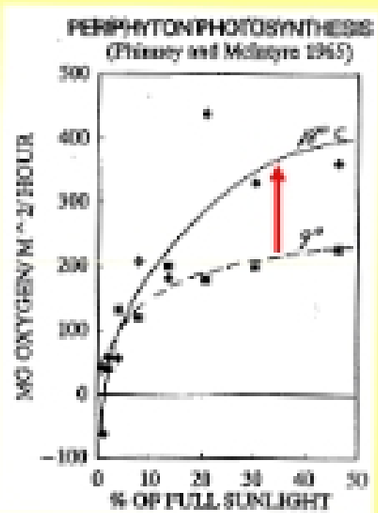
Temperature Tolerance Polygons of Species differ

Physiological acclimation influences response

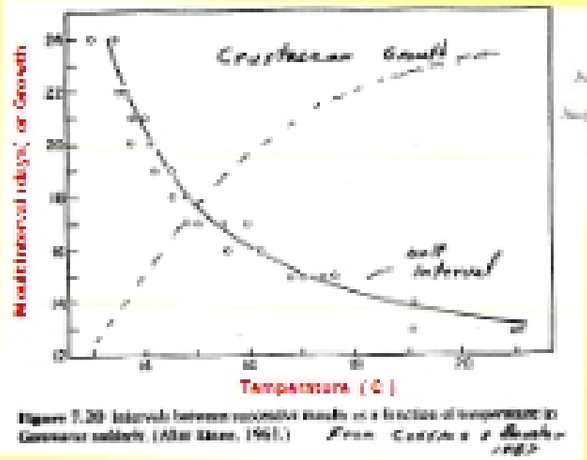


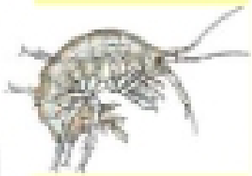
Food Web Effects of Temperature:

Primary Production



Invertebrates
Another ectothermic Group

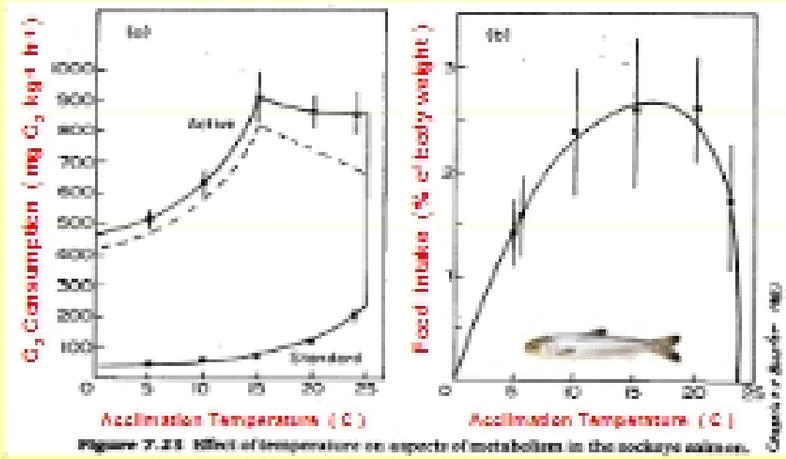




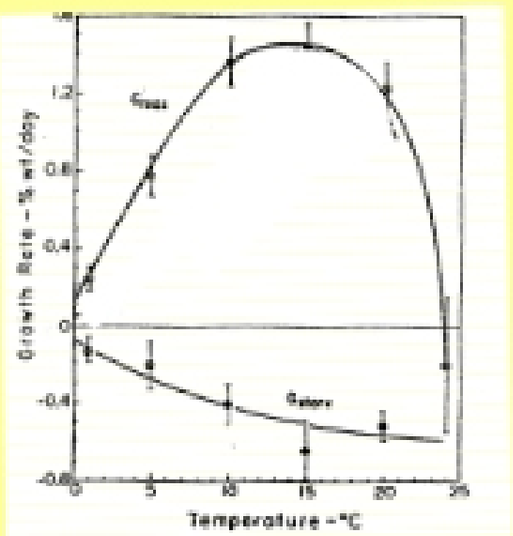
Gammarus "scud"

Bioenergetics & Temperature

Growth = Intake – Respiration - Wastes



Sockeye Salmon Growth
(Brett, J.R. 1979)



Combined Effects of Temperature & Ration Level on Growth of Sockeye Salmon (Brett)