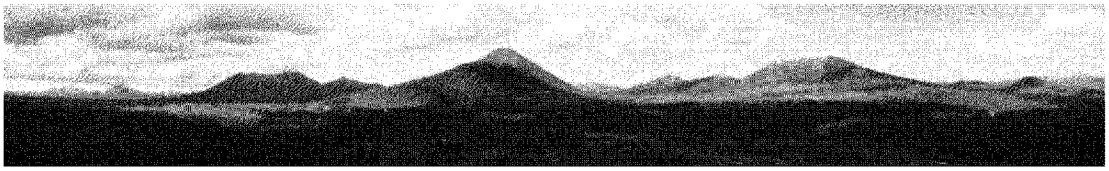

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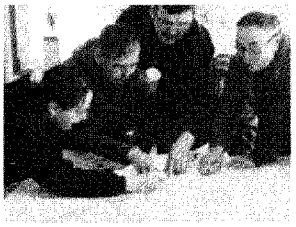
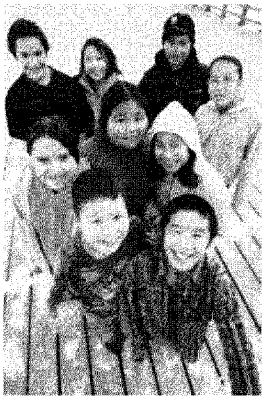
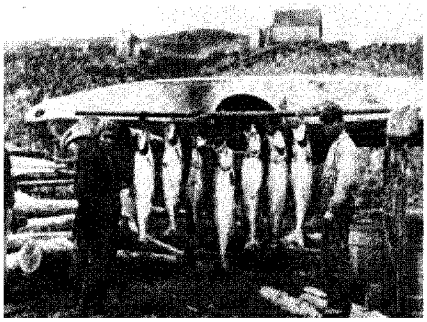


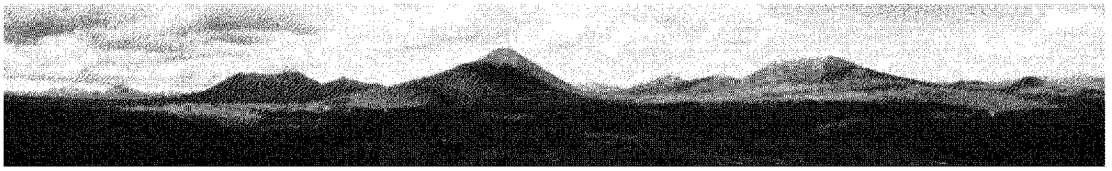
An Assessment of Ecological Risk
to wild salmon from large-scale mining
in the Nushagak and Kvichak Watersheds of Bristol Bay, Alaska

David Albert
Director of Conservation Science
The Nature Conservancy, Alaska Field Office

26 January, 2011







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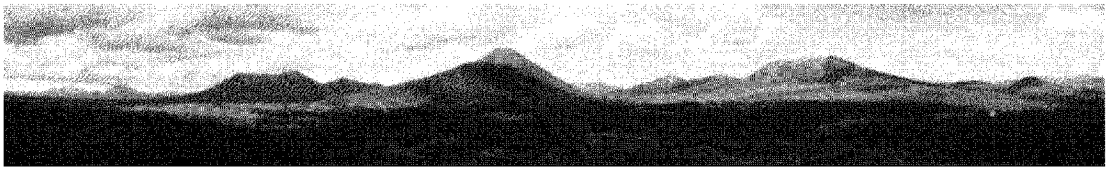
Ecological Risk Assessment Methods:

- Large Mine Scenario:
  - Northern Dynasty application for water rights, 2006
- Problem formulation:
  - Physical stressors
  - Chemical stressors
  - Resources at risk
- Literature Review and Data Analysis
  - Estimate future conditions
  - Describe impact on biological resources
- Risk characterization:
  - Evaluate likelihood of adverse effect over time



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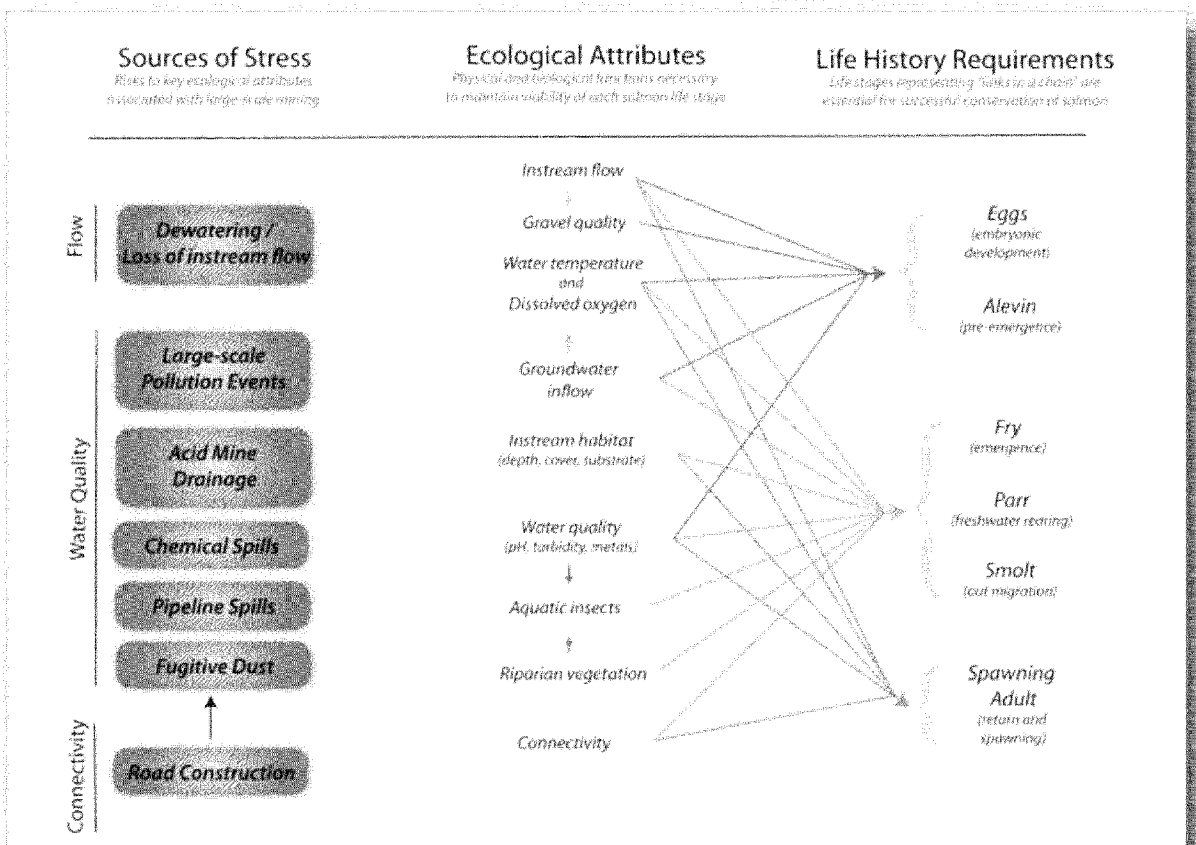

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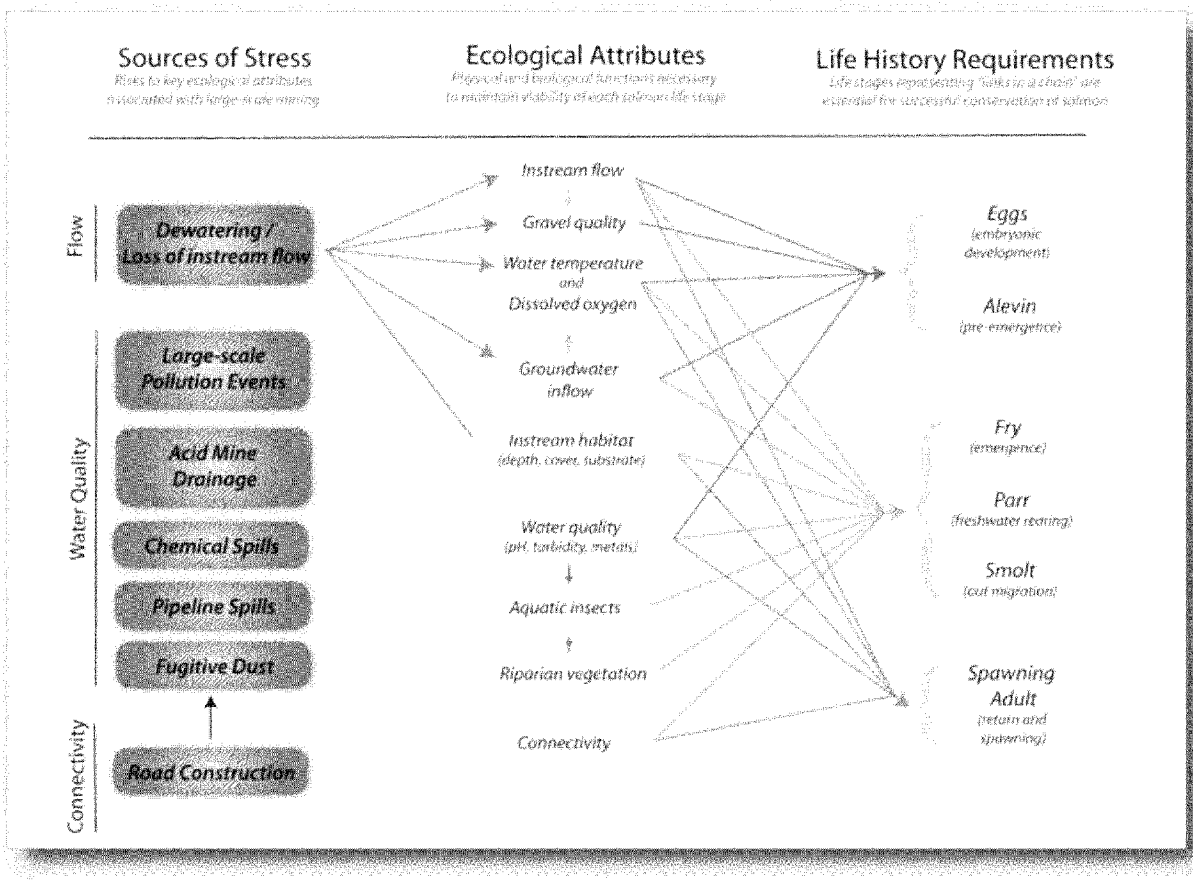

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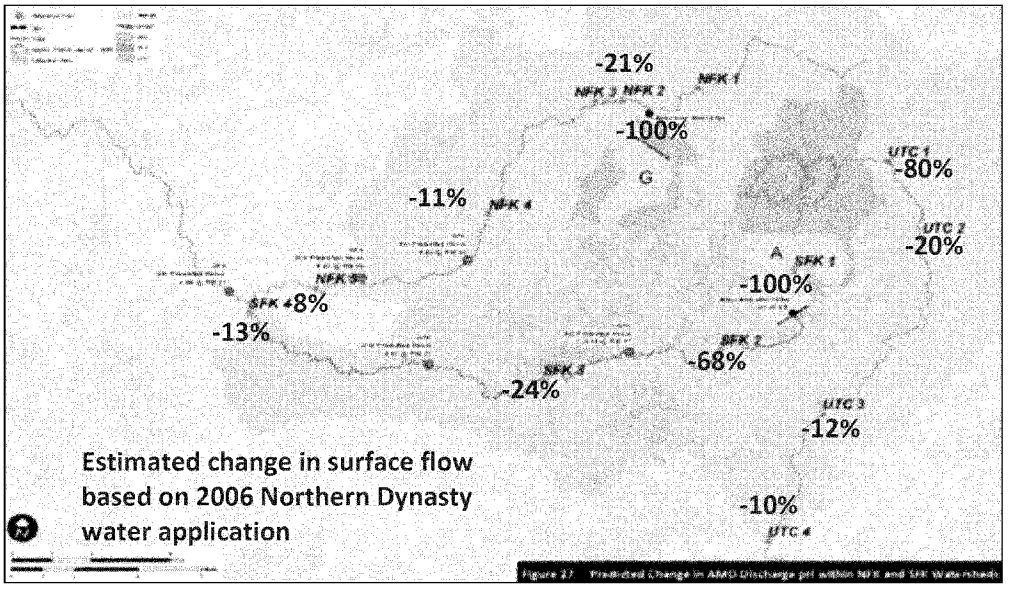
Loss of Instream flow



Risk determination:
(habitat lost or altered)

- Drainage area lost: 33 miles^2
- All Streams lost: 68 miles
- Salmon streams lost: 14 miles
- Salmon streams with reduced flow: 78 miles

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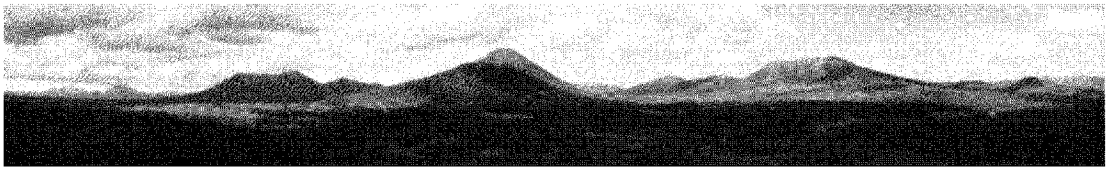

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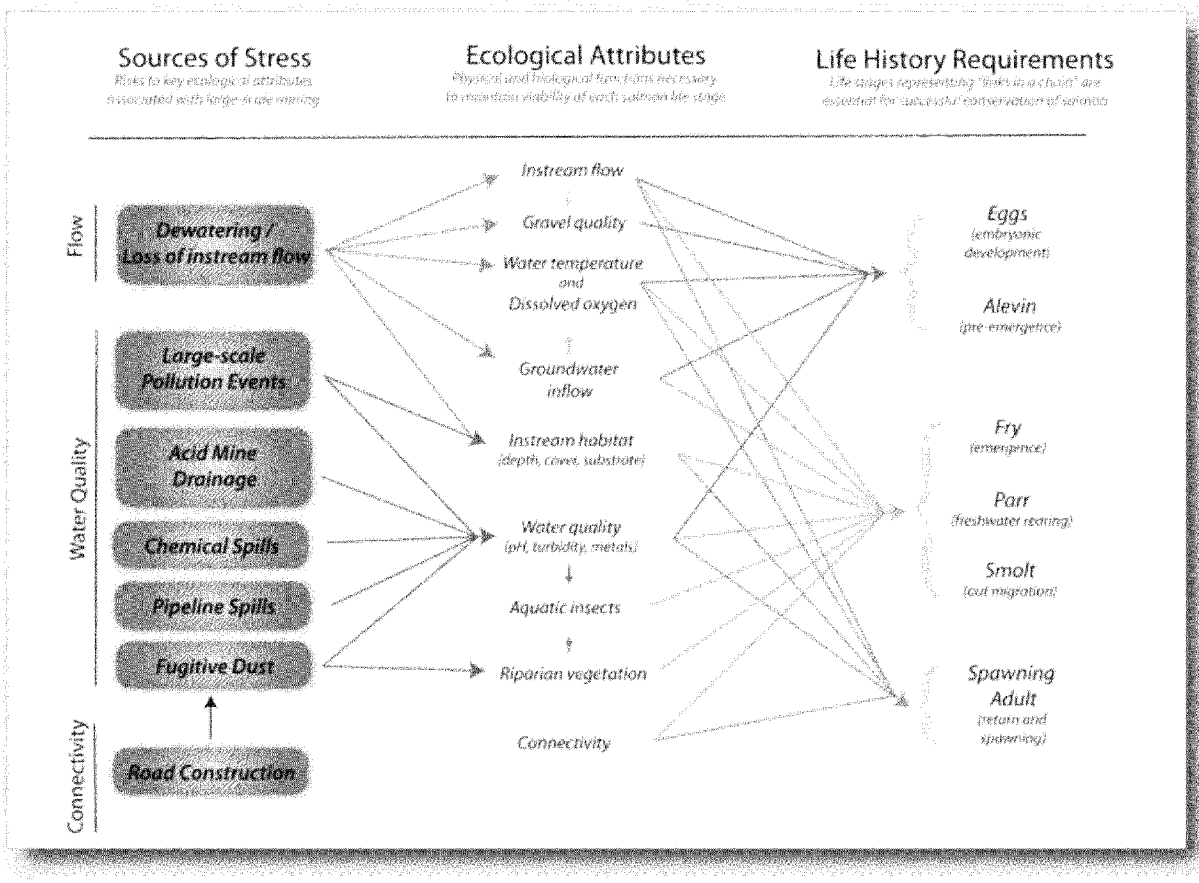

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Acid Mine Drainage

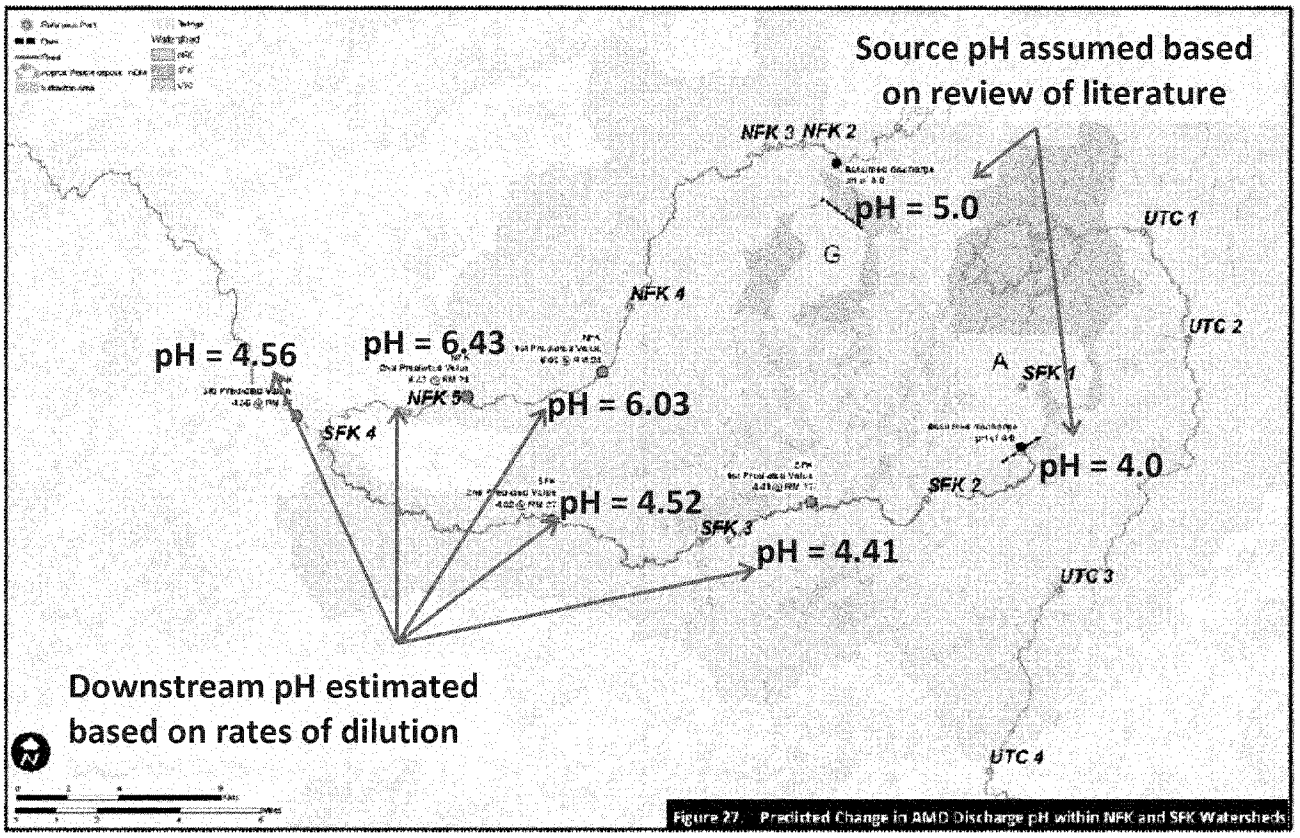
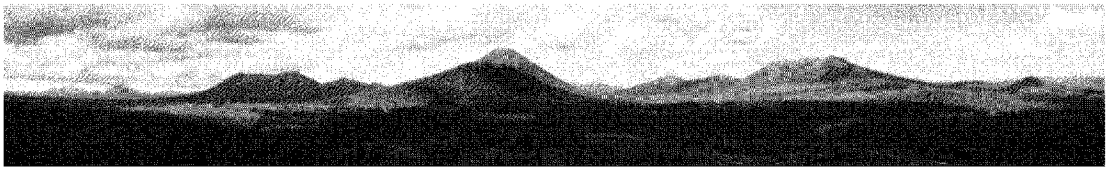


Figure 27. Predicted Change in AMD Discharge pH within NFK and SFK Watersheds



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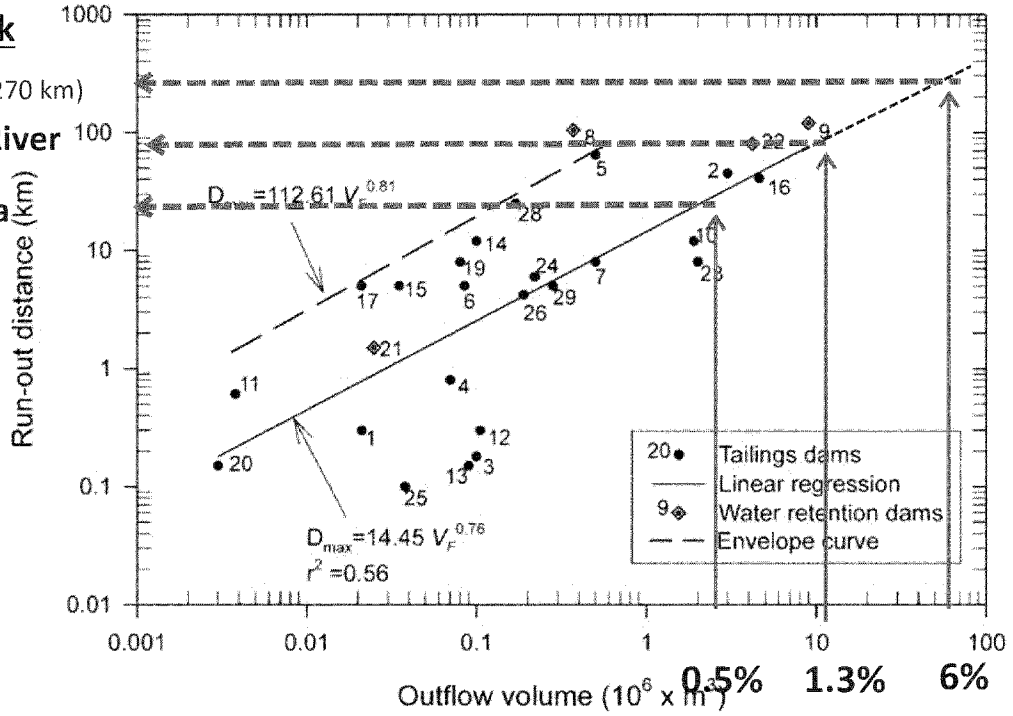
Risk Scenario: 2 billion-ton tailings impoundment

Zone of Risk

Bristol Bay (270 km)

Mulchatna River (78 km)

Lake Illiamna (24 km)



Risk scenario based on Northern Dynasty water application, 2006

Percent of Full Capacity

From: Rico, M., G. Benito and A. Díez-Herrero, 2008. Floods from tailings dam failures. J. Hazard. Materials 154:79-87.

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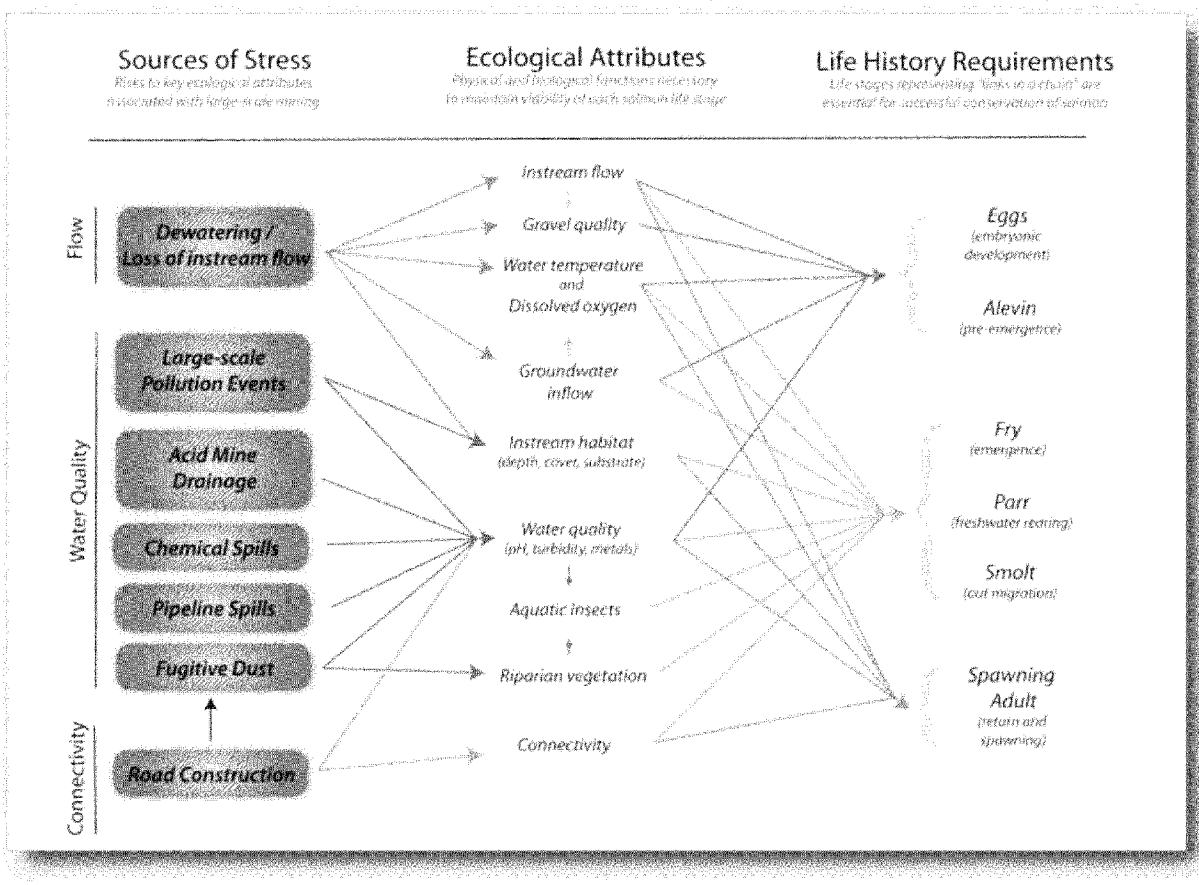

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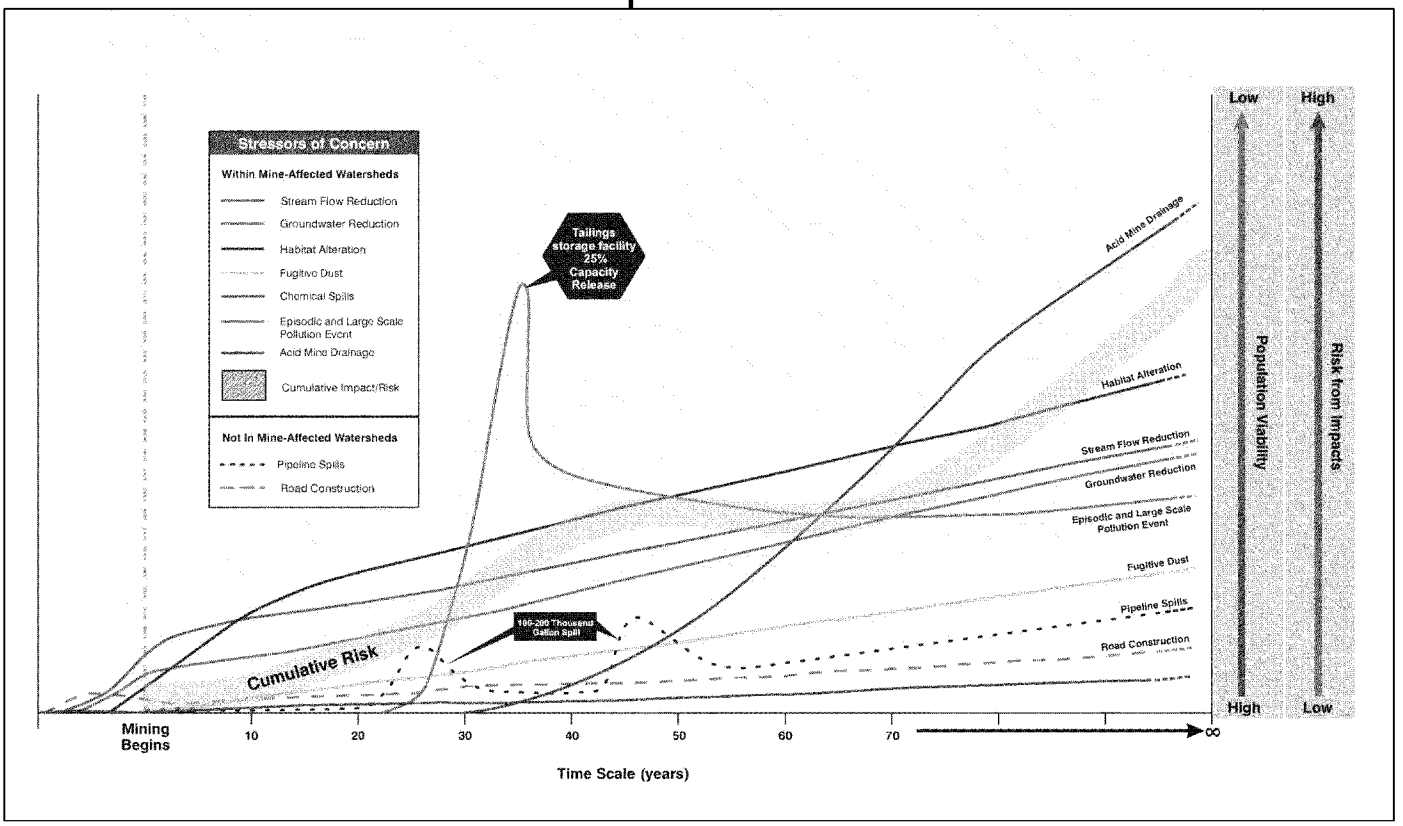
Cumulative effects: a conceptual illustration of risk over time



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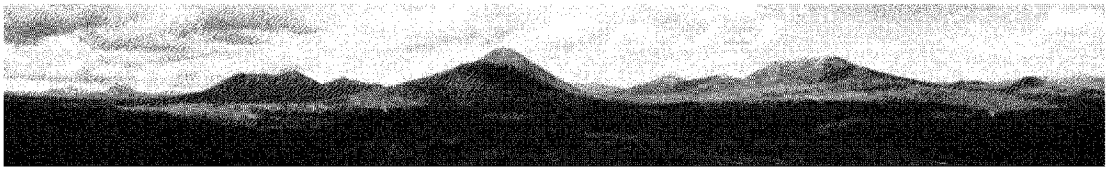

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Conclusion:

TNC Alaska Board of Trustees, Sept 2010:

- Based on our assessment of the risks and state of current, proven mining technology, large scale mining in these critical watersheds at this time presents an inappropriate risk to the salmon systems of the region

- The Conservancy recommends that mining and other activities not be allowed that:
  - Destroy or impair habitat such that sustained abundance is placed at risk
  - Require water withdrawals that exceed ecological flow needs for fish
  - Require active management in perpetuity to avoid contamination
  - Result in acid mine drainage that cannot be eliminated by proven methods at comparable sites and scale

- The Conservancy believes that a very high bar is necessary in this region and the above criteria should form the foundation of that bar