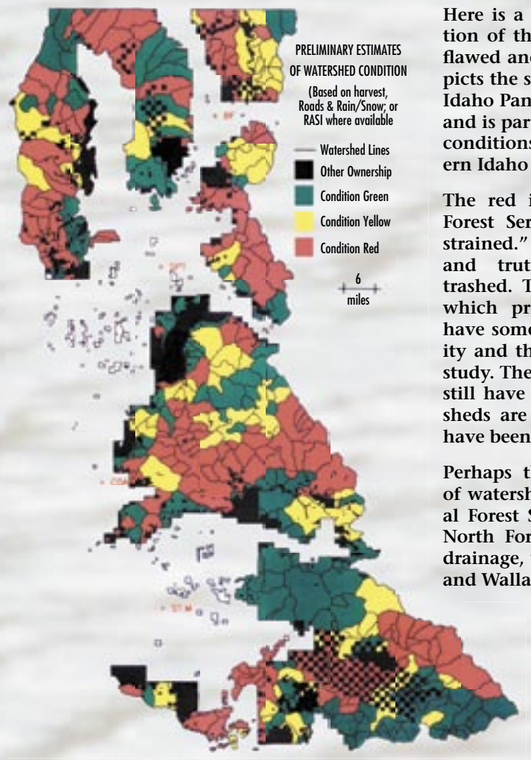
Toxic Floods of the Coeur d'Alene

A confluence of two rivers & a confluence of two histories: logging and mining

When the two federal plans for the Coeur d'Alene watershed — EPA's Superfund cleanup plan and the U.S. Forest Service's forest plan for the Coeur d'Alene National Forest — are blind to each other.

Poster developed by John Osborn, MD for the tour of the Coeur d'Alene Basin by the National Academy of Sciences review committee, April 14, 2004

North Fork, Coeur d'Alene River, Coeur d'Alene National Forest
U.S. Forest Service, forest plan, Idaho Panhandle National Forests



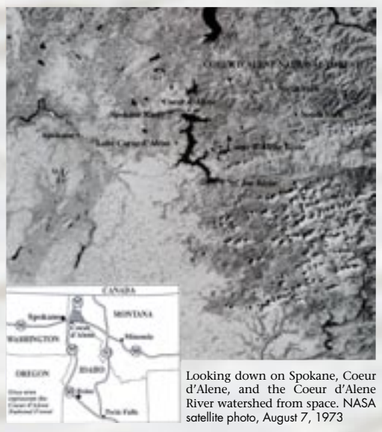
Here is a graphic and dramatic illustration of the result of the Forest Service's flawed and illegal policies. This map depicts the state of watershed health in the Idaho Panhandle National Forests (IPNF), and is part of an evaluation of watershed conditions across all of Region I (northern Idaho and Montana).

The red indicates watersheds that the Forest Service calls "management constrained." If you want to be more blunt and truthful, these watersheds are trashed. The yellow indicates drainages which preliminary indications suggest have some of the parameters of instability and these watersheds require further study. The green displays watersheds that still have integrity. Most of these watersheds are in roadless condition, and/or have been only lightly logged.

Perhaps the most dramatic illustration of watershed abuse in the entire National Forest System has taken place in the North Fork of the Coeur d'Alene River drainage, which encompasses the Fernan and Wallace Ranger Districts on the IPNF. Excessive road building has created areas that have road densities of up to 20 miles per square mile.

Massive clearcut logging and mining have yielded stream instability and toxic heavy metal pollution. Floodwaters from the North Fork are disgorged onto a floodplain, contaminated with heavy metals, pushing toxic metals and nutrients into Lake Coeur d'Alene. In spite of this, Forest Service officers continue to propose large timber sales. These sales call for the same clearcut-like logging that has destabilized the Coeur d'Alene watershed and caused the extirpation of the bull trout and the loss of viability of the native westslope cutthroat trout, Idaho's state fish.

Barry Rosenberg, The Lands Council, excerpt from testimony before the U.S. House Natural Resources Subcommittees on National Parks, Forests, and Public Lands, and Oversight and Investigations. February 1, 1994.



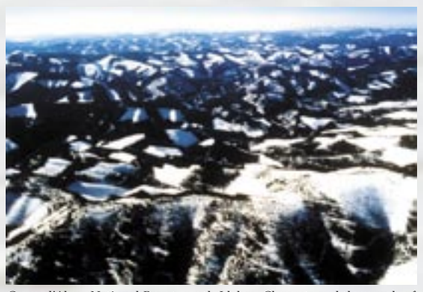
Looking down on Spokane, Coeur d'Alene, and the Coeur d'Alene River watershed from space. NASA satellite photo, August 7, 1973

Flooding stream, Coeur d'Alene National Forest

Bedload gravel, Little North Fork Coeur d'Alene River. Clearcuts and roads increase water yields and hydraulic energies that eat away at the bottom and sides of streams. The resulting bedload moves downstream. Once deposited, the bedload causes streams to fill-in and widen, redirecting the flowing water into the stream banks. The result is further damage. More bedload is produced.

Much like falling dominos, clearcuts and roads at the top of the watershed in the headwater streams cause damage through entire hydrologic systems.

The watershed of the Spokane-Coeur d'Alene is unraveling, just as hydrologists within the U.S. Forest Service warned starting nearly 40 years ago.



Coeur d'Alene National Forest, north Idaho: Clearcuts and thousands of miles of logging roads.

Clearcut filled with snow, Coeur d'Alene National Forest. Much of the Coeur d'Alene National Forest is located in elevations called "rain-on-snow belts". The sudden release of water occurs when warm winter weather events melt accumulated snow. Water yields are increased by removal of forest canopies ("even-aged" management) and logging roads that disrupt water tables and channelize water from rapidly melting snow.

Confluence of the North Fork (railroad trestle) and South Fork (right) of the Coeur d'Alene River. The North Fork's history and watershed are dominated by U.S. Forest Service logging with resultant floods. The South Fork's history and watershed are dominated by mining, with the resultant toxins. The co-mingling of waters is a metaphor for the coming together of two histories – logging and mining – that are the genesis of the toxic floods of the Coeur d'Alene River. photo source: Fred Rabe & David Flaherty, *The River of Green and Gold: a pristine wilderness dramatically affected by man's discovery of gold*, Idaho Research Foundation, 1974

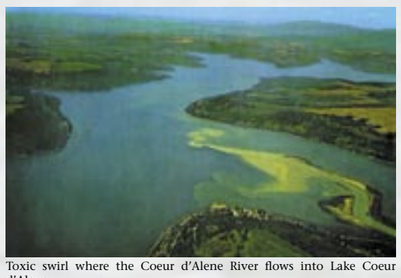
Specifically, Feasibility Study includes the basin except for the North Fork of the Coeur d'Alene River. EPA, Coeur d'Alene Basin Remedial Investigation/ Feasibility Study, Overview, p.v., October 2001

Little sediment is transported through Coeur d'Alene Lake except during flood events. EPA, Overview, p 2-17

These weather patterns make the Basin one of the highest-precipitation areas of the Upper Columbia River Basin and can lead to flooding, especially when winter rainfall occurs on top of snow conditions. EPA, Human Health Alternatives 1-11

Flood, Coeur d'Alene river, 1974. Flood waters carry millions of pounds of lead into Lake Coeur d'Alene, and on into eastern Washington waters. Reprinted from: Fred Rabe and David Flaherty, *The River of Green and Gold*

The impacted floodplain sediments, in particular, also act as "secondary" metal sources that impact the other media. Directly or indirectly, the impacted floodplain sediments are the major source of metals in basin waters, the major source of metal exposure risks to ecological receptors and a major source to humans, and a major source of potential future recontamination of downstream areas that are cleaned up. The estimated mass and extent of impacted site media — primarily sediments — exceeds 100 million tons dispersed over thousands of acres.



Toxic swirl where the Coeur d'Alene River flows into Lake Coeur d'Alene.

In a single day of the February 1996 flood, the USGS calculated that 1.4 million pounds of lead flowed into the lake. The lake is an inefficient trap for metals, and releases mine wastes downstream, polluting the Spokane River and Washington waters.

High blood lead levels in the lower basin have been associated with homes that were flooded in 1996, and recreational activities outside the home (TerraGraphics and URSG 2001). EPA, Overview 3-4

Recontamination—Periodic flooding can recontaminate previously remediated areas where storm, snow melt, or flood waters have caused erosion and subsequent redeposition of contaminated sediments. This is a particular concern for community recontamination in smaller basin communities. Many of these communities do not have surface water control systems (e.g., curbs, gutters, and ditches) that effectively control runoff during snowmelt and storm events. For residents living in or near flood plains, uncontrolled surface water runoff, especially during flood events, has a high likelihood of recontaminating properties where remediation has previously been conducted. EPA, Overview. p. ix

Flooding would recontaminate remediated yards by depositing contaminated sediment derived from upstream mining activities. Reviews of flood maps prepared by the U. S. Department of Housing and Urban Development (HUD) and the Federal Emergency Management Agency (FEMA) identified communities with significant flooding problems. Other communities with flooding problems were identified by obtaining anecdotal information from local residents. The estimated percentage of residences with flooding problems is provided by investigation area and community in Table 4-3. EPA, Human Health Assessment, 4-6

Researchers have confirmed their suspicion that a muddy springtime plume cruising across Lake Coeur d'Alene carries Silver Valley mining pollution to Spokane. The 30-foot-deep plume carried one-third of the lead it picked up from the Coeur d'Alene River into the Spokane River, according to the U.S. Geological Survey.

Zaz Hollander, "Study pinpoints source of lead in river: Lake CdA plume regularly dumps pollutants into the Spokane, data show *Spokesman Review*, October 15, 2000

This sign is located just downstream from the Idaho-Washington state line.

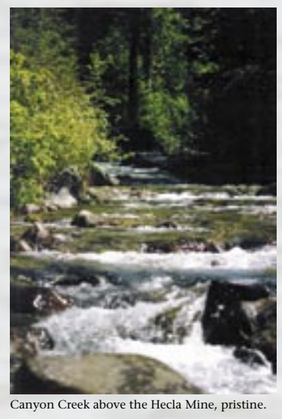
Sunbathers and swimmers enjoying the beaches of the Spokane River.

Trout Fishing, Spokane's West Central Neighborhood. The Spokane River is one of America's unique urban trout fisheries. Trout depend on cold, clean water from the Aquifer. Depleting the Aquifer threatens to destroy Spokane's prized fishery. Toxic metal pollution is less of a problem further from the Idaho border, allowing for one fish meal per month. Anglers increasingly advocate the fishery be designated "catch and release" to protect human health and the fishery.

"By removing more timber and Increasing the risk for damage [the U.S. Forest Service is] also risking the rehabilitation efforts and risking the taxpayers funds. I recommend that the N.F. Coeur d'Alene River be placed under a moratorium from timber harvest, and that rehabilitation be completed along with at least 10 If not 20 years' regrowth on the vegetation before any timber removal."

J. Allen Isaacson, former Supervisory Hydrologist for the Idaho Panhandle National Forests, referring to the Barney Rubble's Cabin and Skookum timber sales, letter to Inland Empire Public Lands Council Forest Watch, September, 1993, attachment C, appeal of the Supplemental Environmental Assessments for both sales.

South Fork, Coeur d'Alene River, Coeur d'Alene
Mining District, EPA, Superfund Cleanup Plan

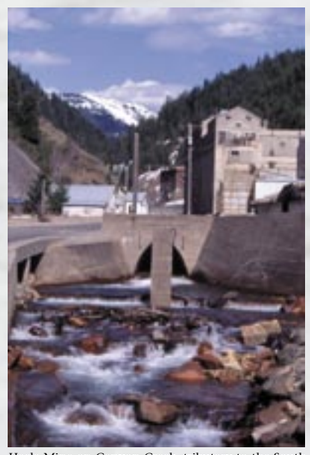


Canyon Creek above the Hecla Mine, pristine.

Mining within the Coeur d'Alene Basin began more than 100 years ago. The basin has been one of the leading silver, lead, and zinc-producing areas in the world, with production of approximately 1.2 billion ounces of silver, 8 million tons of lead, and 3.2 million tons of zinc (Long 1998). The region surrounding the South Fork has produced over 97 percent of the ore mined in the basin (SAIC 1993). The Bureau of Land Management (BLM) has identified nearly 900 mining or milling-related features in the region surrounding the South Fork (BLM 1999). EPA Coeur d'Alene Basin Feasibility Study Report, Overview 1-5, October 2001

An estimated 62 million tons of tailings were discharged to streams from the beginning of ore processing in 1884 until discharge to streams was discontinued in 1968. The tailings contained an estimated 880,000 tons of lead and more than 720,000 tons of zinc (Long 1998). EPA, Overview 1-6

By the 1950s, mine tailings piped from the river covered 2,000 acres of the Cataldo Mission Flats to an average depth of 25 to 30 feet. Sediment dredging, pumping 7,000 gallons of water per minute, and excavating some 500 tons of contaminated river sediments per day continued until 1968. Approximately 72 million tons of this sediment contaminated with mine tailings have been discharged into the Coeur d'Alene River (Krieger 1990, Weston 1989). EPA: Human Health Alternatives 1-8, October 2001



Hecla Mine on Canyon Creek, tributary to the South Fork of the Coeur d'Alene River. Canyon Creek above Hecla Mine is a forest stream; below, sterile with mine wastes. photo: Chris Anderson-Aurora, *US News and World Report*, May 4, 1998

Blowing up the 715-foot-tall smoke stack at the Bunker Hill lead smelter, May 26, 1996. The once-denuded mountainsides are beginning to recover. photo: Liz Kishimoto, *Spokesman-Review*, May 27, 1996

The dredge pipe shown above and the suction dredge below are the two ends of one solution to the problem of mine-waste pollution in the Coeur d'Alene River and Lake. They were located at Mission Flats, downstream from the mining district. Above, #MG-5, Stanly Easton Papers; below #8-X017, Barnard-Stockbridge Collection; both University of Idaho Library, Moscow, Idaho

From: Nicholas A. Casner, "Toxic River: Politics and Coeur d'Alene Mining Pollution in the 1930's", *Idaho Yesterdays*, a publication of the Idaho State Historical Society, Fall, 1991; Volume 35, Number 3

Eight dead swans found in just a single day (April 9, 1997) in one still-polluted field of the Coeur d'Alene River's floodplain.

On the surface, Lake Coeur d'Alene looks like the perfect postcard, its cool waters shimmering beneath a rolling green carpet of trees. But beneath the water lies a graphic portrait of environmental devastation, according to a four-year study that will be released today. Government scientists found an estimated 75 million tons of toxic mining waste coating the lake bottom. The result is a 25-mile-long dead zone where no organisms can survive. The U.S. Geological Survey would not release its findings until today. But several sources in the Coeur d'Alene Basin Interagency Group said the final report supports preliminary data released in April 1992:

- **Heavy metals such as lead, cadmium, arsenic and mercury are encased in sediment. But continued increases in nutrients, such as fertilizers and runoff, and decreases in oxygen a total process called eutrophication — could unleash the toxic metals into the water column. That would threaten fish and other aquatic life.**
- **Zinc already has oozed into the water column and exceeds federal standards.**
- **Age-dating studies trace the birth of the toxic, muddy layer to about a century ago. Hard-rock mining began in the region in the 1880s.**
- **The mining waste lying beneath Lake Coeur d'Alene includes an estimated $200 million worth of silver. But the environmental consequences and cost of extracting the mineral would far exceed its value. Conventional extraction methods such as a suction dredge could cost $1 billion.**
- **90 percent of the heavy metals that leach into the lake today originate in the chain lakes region south of Cataldo. The waste washed downstream over the last century and accumulated on the floodplain. That means most of the government cleanup efforts upstream of Cataldo are missing the source.**

"It's probably the most contaminated lake in the United States and ranks among the most contaminated in the world," said Howard Funke, an attorney for the Coeur d'Alene Tribe.

J. Todd Foster, "Toxic waste covers bottom of Lake CdA" *Spokesman-Review*, December 8,1993

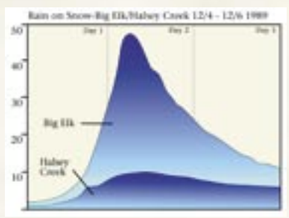
A procedure for evaluating risk of increasing peak flows from rain on snow events by creating openings in the forest canopy

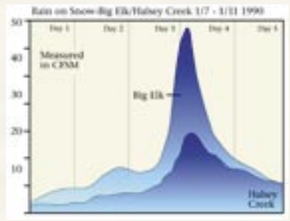
Gary Kappesser, Forest Hydrologist ✣ Idaho Panhandle National Forests ✣ March, 1991

Some of the largest and most damaging flood events in north Idaho have occurred in November through February from "rain on snow" events. Warm Pacific maritime air masses moving into the area provide the moisture and energy to rapidly melt existing snowpacks. Latent heat of condensation is liberated as the water vapor in the warm moist air condenses at the snow surface. Rate of heat liberation is a function of wind velocity at the snow surface to provide a continuing source of water vapor. Large openings in the forest canopy created by timber harvest can result in significantly increased wind velocities at the snow surface. This will produce an altered hydrologic response with higher flood peaks, shorter times to rise, and shorter recession. The result may be destabilized stream channels with increased bedload transport. The risk of increasing peak flows through timber harvest may be evaluated in terms of significant causal factors. These include elevation ranger, size of opening created in the canopy, percent crown cover removed, and a combination of aspect and slope.

Kappesser, Gary. A procedure for evaluating risk of increasing peak flows from rain on snow events by creating openings in the forest canopy. USFS. Idaho Panhandle National Forests. March, 1991.

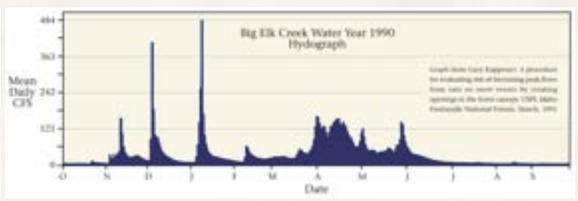
As stream flows increase, so does the stream energy and the ability to do damage. The relationship between stream flow and energy is logarithmic: as stream flow doubles, stream energy increases 10-times.





Compare the stream flows from an extensively clearcut stream (Big Elk Creek about 50 percent clearcut equivalent acres) with a stream logged previously and now with forest canopy regrown and hydrologically recovered (Halsey Creek). For comparative purposes, stream flows are expressed in units of "CFSM" or cubic feet per square mile.

Graphs adapted from: Kappesser, Gary. A procedure for evaluating risk of icreasing peak flows from rain on snow events by creating openings in the forest canopy. USFS. Idaho lanhandle National Forests. March, 1991.



Compare the 3 short bursts of intense runoff during the winter with the sustained high runoff during the spring melt, "rain on snow" exceeds spring runoff by a magnitude of 4. "Rain on snow" storm events caused the high water yields during the winter. Stream energy is much, much higher during the "rain on snow" peak flow because the relationship of stream flow (shown here) with stream energy is logarithmic, not linear.

Recurrance Interval*	
CSFM	YEARS
6.21	1.01
8.23	1.05
9.59	1.11
11.52	1.25
16.25	2.00
22.72	5.00
26.97	10.00
32.31	25.00
36.25	50.00
40.17	100.00
44.09	200.00

Water flows on Halsey Creek (forest canopy intact) occurred with a likelihood of an annual event (recurrence interval of 1) on December 5, 1989, and 12-15 years on January 10. Peak flows for Elk Creek (clearcut) occurred with a frequency of once every 200 years on December 5, 1989, and once every 200+ years on January 10, 1990. Indeed, the peak event of 70 CFSM is significantly off the charts, and perhaps in the range of a flood event occurring every 500-1000 years.

* Data from Shoshone Creek on the North Fork of the Coeur d'Alene River near Pritchard, Idaho, appended to Gary Kappesser: A procedure for evaluating risk of increasing peak flows from rain on snow events by creating openings in the forest canopy, USFS. Idaho Panhandle National Forests, March, 1991. CFSM = Cubic Feet per Square Mile.