

Summary

AFS Policy Statement #13:
Effects of Surface Mining on

Aquatic Resources in
North America (Revised)
(Abbreviated)

Mining and mineral extraction is a transitory land use that takes many forms (e.g., dredging, placer, area mountain-top removal, and contour operations). It includes exploration, site preparation, mining, milling, waste management, decommissioning or reclamation, and even mine abandonment. Surface coal mining was first regulated in 1939 by reclamation laws passed in West Virginia. The U.S. Congress passed the Surface Mining Control and Reclamation Act (SMCRA) in 1977.

Stringency of federal, state, provincial, and local regulations varies with location, mineral, historical perspective, and controversy generated by proposed or existing projects. Primary responsibility for regulating surface mining often lies with state or provincial and local authorities, where the focus is on flexible approaches considering only site-specific characteristics.

Surface mining (1) eliminates surface vegetation, (2) can permanently change topography, (3) permanently and drastically alters soil and subsurface geological structure, and (4) disrupts surface and subsurface hydrologic regimes. Secondary mining impacts range from urban development in support of mining to creation of offroad networks for exploration activities. Surface subsidence following long-wall deep mining can dewater stream reaches and divert flows into different surface stream channels that are not adjusted to such increased flows. Altered patterns and delivery rhythms can be expected as well as changes in water quality.

Off-site impacts such as stream pollution can be significant. Water quality impacts can generally be controlled during active mining, but many acid-potent coal reserves cannot be mined with current technology without "residual acid seepage" requiring "uninterrupted perpetual treatment" in order to protect large river systems. Backfilled, reclaimed surface mine sites thus constitute artificial, porous "geological recharge areas" where infiltrating water percolates through the fill and emerges as very acid seeps or springs that often flow even during drought when natural waters dry up. Many receiving streams have low alkalinities (<10 mg/L), and great volumes or distances are required to neutralize even small mine flows that may carry 1,000 to 2,000 mg/L of acid.

The magnitude of surface mining impacts on aquatic life depends on the mining technology employed, extent of the disturbance, chemical and physical composition of the mineral and its overburden, surface and subsurface hydrologic patterns, and method of reclamation. In most areas of North America, reclamation after coal mining reduces off-site impacts, mitigates aesthetic damage to disturbed land, and reconstructs topography, soil profiles, and hydrologic patterns. This permits a wide range of options for future land use and even provides an opportunity to enrich, cool, and stabilize streamflows.

However, even under current regulations, some mining operations such as sand and gravel dredging remain largely unregulated, and some regulated mining companies fail to follow approved mining plans. In these cases surface mining continues to impact fish and aquatic resources through erosion and sedimentation, dewatering of wetlands, diverting and channelizing of streams, and contaminating surface water and aquifers with toxic chemicals. These impacts result in loss of sensitive species, biodiversity, and ecosystem integrity. Chemical pollution can result in complete and "permanent" losses extending far downstream. Accumulation of

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contaminants in fish may render them unsuitable for human consumption. Impacts from mining for phosphate rock, peat, copper, silver, gold, lead, zinc, and other heavy metals are of increasing concern.

The AFS endorses energy conservation, resource recycling, and alternative energy sources, particularly solar power to reduce the need for mined minerals and fuel. However, when mining is inevitable, proper mine site selection, operation, and reclamation can offer aquatic resource enhancement opportunities such as re-created wetlands, and reclaimed surface mine ponds, quarries, and gravel pits. All can provide important aquatic resource areas.

The AFS encourages its members to work closely with mine owners and operators, as well as with regulatory agency administrators. Biologists must provide timely, useful, and effective input to development and implementation of both short- and long-range reclamation plans, development of state or provincial and local mining regulation laws, and review of cumulative hydrological impacts. Biologists are also encouraged to seek overhaul of Office of Surface Mining regulations to better protect water quality and aquatic habitats.

The Clean Water Act and the SMCRA need amending to provide appropriate overlap to cover all potential discharges from mining operations. Research is needed to develop methodologies for predicting the biological impacts of multiple mines in a watershed, and the eventual toxicity of post-mining surface and groundwaters. Improved technology is needed to predict acid-base accounting, leach quality and rate, and the quality, size, and amount of each type of material involved in mining operations. Wetland and stream reclamation strategies need further development; restoration techniques should seek to optimize long-term fish production and promote aquatic diversity. Water quality standards need to be evaluated, and altered if necessary to protect aquatic life. Where possible, public access to and use of reclamation sites should be promoted.

The AFS policy regarding the effects of surface mining on aquatic resources in North America is to:

1. Encourage energy conservation, resource recycling and use of alternative sources of energy, particularly solar power to minimize the need for non-renewable minerals and fuels obtained through mining.
2. Encourage legislation and diligent regulation of all surface mining at the local, state, provincial, and federal levels to provide adequate protection of aquatic resources.
3. Encourage development of legislation (similar to the SMCRA for coal) that attempts to minimize the environmental impacts from mining of minerals other than coal.
4. Encourage AFS member involvement in policy making and mine reclamation by providing policy makers with technical information essential for protection and continued propagation of fishery resources.