and debris dams have been documented on many of the rivers within the DPS. Typically, these are partial obstructions and are ephemeral in nature.

One of the predominant land uses of central and northern coastal Maine watersheds is the growth and harvest of forest products. Forest management practices can cause numerous short- and long-term negative impacts to Atlantic salmon. Deforestation alters the water retention of watersheds resulting in high seasonal runoff followed by inadequate river flows. The removal of riparian vegetation reduces shading and increases water temperature. Poor logging practices and road construction adjacent to streams results in the deposition of substantial loads of woody debris and silt into waterways. Insecticides used to control insect infestations and herbicides used to manage competing vegetation enter waterways and adversely affect salmon. While historic forest practices have had harmful effects on Atlantic salmon in certain watersheds, numerous state and Federal laws now exist to prevent adverse impacts to Atlantic salmon and other aquatic species. Current forest practices are not considered a major threat to Atlantic salmon.

Another significant land use in eastern Maine watersheds is lowbush blueberry agriculture. Water extraction and diversion from rivers and streams for blueberry cultivation can make habitat unsuitable for Atlantic salmon. The herbicide hexazinone (velpar) is applied to blueberry fields to control competing vegetation. Blueberry barrens are also treated with fungicides and insecticides to prevent disease and control insect pests. Such chemical spraying can cause direct mortality of juvenile Atlantic salmon or adversely affect salmon if chemicals drain into waterways and reduce populations of aquatic insects, an important food source for salmon. With assistance from the Cooperative Extension Services of the University of Maine and the Natural Resource Conservation Service, numerous measures are being implemented to reduce the potential for contamination of waterways from blueberry cultivation. Current agricultural practices are not considered a major threat to Atlantic salmon.

Many of the eastern Maine rivers have deposits of peat within their watersheds. Commercial peat mining has the potential to adversely affect salmon habitat through the release of peat fibers, arsenic, and other chemical residues present in peat deposits. Further study is necessary to determine the impacts, if any, of peat mining on Atlantic salmon and Atlantic salmon habitat.

## *B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes*

Historically, the marine exploitation of U.S.-origin Atlantic salmon occurred primarily in foreign fisheries. U.S. origin Atlantic salmon have been documented in the harvests of West Greenland, New Brunswick, Nova Scotia, Newfoundland, and Labrador fisheries. The Newfoundland and Labrador fisheries constituted the majority of the harvest and intercepted the highest percentages of U.S.-origin Atlantic salmon. In the absence of West Greenland and Canadian interception fisheries, returns of U.S. Atlantic salmon could potentially increase twofold. In Canada, a 5-year moratorium is in place in Newfoundland and licenses are being purchased by the government. The Labrador fishery is now managed by quotas, and the 1993 quota represents a reduction of 92 percent from that of the 1990 quota level. In 1982, the North Atlantic Salmon Conservation Organization (NASCO) was formed for the purpose of managing salmon through a cooperative program of conservation, restoration and enhancement of North Atlantic stocks. NASCO accepted an agreement in 1993 that set quotas on the harvest off West Greenland with the goal of reaching target spawning escapements for North American stocks. During the next three years of the management plan, the number of spawners needed to sustain North American stocks of Atlantic salmon (194,000) will be protected by adjusting the West Greenland quota.

In 1987 the New England Fishery Management Council prepared a Fishery Management Plan (FMP) to establish explicit U.S. management authority over all Atlantic salmon of U.S. origin in Federal waters. The FMP prohibits the possession of Atlantic salmon in the exclusive economic zone, the area between 3 and 200 miles off the U.S. coastline. During the 1970s, recreational fishermen were harvesting as much as 15 to 25 percent of the Atlantic salmon returning annually to home waters. Currently state law allows only a catch and release fishery for Atlantic salmon, and no salmon fishing is authorized on the Pleasant River. Multi-sea-winter salmon incur some mortality from catch-and-release fishing and parr are vulnerable to incidental hooking mortality or illegal harvest by trout anglers. Poaching also poses a serious threat to depressed populations of Atlantic salmon in New England rivers.

## C. Disease or Predation

During their various life stages, Atlantic salmon are preyed upon by numerous species of fish, birds, and mammals and also compete with other species of fish. Major freshwater predators on Atlantic salmon include brook trout, brown trout, eel, burbot, northern pike, chain pickerel, smallmouth bass, belted kingfisher, heron, common and red-breasted merganser, osprey, herring and greater black-backed gull, otter and mink. Documented predators in the estuarine and marine environments include striped bass, shark, skate, ling and Atlantic cod, pollock, whiting, garfish, double-crested cormorant, European cormorant, harbor seal, gray seal, harp seal, and ringed seal. The effects and magnitude of competition and predation in the riverine, estuarine, and marine environments are not known.

Atlantic salmon are susceptible to a number of diseases and parasites that can result in high mortality. Freshwater external parasites of Atlantic salmon are the gill maggot, freshwater louse, leaches, and the skin parasite Gyrodactylus salaris, while internal parasites include flukes, tapeworms, spiny-headed worms and roundworms. Ocean parasites include the sea louse and sea lamprey. Atlantic salmon are susceptible to numerous bacterial, viral and fungal diseases, including furunculosis, bacterial kidney disease and vibriosis. Disease-related mortality is primarily documented for hatcheries and aquaculture facilities. Disease epizootics in wild salmon are uncommon. In New England, furunculosis is the only known source of disease-related mortality in wild Atlantic salmon.

## D. Inadequacy of Existing Regulatory Mechanisms

Many Federal and state laws and programs have affected the abundance, health and survival of anadromous Atlantic salmon populations in the United States. However, they have not prevented the decline of the species. The effectiveness of certain existing laws and regulations, which are summarized in the status review, could be strengthened by more stringent implementation and enforcement. Aquaculture facilities are located within 20 kilometers (km) (12 miles) of the mouths of five of the rivers within the DPS. Atlantic salmon that have been released or that have escaped from aquaculture pens are known to have entered some of these rivers. The escape of fish from Atlantic salmon aquaculture operations could pose a threat to the