SEISMIC EXPLORATION - FLATHEAD LAKE

Statements pertinent to preparation of an Environmental Assessment for seismic exploration at Flathead Lake, Montana are prepared cooperatively by the U.S. Fish and Wildlife Service and Montana Fish, Wildlife and Parks Department, Kalispell, Montana. Sections addressed referencing the fish and wildlife resource are: Description of the Affected Environment and Environmental Consequences.

Description Of The Affected Environment

Flathead Lake is one of the largest natural lakes in the United States west of the Mississippi and is located in northwestern Montana. Flathead has a mean depth of 32.5 meters and a maximum depth of 113 meters. Most of the lake exceeds 20 m in depth except for Polson Bay (maximum depth of 5 meters). Kerr Dam is located 6.4 km downstream from the lake on the Flathead River and has regulated the upper three meters of the lake since its completion in 1938.

Flathead Lake is noted for its high water quality which has an average alkalinity of 84 mg/L as $CaCO_3$ and average conductivity of about 150 micromhos per cm^2. Historical trends in lake productivity have not been determined but the fact that as much as 20 percent of the phosphorous input may have come from domestic sewage has raised concern for the future. While the lake was formerly considered to be quite oligotrophic, Standford et al. (1981) concluded it was in fact oligo-mesotrophic.

The pristine nature of Flathead Lake is primarily due to the fact that most of the 18,379 km^2 drainage area is underlain by nutrient-poor Precambrian sedimentary rock which is frequently deficient in carbonates and nutrients. The largest tributary to the lake is the Flathead River which has an average flow of 9,753 cfs at Columbia Falls. The three forks of the Flathead River (North, Middle and South) drain large tracts of undisturbed lands including all of Glacier National Park west of the Continental Divide (2,266 km^2) and a large portion of the 3,842 km^2 Bob Marshall Wilderness. Other major tributaries to the lake include the Swan, Stillwater and Whitefish Rivers. The completion of Hungry Horse

Dam of the South Fork of the Flathead River in 1952 has effectively blocked fish passage and isolated 23 percent of the Flathead Lake drainage from the remainder of the lake-river system.

Of the 25 fish species listed for Flathead Lake only nineteen persist in the lake. Four of the seven common game fish are native to the lake and include the westslope cutthroat trout (Salmo clarki lewisi), bull trout (Salvelinus confluentus), mountain whitefish (Prosopium williamsoni), and pygmy whitefish (Prosopium counteri). The other three species of common game fish were introduced into the lake and include the kokanee salmon (Oncorhynchus nerka), lake trout (Salvelinus namaycush), and lake whitefish (Coregonus clupeaformis). Rainbow trout (Salmo gairdneri) and brook trout (Salvelinus fontinalis) occur rarely in the lake. Other introduced game fish include the largemouth bass (Micropterus salmoides), northern pike (Esox lucius) and black bullhead (Ictalurus melas).

With the exception of the yellow perch (Perca flavescens), all common nongame fish species are native. This group includes the northern squawfish (Ptychocheilus oregonensis), peamouth (Mylocheilus caurinus), longnose and largescale suckers (Catostomus catostomus and C. Macrocheilus), redside shiner (Richardsonius balteatus) and slimy sculpin (Cottus cognatus).

The Flathead Lake fishery is dependent on the natural reproduction in the lake and recruitment from the tributary system above the lake. Fisheries investigations from 1950 through 1965 defined the relationship of the lake as an intergal part of this lake-river system. Each part, the lake and river system, being dependent upon the other to provide the necessary environment for the production of the dominant game fish. More recent studies, which includes work funded by the Environmental Protection Agency and the Bonneville Power Administration, have identified impacts upon the lake-river fisheries resulting from natural changes and mans activities in this water drainage.

The annual sport fish catch in the lake has been estimated at 500,000 fish (Graham, 1983) representing the States' largest fish harvest.

Angling pressure to produce this harvest was calculated to be 168,000 angler days with 100,000 boat days being expended on the lake. The peak use period occurs from June to September. Kokanee salmon dominated the catch (75 to 95 percent) during two creel census programs conducted in 1962-63 and 1981-82. Collectively cutthroat trout, bull trout and whitefish comprised approximately 10 percent of the annual harvest. Yellow perch and largemouth bass (Micropterus salmoides) represented the remainder. These fish are primarily taken in the shallow areas of the lake (mainly Polson Bay). Northern Pike occur rare in the lake and were a result of an unauthorized introduction.

Important wildlife habitat of the Flathead Lake area is present along shoreline areas for nesting and brooding waterfowl, mule and whitetail deer, other mammals, birds, reptiles, amphibians and insects. Large open-water areas serve as refuge sites for many species of waterfowl isolating them from shoreline disturbances. The Bird Island Complex Bull Islands, Cromwell, Cedar and Shelter Islands, other small islands, southeastern portion of Polson Bay and Flathead Lake Waterfowl Production Area represent the most important habitat for raptors and waterfowl. Wildhorse Island provides habitat for approximately 50-70 Rocky Mountain Big Horn Sheep and 25-30 mule deer.

The Flathead Lake Waterfowl Production Area provides a band of protection for approximately seven miles across the entire north shore of Flathead Lake. It encompasses an area of 2,370 acres and is closed to all entry each year during the period of from March 1st to July 1st for waterfowl/raptor nesting and fledging or brooding. Big Bird Island (30 acres) is designated by the State of Montana as a "Bird Preserve" and remains closed to all entry during nesting periods.

Many species of wildlife including migratory waterfowl are common throughout the year at Flathead Lake. Canada geese are common nesters with approximately 120 young being produced annually at the Flathead Lake Waterfowl Production Area. Other areas of importance to the Canada goose

are Bird Islands, Cedar and Shelter Islands and the southeastern portion of Polson Bay.

American Bittern, sora and red necked, western, and pied-billed grebes are common in all areas. California and ring-billed gulls occur throughout the year. Common snipe, spotted-sandpiper, killdeer, Wilson's phalarope, and the American Avocet, as well as black and Forster's terns frequent the Flathead Lake area. Red-tailed, marsh, and rough-legged hawks utilize all areas. Osprey nesting surveys of the Flathead Waterfowl Production area showed that 11 active nests produced 13 young in 1982. Many other areas of Flathead Lake are important for osprey nesting with more than 100 nests occurring from Perma, Montana north in the Flathead system to Columbia Falls, Montana along the Flathead River.

The bald eagle (Haliaeetus leucocephalus), is listed as an endangered species under the provisions of the Federal Endangered Species Act. Each year approximately 3 pairs of bald eagles nest within the area of Flathead Lake. As many as several hundred bald eagles pass through the Flathead Valley in the fall each year with approximately 100 wintering in the area surrounding Flathead Lake.

The most delicate period for Flathead Lake raptors and waterfowl is the period between March 1st and July 1st when nesting, fledging and brooding occurs. The most important period for hunting of waterfowl is from late September to December 31st each year. Documentation of hunter use at Flathead Lake is incomplete at this time.

Environmental Consequences (5) Mitigation Measures

I. To minimize impacts on Flathead Lake's fish and wildlife resources by the proposed seismic exploration work, operation of the seismic guns should be limited to:

1. Water depths greater than 20 feet
2. Locations farther than .5 miles from any land

II. During initial exploration before active seismic activity begins fish and wildlife agencies will be notified to observe general procedures and conduct sound level monitoring if deemed necessary.

III. During actual seismic exploration, fish and wildlife agencies will be notified as to survey duration and further reserve the option of being present when the seismic activities are being conducted for monitoring purposes.

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REFERENCES

Standford, J.A., T.J. Stuart, J.D. Coulter, and F.R. Hauer. 1981. Limnology of the Flathead River-Lake ecosystem, Montana: Annual Report. Flathead Research Group, Univ. Montana Biol. Station, Bigfork, Montana. 340 p.

Graham, P.J., and W. Fredenberg. 1982. Flathead Lake Fisheries Census. U.S. Environmental Protection Agency, Montana Department of Fish Wildlife and Parks, Kalispell, Montana.

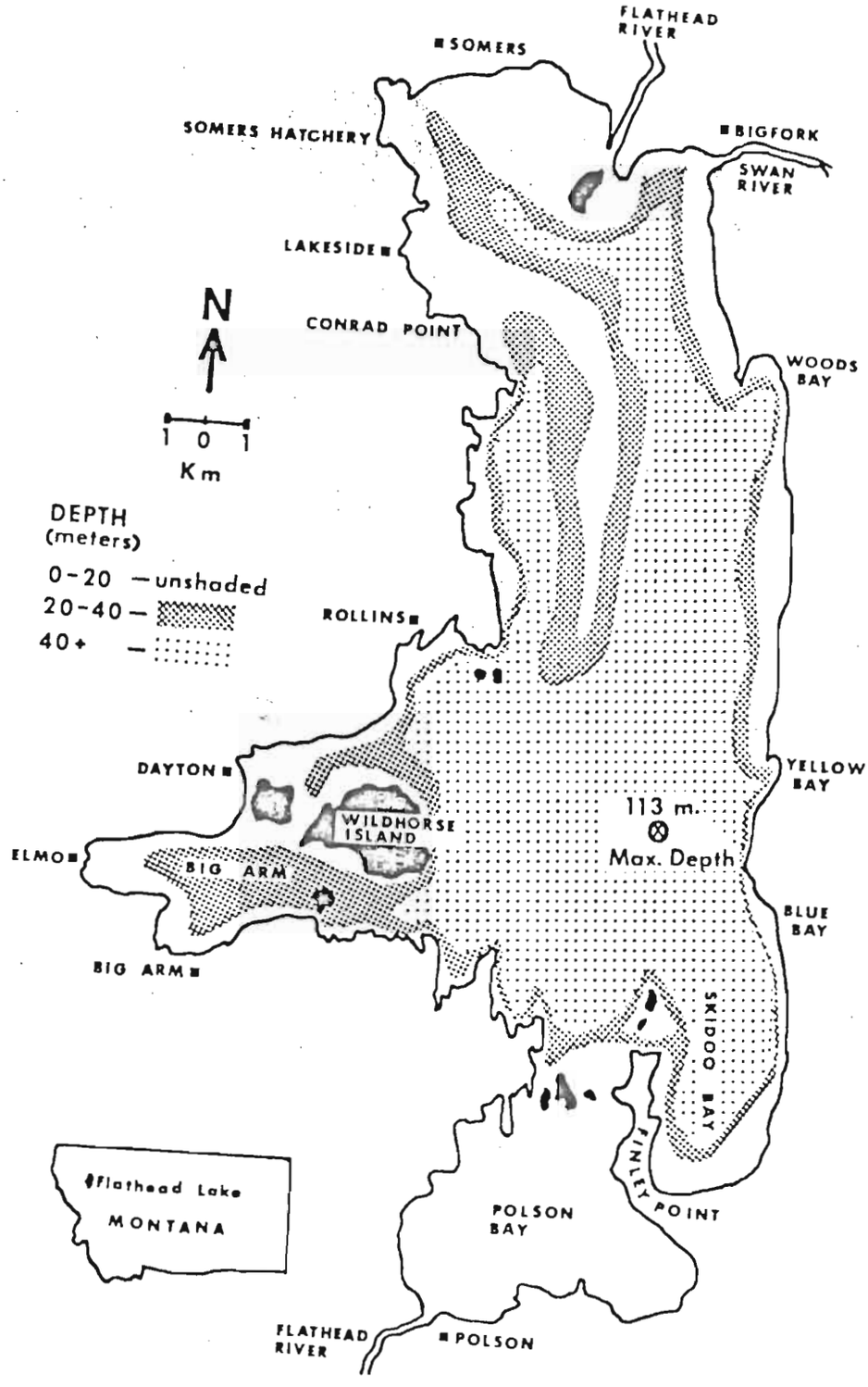

Figure 2. Map of Flathead Lake, Montana including 20 meter depth contours.

Table 1. Morphometric data for Flathead Lake (from Potter 1978).

Elevation (maximum regulated)	882.4 m
Maximum length	43.9 km
Maximum breadth	24.9 km
Mean breadth	10.5 km
Maximum depth	113.0 m
Mean depth	32.5 m
Maximum length Main Basin	39.4 km
Maximum length Polson Bay	10.5 km
Area	
Total	476.6 km^2
Islands	14.3 km^2
Water	462.3 km^2
Drainage	18378.6 km^2
Volume	24.9 km^3
Shoreline	
Total	301.9 km
Islands	42.2 km
Mainland	259.7 km
Shoreline development	3.9
Volume development	0.86