

Influence of Water Level Drawdown on the Fish Populations of Cross Lake, Manitoba

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Regulated discharges into Cross Lake, Manitoba, resulted in average summer water volumes in 1980 and 1981 that were 49% lower than preregulated volumes. Water level drawdown in the summer reduces the amount of available habitat. Consequently, the standing crops of lake whitefish (*Coregonus clupeaformis*), walleye (*Stizostedion vitreum vitreum*), northern pike (*Esox lucius*), and cisco (*Coregonus artedii*) are lower now than in preregulation and early postregulation years. Unusually early and rapid drawdown in March 1981 resulted in a severe winterkill, causing a substantial decrease in catches per unit of effort (CPUE) for most species from 1980 to 1981. The most affected species were whitefish and cisco, which showed a 50% reduction in CPUE from 1980 to 1981. The amount of fall to late spring drawdown and the year-class strengths of coregonid fishes were inversely related. A marked overwinter drawdown reduces whitefish and cisco hatching success apparently by dewatering their spawning areas and desiccating the eggs. Low water levels in spring prevented pike and walleye access to spawning areas.

Au cours des étés 1980 et 1981, les volumes moyens d'eau s'écoulant dans le lac Cross (Manitoba) étaient de 49% moins élevés par rapport à ceux d'avant le réglage du débit. La baisse du plan d'eau en été réduit le nombre d'habitats disponibles. Par conséquent, la biomasse du grand corégone (*Coregonus clupeaformis*), du doré jaune (*Stizostedion vitreum vitreum*), du grand brochet (*Esox lucius*) et du cisco de lac (*Coregonus artedii*) est actuellement moins élevée que pendant les années d'avant la régulation du débit ou au tout début de celle-ci. Une baisse exceptionnellement hâtive et rapide du plan d'eau en mars 1981 a entraîné une forte mortalité hivernale qui s'est traduite par une baisse importante des prises par unité d'effort pour la plupart des espèces par rapport à 1980. Le grand corégone et le cisco de lac, les espèces les plus touchées, ont accusé une baisse de 50% des prises par unité d'effort comparativement à 1980. Il existait une relation inverse entre, d'une part, la baisse du plan d'eau de l'automne à la fin du printemps et, d'autre part, l'abondance des corégonidés d'une classe d'âge. Une baisse prononcée de l'eau pendant la période hivernale diminue le succès de la reproduction du grand corégone et du cisco de lac car les frayères s'assèchent et les oeufs se déshydratent. De faibles niveaux d'eau printaniers ont empêché le grand brochet et le doré jaune d'atteindre les frayères.

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Hydroclimatic regulations in the Cross Lake stream (Dickson 1981) is immediately apparent. The regulations have been in effect since 1974. The regulated water level fluctuations in the stream are high during the summer months and low during the winter months.

The eastern shore of Cross Lake from 1959 to 1981 had a total catch of 44 100 kg of lake whitefish (*Coregonus clupeaformis*) and 10 000 kg of the premium grade lake whitefish, respectively. The regulated water level fluctuations in the stream are high during the summer months and low during the winter months. The eastern shore of Cross Lake from 1959 to 1981 had a total catch of 40 500 kg of lake whitefish (1982).

Brief fisheries regulations (1972), 1973 (

sources, unpublished data. The position and catch per unit of effort predicted that under the regulation at Jenpeg, production of northern pike (*Esox lucius*) and walleye (*Stizostedion vitreum vitreum*) is lower than in the unregulated period. A study is being conducted to determine the effect of commercial and unlicensed fishing on lake morphology and fish populations.

of narrow, deep channels, while the east bank of the Cross River flows only through channels shorter here than in the Cross River flows decrease in total dissolved solids and carbon concentration. The lake plankton biomass is 1

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Articles

Towards dynamic biological oceanography and limnology	L. Legendre and S. Demers	2-19
Alteration of fish communities in lakes stressed by acid deposition and heavy metals near Wawa, Ontario	K. M. Somers and H. H. Harvey	20-29
Nutrient regeneration in Deep Baffin Bay with consequences for measurements of the conservative tracer NO and fossil fuel CO ₂ in the oceans	E. P. Jones, D. Dyrssen, and A. R. Coote	30-35
Interrenal, thyroidal, and carbohydrate responses of rainbow trout (<i>Salmo gairdneri</i>) to environmental acidification	S. B. Brown, J. G. Eales, R. E. Evans, and T. J. Hara	36-45
Planktonic communities in Florida softwater lakes of varying pH	P. L. Brezonik, T. L. Crisman, and R. L. Schulze	46-56
Lake mixing and its relationship to epilimnetic phosphorus in Shagawa Lake, Minnesota	R. E. Stauffer and D. E. Armstrong	57-69
Babine Lake sockeye salmon (<i>Oncorhynchus nerka</i>) enhancement program: testing some major assumptions	J. McDonald and J. M. Hume	70-92
A cost-benefit method for determining optimum closed fishing areas to reduce the trawl catch of prohibited species	D. A. Somerton and J. June	93-98
Effect of individual growth rates on expected behavior of the northern California dungeness crab (<i>Cancer magister</i>) fishery	L. W. Botsford	99-107
Homing of Atlantic herring (<i>Clupea harengus harengus</i>) in Newfoundland waters as indicated by tagging data	J. P. Wheeler and G. H. Winters	108-117
Influence of water level drawdown on the fish populations of Cross Lake, Manitoba	M. N. Gaboury and J. W. Patalas	118-125
Relationship between otolith microstructure and the growth of juvenile chum salmon (<i>Oncorhynchus keta</i>) under different prey rations	E. C. Volk, R. C. Wissmar, C. A. Simenstad, and D. M. Eggers	126-133
Influences of stock and site on growth and mortality in the blue mussel (<i>Mytilus edulis</i>)	L. M. Dickie, P. R. Boudreau, and K. R. Freeman	134-140
Nucleic acid, protein content, and growth of larval fish sublethally exposed to various toxicants	M. G. Barron and I. R. Adelman	141-150
Susceptibility of grey (<i>Halichoerus grypus</i>) and harp (<i>Phoca groenlandica</i>) seals to the influenza virus and mycoplasma of epizootic pneumonia of harbor seals (<i>Phoca vitulina</i>)	J. R. Geraci, D. J. St. Aubin, I. K. Barker, V. S. Hinshaw, R. G. Webster, and H. L. Ruhnke	151-156
Body and fin form and strike tactics of four teleost predators attacking fathead minnow (<i>Pimephales promelas</i>) prey	P. W. Webb	157-165
Orthophosphate uptake rate constants are mediated by the 10 ³ -10 ⁴ molecular weight fraction in Shield lake waters	P. Brassard and J. C. Auclair	166-173
Associations among Chironomidae and sandy substrates in nearshore Lake Michigan	M. H. Winnell and D. J. Jude	174-179
Transport of dissolved organic carbon, nutrients, and trace metals from the Wilson and Blossom rivers to Smeaton Bay, southeast Alaska	S. F. Sugai and D. C. Burrell	180-190
Hypolimnetic aeration and zooplankton distribution: a possible limitation to the restoration of cold-water fish production	C. T. Taggart	191-198

Notes

Parr-smolt transformation of Atlantic salmon (<i>Salmo salar</i>): activities of two respiratory enzymes and concentrations of mitochondria in the liver	R. L. Blake, F. L. Roberts, and R. L. Saunders	199-203
Female size and nest depth in coho salmon (<i>Oncorhynchus kisutch</i>)	E. P. van den Berghe and M. R. Gross	204-206
Uncertainty analysis of calculated nutrient regeneration rates in Lake Michigan	M. J. McCormick and S. J. Tarapchak	206-211
Comparison of three methods for estimating the food intake of a fish	J. Majkowski and W. S. Hearn	212-215