8.0 LAKE EVAPORATION

Little previous research has been done to quantify the amount of water lost to evaporation from the main valley lakes in the Okanagan. Accordingly, as part of this Project, Environment Canada undertook a study of lake evaporation, with the goal of identifying a model (or suite of models) most suitable for estimating lake evaporation in the Okanagan. Environment Canada also recommended a method for estimating evaporation from the upland lakes and reservoirs in the Basin. A summary of the Environment Canada report is presented in Appendix F1 of this Summary Report, and the full report is presented as Appendix F2.

Environment Canada evaluated 19 potentially relevant models for estimating lake evaporation in the Okanagan. According to these 19 models, estimates of average annual evaporation from Okanagan Lake range from 271 mm/year to 1,227 mm/year. Environment Canada stated a preference for the Trivett (1984) method, because the data used to make the evaporation estimates was considered slightly more reliable than the data underlying the other models. The Working Group chose the Penman-Monteith method for the purposes of Phase 2, because the advantage of slightly stronger data for the Trivett method was outweighed by problems integrating these results with other models used in Phase 2. The Penman-Monteith model is the same model used for estimating evapotranspiration in the Okanagan Water Demand Model. Lake evaporation estimates derived using the Penman-Monteith method are discussed in Appendix J, and summarized in Table 8.1. Average annual evaporation from the five mainstem lakes is 972 mm. For Kalamalka and Okanagan Lakes, the volume lost to evaporation is approximately 90% and 50%, respectively, of the net inflow to these lakes.

Table 8.1 Evaporation from the five Okanagan mainstem lakes.

Lake	Area (km^2)	Average annual evaporation (mm)	Average annual volume lost to evaporation (1996-2006) (ML)	Average annual net inflow (1996-2006) (ML)
Kalamalka	35.6	905	32,200	34,900
Okanagan	348	918	320,000	609,000
Skaha	20.1	963	19,400	651,000
Vaseaux	2.75	1008	2,800	660,000
Osoyoos	15	1068	16,000	696,000

Note: Evaporation values are estimated using the Penman-Monteith model. Average annual net inflow is taken from Appendix G.

Environment Canada also proposed a method for computing lake evaporation for upland reservoirs based on air temperature. The method was illustrated with evaporation data calculated using the Trivett method. One of the key advantages of this method is that daily air temperature data are available throughout the Basin from the 500 m by 500 m climate grid (Section 5.0). In future updates of the Phase 2 work, it is recommended that a simple air temperature-based method such as this be adopted for the purpose of estimating lake evaporation from upland reservoirs.

Further meteorological and limnological data collection and studies should be undertaken to determine the magnitude and timing of evaporation from Okanagan Lake and other mainstem lakes, and the upland Basin lakes. This would allow more detailed lake evaporation modelling and indicate the optimal model(s) for these lakes. With improved knowledge of evaporation volumes and timing, the accuracy of the water budget for the lakes and for the Basin as a whole would be improved.