Methods and Summary Data for Limnology and Food Web Structure in Osoyoos Lake, B.C. (2005-2013)

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METHODS AND SUMMARY DATA FOR LIMNOLOGY AND FOOD WEB STRUCTURE IN OSOYOOS LAKE, B.C. (2005-2013)

by

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Hyatt, K.D., McQueen, D.J., Rankin, D.P., Stockwell, M.M., Wright, H., Lawrence, S., Stevens, A., Mathieu, C., and Weins, L. 2015. Methods and summary data for limnology and food web structure in Osoyoos Lake, B.C. (2005-2013). Can. Data Rep. Fish. Aquat. Sci. 1258: vi + 71 p.

In 1994, the Okanagan Nation Alliance approached Fisheries and Oceans Canada with a request for assistance in status and trend assessments to support stock and habitat restoration work focused on Okanagan sockeye salmon that appeared to have fallen to historic lows of abundance. In the following years, several collaborative habitat and stock restoration projects were initiated to facilitate rebuilding of the Okanagan sockeye salmon population to historic abundance levels. Here we provide a detailed site-description and report on field survey and sample processing methods used on Osoyoos Lake to assess: (1) limnological conditions (temperature, oxygen, water transparency, nutrient concentrations, plankton community structure etc.) in the principal nursery lake, (2) annual to seasonal changes of abundance and biological traits of juvenile sockeye salmon, and (3) abundance of other limnetic fish species. Monthly or sub-monthly survey work was especially intensive during the years 2005-2013 when detailed field observations were required to serve as: (a) critical response variable observations to determine whether DFO recommended increases in abundance of adult sockeye spawning in the Okanagan River (Hyatt and Rankin 1999) were accompanied by proportionate increases in abundance levels of fry recruiting to Osoyoos Lake and subsequent production of both smolts and returning adults, (b) “control” observations of seasonal to annual patterns of growth and survival of wild-origin, sockeye fry relative to hatchery-origin fry introduced into either Skaha or Osoyoos lakes as part of an Okanagan Nation Alliance stock restoration project and (c) “test interval” observations to monitor annual production of wild fry and smolts following the 2004 deployment of a fish-and-water management tools (FWMT) decision support system to improve “fish friendly” water management decisions for the Okanagan River and Lake system (Hyatt et al. 2015). Annual to seasonal observations obtained from Osoyoos Lake are documented in the current report while comparative observations from Skaha Lake are published in a companion Data Report (Hyatt et al. 2015).

RÉSUMÉ

Hyatt, K.D., McQueen, D.J., Rankin, D.P., Stockwell, M.M., Wright, H., Lawrence, S., Stevens, A., Mathieu, C., et Weins, L. 2015. Méthodes et données sommaires relatives à la limnologie et à la structure du réseau trophique du lac Osoyoos, en Colombie-Britannique (2005-2013). Can. Data Rep. Fish. Aquat. Sci. 1258: vi + 71 p.

En 1994, l'Okanagan Nation Alliance a demandé à Pêches et Océans Canada de l'aider à réaliser des évaluations de l'état et des tendances à l'appui des activités de restauration du stock et de l'habitat visant le saumon rouge de l'Okanagan, dont l'abondance semblait avoir atteint ses plus bas niveaux historiques. Au cours des années suivantes, plusieurs projets de collaboration visant à restaurer l'habitat et le stock de saumon ont été entrepris afin de favoriser le rétablissement de la population de saumon rouge de l'Okanagan jusqu'aux niveaux d'abondance historiques. Dans le présent document, nous offrons une description détaillée du

site et faisons état des méthodes de levé hydrographique et de traitement des échantillons utilisées dans le lac Osoyoos afin d'évaluer : 1) les conditions limnologiques (température, oxygène, transparence de l'eau, concentration de nutriments, structure de la communauté de plancton, etc.) dans l'habitat de croissance principal du lac; 2) les changements saisonniers annuels de l'abondance et des caractéristiques biologiques des saumons rouges juvéniles; et 3) l'abondance d'autres espèces de poissons limnétiques. De nombreux relevés mensuels ou infra-mensuels ont été réalisés entre 2013 et 2015, car nous avions besoin d'observations détaillées sur le terrain afin de nous en servir comme : a) variables de réaction essentielles pour déterminer si les augmentations de l'abondance des saumons rouges adultes frayant dans la rivière Okanagan recommandées par le MPO (Hyatt et Rankin 1999) étaient accompagnées d'augmentations proportionnelles des niveaux d'abondance du recrutement d'alevins dans le lac Osoyoos et de la production subséquente des saumoneaux et des adultes qui reviennent frayer; b) données de « contrôle » des profils saisonniers et annuels de croissance et de survie des alevins de saumon rouge d'origine sauvage par rapport aux alevins provenant des écloseries qui ont été introduits dans le lac Skaha ou le lac Osoyoos dans le cadre d'un projet de restauration du stock de l'Okanagan Nation Alliance; et c) données d'« intervalle entre les contrôles » afin de surveiller la production annuelle des alevins et des saumoneaux sauvages à la suite du déploiement des outils de gestion du poisson et de l'eau en 2004 comme système de soutien des décisions en vue d'améliorer les décisions de gestion de l'eau « favorables aux poissons » dans le système de la rivière et du lac Okanagan (Hyatt *et al*. 2015). Les observations annuelles et saisonnières effectuées dans le lac Osoyoos sont consignées dans le présent rapport tandis que les observations comparatives faites dans le lac Skaha sont publiées dans un rapport statistique complémentaire (Hyatt *et al*. 2015).

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INTRODUCTION

One hundred years ago, several sockeye salmon (*Oncorhynchus nerka*) populations spawned in the Columbia River watershed (Fryer 1995). Since that time, dams, overfishing and habitat destruction have reduced the number of self-sustaining populations to two. One population remains in the Wenatchee River, Washington State and the other in the Okanagan River, British Columbia. Adult sockeye bound for the Okanagan Valley, begin their up-stream migration during May-June, negotiate 10 fishways placed at dams in the Columbia and Okanagan rivers, and arrive at Osoyoos Lake during late June through early September (Allen and Meekin 1980, Chapman et al. 1995, reviewed in Hyatt and Rankin 1999)**.** They generally hold in the lake until late September when they move north into the Okanagan River where peak spawning generally occurs by mid-October (Stockwell and Hyatt 2003). In April-May, newly hatched age 0+ juveniles move down-stream to Osoyoos Lake where they rear for one summer, over-winter, and leave as age 1+ smolts in April-May of the next year.

During the period 1953-1972 total sockeye salmon returns (potential spawners plus catch) to the Okanagan River averaged 72,368. During 1973-2004, average returns declined to 35,687. During 1953-72, average annual exploitation by the commercial fishery and First Nations averaged 57 %. After 1972, exploitation was reduced to 11 % (Chapman et al. 1995, Hyatt and Rankin 1999, Hyatt et al. 2003) but stock declines continued such that fewer than 10,000 adult fish returned in 4 of 6 years from1994-1999. In response to these declining returns, the three-party (Fisheries and Oceans Canada, Okanagan Nation Alliance, BC Forests Lands and Natural Resource Operations) Canadian Okanagan Basin Technical Working Group (COBTWG) was formed in 1996-97 to coordinate stock assessment and restoration projects. Both types of projects required standardized assessments of annual to seasonal changes in environmental conditions along with biological traits of adult sockeye spawning in the Okanagan River (Stockwell and Hyatt 2001, 2003) and juvenile sockeye rearing in Osoyoos Lake (Hyatt and Rankin 1999). The Okanagan Nation Alliance also embarked on a program designed to re-establish sockeye salmon in the upper Okanagan River and Skaha Lake. After several years of project design and risk assessment (Okanagan Nation Alliance 2001, 2002, 2003), the COBTWG concluded that sockeye salmon should be stocked, on an experimental basis, into Skaha Lake (Peters et al. 1998). One of the objectives of this program was to quantify rates of growth and rates of egg-to-smolt survival for hatchery-origin sockeye in Skaha Lake relative to their wild-origin siblings in Osoyoos Lake.

Data originating from the most recent decade of field surveys of biophysical and chemical conditions in Osoyoos Lake are highly relevant to assessments associated with several ongoing projects (Okanagan sockeye management, Okanagan Lake and River System water management, Sockeye reintroduction to Skaha Lake, Okanagan River Restoration Initiative) and are documented in the tables of the current report. Similar data originating from field surveys of Skaha Lake are published in a companion Data Report (Hyatt et al. 2015).

OSOYOOS LAKE SITE DESCRIPTION

PHYSICAL DESCRIPTION

Osoyoos Lake (Figures 1, 2 and 3), measures 16 km in length, has a surface area of 23 km^2, a volume of 0.40 km^3, maximum depth of 63 m, mean depth of 14 m, and an average water residence time that is very short (weeks) and varies greatly depending on the amount of snowpack plus summer rainfall in the Okanagan Valley. The North Basin of Osoyoos Lake measures 7.5 km in length, has a surface area of 990 ha (933 ha of usable limnetic fish habitat), a volume of 0.25 km^3, a maximum depth of 63 m, mean depth of 21 m, and an average water residence time measured in weeks. The North Basin of Osoyoos Lake is entirely within Canadian territory and is the only section of the lake where age-0 sockeye can survive during the summer (Hyatt and Rankin 1999; Rensel 1995, 1996, 1997, and 1998).

WATER CHEMISTRY

A review of water quality trends in the Okanagan watershed between 1970-2001 (Jensen and Epp 2002) showed that although the number of people living in the Okanagan Valley increased from 100,000 in 1970 to approximately 300,000 in 2001, extensive abatement efforts from municipal sewage treatment facilities reduced phosphorus loads into the Okanagan watershed from 59,148 kg y^{-1} in 1970 to 2,643 kg y^{-1}in 2001. During 1970-2001, there were marginal increases in total phosphorus (TP) loading from other sources. Phosphorus loading from farm lands decreased from approximately 4,000 to 2,000 kg y^{-1}. Loading from forestry remained unchanged at approximately 8,000 kg y^{-1} and loading from other non-point sources (industry, roads, storm water, soil erosion, dust-fall, and other unidentified watershed sources) also remained unchanged at approximately 40,000 kg y^{-1}. Loading from septic tanks doubled from approximately 6,000 to 12,000 kg y^{-1}. The net effect of loading reductions from municipal sources combined with slight increases from other sources was a 55 % reduction in total loading into the Okanagan River watershed, and indicators of water quality in Lake Okanagan and Skaha Lake showed improvement.

In Osoyoos Lake during 1970-99, the results were more mixed. Osoyoos Lake North Basin spring epilimnetic total phosphorus (TP) fell from a range of 23-37 µg L^{-1} in 1969-70 to 15 µg L^{-1} in 2001, but fall epilimnetic TP remained relatively constant at about 12 µg L^{-1}, increasing slightly during 1995-2001. Osoyoos Lake North Basin spring and fall total nitrogen remained relatively unchanged at 250-350 µg L^{-1}. Spring and fall chlorophyll a concentrations were variable but remained in the range of 5-15 µg L^{-1}. Similarly, over the 40 year monitoring period, Osoyoos Lake North Basin Secchi depths remained relatively unchanged at 2-6 m. These trends suggest that despite substantial up-stream reductions in nutrient loading, Osoyoos Lake North Basin epilimnetic nutrient concentrations, algal biomasses, and water clarity have remained relatively static for 40 years (1970-2001). On the other hand, these negative or unchanged epilimnetic trends contrast with Osoyoos Lake hypolimnetic fall TP concentrations that have declined from 50-80 µg L^{-1} during 1975-80 to 5-15 µg L^{-1} during 2000-04. This trend is strongly correlated with results from up-stream Okanagan and Skaha Lakes, and may signal that water quality improvements in Osoyoos Lake are simply lagging behind improvements seen in the upstream lakes.

OSOYOOS LAKE FISH HISTORY AND METHODS 1997-2005

In the early 1970's the Osoyoos Lake fish community comprised 20 species (Northcote et al. 1972). By 2004, the total had increased to approximately 28 species including several species of bass, bullheads, suckers, chub, perch, dace, sculpins, and carp (COBTWG 2004). Anadromous salmonids include chinook (*Oncorhynchus tshawytscha*), steelhead (*O. mykiss*), and sockeye (*O. nerka*). Sockeye are orders of magnitude more common than the other two species, and cohabit with small numbers (< 2% of the total) of kokanee (*O. nerka*).

During 1997-2001 pelagic fish (principally juvenile sockeye salmon) densities were estimated at night using a Simrad EY-M, 70 kHz, single beam, echosounder with 75 W of power output, pulse width 0.6 ms and a Time Varied Gain circuit to control for attenuation losses due to increasing target depth. During 2002-05, pelagic fish densities were estimated at night using a Simrad EY-500, 70 KHz sounder with 50 W power output with pulse width at 0.2 ms and a Time Varied Gain circuit. During 2006-13 pelagic fish densities were estimated at night using a split-beam Biosonics DT-X, 200kHz sounder with 300 W power, pulse width at 1 ms and a 6.6° transducer. The methods used during 2006-13 will be detailed later in this data report. Cross-calibration of the two Simrad machines showed that they produced similar results. Comparisons of pelagic fish abundance estimates from the Simrad and Biosonics ("Sonar 5") echosounders were conducted during 2005-06. Survey data were collected on 14 sampling dates from four lakes (Skaha Lake = 4 dates, Osoyoos Lake = 5, Woss Lake = 2 and Vernon Lake = 2). During each sampling date, complete lake surveys were conducted simultaneously by two survey crews following identical survey transects. Total density estimates ranged from 300-4000 fish ha^{-1}. The relationship between total densities derived from Simrad versus Biosonics was:

$$\text{Simrad} = 111+0.9*\text{Biosonics} \ (n = 14, R^2 = 0.94)$$

From this, we concluded that density estimates from Simrad and Biosonics units were correlated over a wide density range (100-4000 fish ha^{-1}). Additional details regarding transducer design and counting methods are provided in, Hyatt et al. (1984), Hyatt and Stockner (1985), Gjernes et al. (1986), and Hyatt et al. (2000).

During 1997-2005, fish biosamples were collected throughout the sampling period using a mid-water trawl net (2 m x 2 m mouth opening x 7.5 m long) (stretch mesh ranging from 5.0 cm at the mouth to 1.3 cm knotless nylon at the cod end). The nets were towed only at night, and surveys were based on 5-15 trawls per sampling session. Numbers of seasonal biosamples were the same as for echosounding. On some dates after each trawl set, fish were immediately removed from the net, held on ice, and then weighed at the end of the sampling session. On two dates, fish were frozen before processing. Weights were corrected for the effects of freezing using the expression [fresh weight = 0.124 + 1.0077 * thawed weight] (Shields and Carlson 1996). On four dates, fish were preserved in ethanol before processing. Weights were corrected for the effects of ethanol using the expression [fresh weight = preserved weight/0.868429] (P. Rankin, Pacific Biological Station, unpublished data). On two dates, fish were preserved in formalin and weights were corrected using the expression [(preserved weight) / 1.1151].

METHODS 2005 - 2013

WATER CHEMISTRY

Osoyoos Lake water chemistry was sampled at two stations located at (Stations 1 and 6, Figure 3). Samples were taken at monthly intervals from May-October. At each station, Secchi depth was recorded and oxygen-temperature profiles were measured in 1 m intervals to 24 m depth then at 4 m intervals to 50 m or 4 m from bottom (depending on the water depth). In the epilimnion, water chemistry samples were collected using a Van Dorn bottle at 1, 5, 10 m depths. Water from the three depths was integrated and then sub-sampled to yield: 1 nutrient (nitrogen) sample stored in a clear 250 mL bottle, 1 TP sample stored in the clear 250 mL bottle, 2 chlorophyll a samples stored in 1 L brown bottles and 1 phytoplankton sample stored in a 500 mL clear plastic bottle and treated with Lugol’s solution. During collection, all water samples were held in coolers in the dark. In summary, at the end of the day for each lake, the field crews had collected a total of 4 chlorophyll samples and 2 phytoplankton samples (one epilimnetic sample from each station), 6 TP samples and 6 nutrient samples (three from each station). Osoyoos Lake hypolimnetic samples were collected at 20 and 45 m. Samples were treated as above. At the laboratory, 500 mL of each chlorophyll a sample was passed through a 0.45 µm filter. Details are in Lawrence et al. (2007). All samples were couriered to the provincial water chemistry laboratories in Burnaby, B.C. (PSC Analytical Services laboratory, Burnaby, British Columbia). The analytical protocol followed the methods of Bran and Luebbe Inc. (1987) and Eaton et al. (1995, 1998).

PHYTOPLANKTON

All samples were collected at the two water chemistry sites (stations 1 and 6, Figure 3). All phytoplankton samples were treated with Lugol’s solution and stored in the dark. At the laboratory, the Osoyoos Lake samples were combined and processed using the Utermöhl technique. Through the season, 6-7 samples were collected at monthly intervals. All taxa were identified to genus (many to species). Densities, cell sizes, cell shapes, and biovolumes were recorded. One of the objectives of the phytoplankton counting procedure was to assess the relative availabilities of edible (grazable) and non-edible (non-grazable) algae. We quantified "edibility" based on size, toxicity, and digestibility. Single cells or colonies < 30 µm width or length were considered edible (Cyr 1998; Cottingham 1999) unless they were classified as being either "toxic" or "digestion-resistant" (defined below). *Microcystis* was always classified as being "toxic". Other genera were assumed to be non-toxic. Algae with thick gelatinous sheaths can pass through *Daphnia* guts undigested (Stutzman 1995) and were considered to be digestion-resistant, independent of size. More methodological detail is given in Hyatt et al. (2005) and McQueen et al. (2007).

ZOOLANKTON

In Osoyoos Lake, zooplankton were sampled at stations 2, 4, 6, 8, 10 (Figure 3) using a vertical haul net (0-30 m night-time hauls, 100 µm mesh, 0.5 m net diameter, net length 3 m, Rigosha flow-metered). Samples were collected every 2-3 weeks. Each sample was washed out of the plankton net using water saturated with carbon dioxide and were then preserved in 5.5% buffered and sugared formalin and returned to the laboratory. In the laboratory, the five samples were combined to produce one volume-weighted “combined” sample for each lake for each sampling date (Lawrence et al. 2007). Because each of the samples had different sampling efficiencies (measured with a Rigosha flow-meter), each station sample was suspended in water so that each one mL of sample contained water from 10 L of lake water. For each station, 10 mL (containing plankton from 100 L of lake water) from each sample jar was then added to a "combined" sample jar. Since there were 5 stations in each lake, the combined sample jar contained 50 mL of sample representing the zooplankton found in 500 L of lake water (100 L collected at each of five stations). The original samples were then re-filtered to remove excess water, re-suspended in 5.5 % formalin and relabelled to record the loss of a certain percentage of the sample.

All zooplankton were identified to species, measured and eggs counted. Dry weight length-weight regressions were used to calculate biomass for each individual (Allen et al. 1994). Cladocera and copepods (adults and copepodids) were identified to species. Edmondson (1959) was the principal taxonomic reference, but also Dussart and Fernando (1990) for Cyclopoida, Korinek (1981) for *Diaphanosoma*, and Lieder (1983) for bosminids. Eggs per female were counted for all species. To calculate biomass, body lengths of all animals were measured using a semi-automated counting and measuring system (Allen et al. 1994). Because *Holopedium gibberum* (Yan and Mackie 1987) was not found, corrections for contraction due to preservative were not applied to any of the species encountered in Skaha or Osoyoos lakes (Campbell and Chow-Fraser 1995). Animal weights were estimated using length-weight regressions summarized in Girard & Reid (1990).

Mysis relicta

In Osoyoos Lake, *M. relicta* were sampled every 3-6 weeks (depending on the time of year) at stations 1-10 (Figure 3) by means of a vertical haul net (0-30 m night-time hauls, 300 µm mesh, 1.0 m net diameter, net length 3 m, Rigosha metered). Samples were preserved in 5.5% buffered and sugared formalin. In the laboratory, each individual animal was measured for total length (measured as the distance from the tip of the rostrum to the end of the telson), sex, and developmental stage. Embryos from gravid females were counted. From these counts, we calculated densities and wet weight biomasses. We also calculated length and weight frequencies which to be used for production analysis.

Mysid diets were assessed from direct inspection of gut contents of juveniles (2-10 mm length) and adults (11-22 mm) collected from each sample. During 2006-08, only 30 specimens were examined on each sampling date. During 2009-13, we attempted to examine at least 100 specimens on each sampling date. The foregut of each mysid was removed to a glass dish, dissected, and examined under a light microscope. Each identifiable zooplankton part was scored as one individual consumed. Mean weights for each prey type were taken from zooplankton field samples collected at the same time as the *Mysis*. Average proportion of prey found per *Mysis* gut was calculated as the relative biomass (prey counts * mean prey weight) of each prey type per gut.

OSOYOOS LAKE SOCKEYE AND KOKANEE

In Lake Sampling

Osoyoos Lake fry were sampled 5-7 times (depending on the year) between June and March of the following year. In Osoyoos Lake the age-0 fry were comprised of very few resident kokanee and large numbers of wild (2005-13) sockeye. Hatchery-origin sockeye fry were also present in samples during 2010, 2012 and 2013. Biosamples were collected using a 3m x 7m mid-water trawl designed by Enzenhofer and Hume (1989). The net was towed only at night, at up to 6 depth strata exhibiting significant numbers of acoustics targets, and surveys were based on 5-15 trawls per sampling session. On each night, the trawl target was 300+ fish comprising juvenile sockeye and various age classes of other nerkids. After each trawl set, fish were immediately removed from the net and held on ice.

Laboratory Processing

All hatchery-origin sockeye fry were subjected to thermal treatments to induce a unique, identifiable mark on their otoliths prior to release in all years. Consequently, during years when age-0 hatchery fry were known to be in the lake (2010, 2012, 2013), otoliths were removed and placed in dry vials from all fish within size groups likely to contain hatchery-origin fish (i.e. <5cm in June, <6cm in July and August, <6.5 cm in September, <7.5 cm in October, <8 cm in November and winter). During all years, (2005-13) stomach contents were removed from approximately 30 age-0 sockeye and from all of the other nerkids larger than the size classes noted above. For all fish selected for diet analysis, stomachs were removed and placed in vials with ethanol, scales were removed and placed in a scale book, otoliths were removed and placed in dry vials, and the fish body was placed in a plastic bag in ethanol.

From 2006-12, all identifiable zooplankton in each of the selected stomachs were counted as species or genus. During 2013, the stomach contents from two groups of 30 age-0 fish were combined (i.e. contents from the first group of 30 and contents from the second group of 30 were treated separately) and a plankton splitter was used to subsample the zooplankton in each group. This procedure resulted in higher stomach counts per fish and perhaps improved accuracy. The stomachs from larger nerkids were individually sampled as in previous years. In all years, the taxonomic counts were transformed into % biomass for each taxonomic group based on the assumption that mean taxonomic weight for each group of zooplankton was equal to the average taxonomic weight for individuals captured in zooplankton samples taken on each sampling date. After processing, data from each fish were associated with a unique fresh length, fresh weight, age (scales), diet (stomach analysis), and sockeye or kokanee designation (otolith).

Assessment of Age-Specific Fish Densities

During 2005, acoustic surveys of Osoyoos Lake for fish abundance were conducted on fives dates using a Simrad EY-500, 70 KHz sounder with 50 W power output with pulse width at 0.2 ms and a Time Varied Gain circuit. During 2006-13, acoustic surveys were completed on 5-7 dates (depending on the year) using a Biosonics DT-X echosounder (200 kHz sounder with 300 W power, pulse width at 1 ms and a 6.6^0.transducer). Density estimates from echo-integration analysis were used to determine numbers of fish and these data were later used to estimate fish mortality throughout the late summer, fall, and winter periods.

Combined data from echosounding, otolith, and scale-age analysis provided estimates of wild (all years) and hatchery-origin (2010, 2012, 2013) age-0 sockeye and older nerkid densities. Because densities of larger fish were relatively low, our concern was that biosamples alone could not be reliably used to estimate densities of larger kokanee. Even though the trawl net was large (mouth opening 3 x 7 m), some of the larger fish may have escaped so that proportions based on trawl estimates would be biased in favour of age-0 sockeye. To correct for this problem, we combined the acoustic and trawl data to estimate fish densities.

The methods used to assign each fish to the appropriate “taxonomic” category (age-0 sockeye or older nerkid length, weight, age), were as follows: (1) Total fish densities were assessed from acoustics data collected using a Biosonics DT-X sounder. (2) Fish size-frequency distributions were estimated using Sonar5-Pro software. (3) Lengths and weights were recorded from each fish caught in 3m x 7m trawl net sets. (4) During 2010, 2012, 2013, "taxonomic" designations for small fish were based on the presence or absence of marked otoliths (marked = hatchery sockeye and absence = wild sockeye). (5) During all years, ages of larger fish (larger nerkids) were assessed from scales. (6) For each sampling date, length frequencies based on Sonar-5 analysis, trawl-based lengths plus weights and trawl-based ages were combined to assign all pelagic targets to one of 4 groups (i) nerkids <15 cm known from the trawl samples to be almost entirely age-0 sockeye, (ii) age-1 smolts or kokanee known to be age-1 from scale data, (iii) larger nerkids length 15-33 cm known from scale samples to be nerkids age 2 and 3, and (iv) fish larger than 33 cm which we assume to be a mixture of lake whitefish and returning adult sockeye. (6) For each group, the trawl-based data combined with echosounder-based density estimates, were used to calculate densities and biomasses of all size classes of fish.

Fish Density and Echosounder Sampling Errors

Most field samples collected from a single lake over a period of time (i.e. time series) raise an inferential statistics issue around the calculation of confidence intervals. Even when each sample in the time series is represented by several subsamples taken from different locations in the lake, inferential statistics and confidence intervals may have limited utility due to pseudo-replication (Hurlbert 1984, Millar and Anderson 2004). In Osoyoos Lake this applies to all of our samples for water chemistry (n = 2 samples per time period), phytoplankton (n = 2), zooplankton (n = 5), Mysis (n = 10), but is especially important for fish (n= 14 transects).

When estimating fish density we acoustically sampled 14 transects per nightly sample period, calculated average fish density per transect and combined the weighted averages (numbers per ha) accounting for the effects of depth and transect length (Hyatt and Stockner 1985, Gjernes et al. 1986, MacLennan and Simmonds 1992, Hyatt et al. 2000). This method allowed us to calculate both mean density and a confidence interval. However, the confidence interval may not apply to our estimate of μ the population mean. This is because lake is the experimental unit and the between-transect confidence interval reflects between-transect variability (i.e. transect is the experimental unit). On each sampling date we calculated these between-transect CIs and they have all been reported in the 2005-2013 annual reports. Typically, CIs around the lake-wide mean abundance on all transects ranged from 10-30% of the mean.

For fish, we recognize that it may be possible to use techniques such as Monte Carlo simulations to apply confidence intervals to our daily estimates, but we decided 9 years ago that these methods would contribute little to our ultimate goal of estimating population densities at key times in the year. There were several reasons for this decision. Density estimates obtained on any one day are strongly influenced by fish distribution on a given set of fixed transects which we have assumed are representative of the lake-wide population. Previous experience (McQueen et al. 2007) shows that when a lake is surveyed on successive days or when two boats sample the same lake on the same day, the results are almost identical. This is to be expected and does not deal with the underlying issue of potential pseudo-replication because areal distributions of fish observed within the lake over such a short interval will be relatively static. However, consecutive surveys repeated within a given year at intervals of several days to a few weeks also generate estimates that are usually similar. Because the limnetic fish that are the subject of our ATS work are highly mobile and undertake not only diel vertical migrations but also maintain horizontal movements of a few body lengths per second, it is virtually certain that their distributions on survey transects involving relatively small between-transect distances (tens of meters to a few hundred meters) will differ after periods of several days to a few weeks. Accordingly, the absence of significant differences in limnetic fish abundance between these surveys is interpreted by us to suggest that the all-transect mean of abundance, identified on a given date, is representative of the lake-wide abundance of limnetic fish. If so, the confidence intervals determined around the all-transect means from surveys are applicable as estimates of uncertainty in our estimates of the lake-wide abundance of limnetic fish.

The above noted results contrast with those obtained from sequential acoustic surveys crossing seasonal boundaries beginning in late May to early June, when estimates of mean density separated by two or more months of time often exhibit statistically significant differences. Inspection of the density data shown in Table 9 reveals that age-0 population densities achieve peak abundance between spring to early summer as age-0 fry recruit offshore from river and nearshore areas of the lake. Significant seasonal declines in numbers commonly occur by late summer to fall (August to November) and then remain relatively stable through to late winter (i.e. February). This pattern is almost certainly due to the dynamic interaction of ongoing recruitment and high mortality rates that are known to affect resultant fry abundance during the early part of their life-history allowing us to conclude that the data are generally “well-behaved” with respect to an underlying biological model of expected recruitment-and-mortality over time. Given the dynamic changes observed between spring and summer, we largely rely on two density estimates per lake-year to characterize annual to seasonal changes in *O. nerka* abundance. The first is a “summer-fall density” estimate based on the average of all samples collected from August-November after full recruitment to the limnetic zone is certain to have occurred. The second estimate is “presmolt density” based on the average of all samples collected from October-winter after which both spring recruitment and spring-summer mortality outcomes are complete. We have chosen these time periods because the August-November estimate is useful for assessments of the impacts of the fish on their zooplankton prey over the summer production interval. By contrast, the October-winter average of juvenile sockeye density is our most reliable index of annual production of smolts destined to migrate seaward at age-2 in May-June after a single summer and winter of lake residence. When calculating survival, our recommended starting point is always to estimates of total egg “deposition” or hatchery fry releases, and for Osoyoos Lake our recommended standardized survival estimates are egg-to-fall fry (average Aug-Nov) and egg-to-presmolt (average Oct-winter).

<u>Densities of Presmolts versus Smolts</u>

Because there are no explicit counts or estimates of smolts as they leave Osoyoos Lake in the spring of each year, we recommend the use of presmolt density as a surrogate for smolt density. The relationship between acoustically derived presmolt densities and weir-based smolt densities has been a continuing challenge for fish biologists, and what little published work there is, suggests that the relationships may be lake-specific (Hyatt et al. 2005). In response to this concern, Hyatt and Stockwell, DFO, Nanaimo (pers. com.) compared presmolt data from Osoyoos Lake with smolt data gathered at Rocky Reach Dam. Of the several dams on the Columbia, only Wells Dam and Rocky Reach Dam involve passage of sockeye that are solely of Okanagan origin. Rocky Reach Dam personnel have conducted a sampling program each spring since 2004, to assess relative abundance of sockeye smolts. For brood years 2002-10, Hyatt and Stockwell (unpub. data) found a highly significant relationship between pre-smolt abundance estimates based on annual acoustic surveys of juvenile sockeye in Osoyoos Lake versus those based on cumulative seasonal sampling each year at Rocky Reach Dam (Osoyoos presmolt abundance = 0.0924*RRH cumulative smolt count – 53703) (R^2 = 0.98, n=9). This relationship is based on data derived from two sampling programs run entirely independently of each other, employing radically different sampling techniques. However, the units of abundance are different. At Rocky Reach Dam, a cumulative smolt count is obtained over several weeks of daily sub-sampling of smolts that utilize a fish-bypass structure. Although this provides a relative index of annual abundance the index was not designed to be confidently scaled up into estimates of the actual number of smolts moving past the dam each year. By contrast, the acoustic and trawl-survey (ATS) based abundance estimates of presmolts are obtained from surveys typically completed in 1-2 nights and designed to inform us of the instantaneous, mean abundance of juvenile sockeye present in the lake on each date. Transect locations were selected to be representative of all limnetic regions of the lake anticipated to contain juvenile sockeye. Thus, mean abundance estimates from all transects, when expanded to account for the entire volume of the limnetic zone, are assumed to represent the entire in-lake population of juvenile sockeye. Thus, we suggest late season (fall-winter) ATS estimates of abundance are likely useful not only as relative abundance indicators but also as reasonable approximations of the total numbers of smolts produced each year.

Units and Conversions

To facilitate comparisons with other studies, we have presented data for phytoplankton ($mm^3 \cdot m^{-3}$), zooplankton ($\mu g \cdot L^{-1}$ dry weight), *Mysis* ($mg \cdot m^{-3}$ wet weight) and fish ($kg \cdot ha$-^{1} wet weight) in units that are traditionally used by limnologists and fisheries biologists. However, to simplify between trophic-level comparisons our conversions are based on the following assumptions and conventions. (1) To convert from $\mu g \cdot L^{-1}$ to $g \cdot ha^{-1}$ it is known that $\mu g \cdot L^{-1}$ equals 1 $mg \cdot m^{-3}$, and 1 ha = 10,000 m^2. We sampled zooplankton and *Mysis* using vertical hauls between 0-30 m and assumed that average zooplankton biomasses in this region represented zooplankton biomass at all depths. To convert from mg to g we divided by 1000. Therefore to convert $\mu g \cdot L^{-1}$ or $mg \cdot m^{-3}$ to $g \cdot ha^{-1}$ we multiplied by (30*10,000)/1000 = 300. (2) A literature survey suggested that wet:dry ratios for crustaceans and juvenile fish ranged from 10-16% (Downing and Rigler 1984, Hewett and Johnson 1992). Throughout we have assumed dry weight to be 14% of wet weight. (3) Therefore, to convert Osoyoos Lake zooplankton biomasses from $\mu g \cdot L^{-1}$ dw to $g \cdot ha^{-1}$ ww, we multiplied by 2100 and to convert *M. relicta* biomasses from $mg \cdot L^{-1}$ ww or $mg \cdot m^{-3}$ ww, to $g \cdot ha^{-1}$ww we multiplied by 300.

RESULTS

OSOYOOS LAKE WATER TEMPERATURES

Table 1. Osoyoos Lake temperature profiles (^{O}C). Profiles are averaged from data collected near the north end of the North Basin and the more southerly Monashee sites (Figure 3, numbers 1 and 5). Shaded area approximates water temperatures generally known to be avoided by juvenile sockeye due to temperature preferences < 17°C (Brett 1952, 1964, Levy 1990, 1991) and/or oxygen preferences > 4ppm (Davis 1975, Brett and Blackburn 1981). No data available for blank cells.

Year 2005 Osoyoos Lake Water Temperatures (°C)

Depth (m)	26-Apr-05	17-May-05	01-Jun-05	20-Jun-05	12-Jul-05	22-Aug-05	30-Aug-05	08-Sep-05	13-Sep-05	27-Sep-05	04-Oct-05	02-Nov-05
1	11.9	16.7	18.1	18.4	20.7	21.9	20.8	19.8	18.2	16.3	15.0	11.3
2	11.6	16.3	18.0	18.1	20.6	21.8	20.7	19.8	18.2	16.3	15.0	11.3
3	11.0	15.8	17.8	18.0	20.5	21.8	20.6		18.2		15.0	11.3
4	10.2	15.4	17.6	17.9	20.4	21.8	20.5	19.6	18.2	16.3	15.0	11.4
5	10.0	14.8	17.3	17.8	20.4	21.8	20.5		18.2		15.0	11.4
6	9.4	14.3	16.8	17.6	20.3	21.7	20.4	19.5	18.2	16.3	15.0	11.4
7	9.0	13.9	16.5	17.1	20.2	21.5	20.4		18.2		15.0	11.3
8	8.8	13.2	16.3	16.5	19.8	21.4	20.4	19.4	18.2	16.2	15.0	11.4
9	8.6	12.5	15.8	15.6	19.2	21.2	20.3		18.2		15.0	11.3
10	8.4	11.5	15.1	14.2	17.8	20.8	20.0	19.3	18.2	15.8	15.0	11.3
11	7.7	10.6	12.2	13.2	15.2	20.0	19.9	19.2	18.1		15.0	11.3
12	8.0	9.9	9.8	11.6	13.8	17.9	19.5	19.1	18.0	15.1	15.0	11.3
13	7.9	9.3	9.0	10.5	12.1	15.7	17.1	18.2	17.9	13.0	15.0	11.3
14	7.7	8.6	8.7	9.6	10.8	12.6	13.9	15.7	16.5	14.1	14.7	11.3
15	7.5	8.3	8.3	9.0	9.9	10.7	10.8	11.2	14.0	15.9	14.4	11.3
16	7.4	7.9	8.1	8.6	9.2	9.9	9.6	10.5	11.7	12.7	14.0	11.2
17	7.3	7.9	8.0	8.3	8.9	9.2	9.2	9.5	9.9	9.3	12.3	11.1
18	7.2	8.0	7.9	8.1	8.5	8.8	8.7	8.9	9.3	8.9	11.1	11.0
19	7.1	7.7	7.8	8.1	8.3	8.5	8.5		8.8	8.5	9.6	11.0
20	7.1	7.6	7.7	8.0	8.2	8.3	8.3	8.5	8.6	8.5	9.1	10.9
24	7.0	7.4	7.6	7.8	7.9	8.1	8.1	8.2	8.3	8.2	8.4	9.4
28	6.8	7.2	7.4	7.6	7.8	8.0	8.0	8.1	8.1	8.1	8.3	8.9
32	6.6	7.2	7.4	7.5	7.8	7.8	7.9	8.0	8.1	8.1	8.1	8.5
36	6.6	7.2	7.3	7.5	7.8	7.9	7.8	7.9	7.9	7.9	8.1	8.4

Year 2006 Osoyoos Lake Water Temperatures (°C)

Depth (m)	24-Jan	24-Apr	23-May	12-Jun	04-Jul	18-Jul	21-Aug	30-Aug	06-Sep	11-Sep	19-Sep	26-Sep	02-Oct	16-Oct	23-Oct
1	3.4	8.9	15.8	17.5	23.8	21.8	21.7	20.1	20.5	20.3	18.2	17.6	16.9	14.5	13.2
2	3.4	8.6	15.7	17.3	23.5	21.6	21.7	20.1	20.4	20.2	18.3	17.6	16.8	14.5	13.2
3	3.4	8.0	15.3	17.1	23.1	21.6	21.7	20.2	20.4	20.2	18.3	17.5	16.8	14.5	13.2
4	3.3	8.4	15.1	17.0	21.8	21.6	21.7	20.2	20.3	20.1	18.2	17.4	16.7	14.5	13.2
5	3.3	7.9	14.7	16.9	21.6	21.5	21.6	20.2	20.3	20.0	18.2	17.2	16.7	14.5	13.2
6	3.3	8.2	14.2	16.6	21.3	21.5	21.4	20.2	20.2	19.9	18.2	17.1	16.7	14.5	13.2
7	3.3	7.7	14.4	16.4	20.7	21.4	21.2	20.2	20.0	19.9	18.1	17.1	16.6	14.5	13.1
8	3.3	8.0	13.6	16.0	19.2	21.6	21.1	20.1	19.8	19.8	18.1	17.0	16.6	14.5	13.1
9	3.3	7.7		16.1	18.7	20.6	20.8	20.1	19.8	19.7	18.0	16.9	16.5	14.5	13.1
10	3.3	7.9	12.9	15.3	17.7	19.0	20.7	19.9	19.7	19.6	17.9	16.9	16.4	14.5	13.1
11	3.4	7.6		14.7	17.0	17.7	20.4	19.6	19.6	19.5	17.9	16.8	16.4	14.5	13.1
12	3.4	7.8	12.4	13.9	16.5	16.6	19.6	19.3	19.3	19.4	17.9	16.8	16.3	14.5	13.1
13	3.4	7.5		13.0	15.8	15.3	16.4	18.6	19.2	19.3	17.6	16.8	16.2	14.5	13.1
14	3.4	7.7	11.3	12.2	14.7	14.0	14.3	16.3	16.8	17.8	16.9	16.6	16.0	14.5	13.1
15	3.4	7.5		11.2	12.9	12.8	12.8	13.5	14.1	12.8	14.4	16.4	15.8	14.4	13.1
16	3.4	7.6	10.3	10.7	11.4	11.5	11.9	11.3	12.1	11.7	12.5	14.6	14.7	14.3	13.1
17	3.4			9.8	10.4	10.5	11.0	10.6	10.8	10.8	11.3	11.8	13.3	13.9	13.0
18	3.4	7.6	9.2	9.1	9.4	9.8	10.3	10.0	10.3	10.4	10.7	10.8	10.5	11.6	13.0
19	3.4			8.8	9.1	9.4	9.9	9.6	10.0	9.9	10.2	10.4	9.9	10.3	12.1
20	3.4	7.3	8.7	8.7	9.0	9.2	9.5	9.4	9.6	9.6	9.8	9.9	9.6	9.7	11.3
24	3.4	6.8	8.0	8.4	8.6	9.0	9.1	9.0	9.1	9.1	9.2	9.2	9.1	9.2	9.4
28	3.4	6.6	7.8	8.2	8.4	7.8	8.9	8.9	8.9	8.9	9.0	9.0	9.0	9.0	9.2
32	3.4	6.4	7.7	8.1	8.3	8.7	8.8	8.8	8.8	8.8	8.9	8.9	8.9	9.0	9.1
36	3.4	6.2	7.6	8.0	8.2	8.7	8.8	8.7	8.7	8.7	8.8	8.8	8.9	8.9	9.1
40	3.4	6.1	7.6	7.9	8.0		8.7	8.7	8.8	8.7	8.8	8.7	8.8	8.9	9.0
44	3.4	6.1	7.4	7.8	7.9		8.7	8.7	8.7	8.7	8.8	8.7	8.8	8.9	9.0
48	3.4	6.0	7.2	7.6	7.8		8.6	8.6	8.7	8.6	8.7	8.7	8.7	8.8	8.9
52	3.4	5.9	6.8	7.6	7.6		8.6	8.6	8.6	8.6	8.7	8.7	8.7	8.8	8.8

Year 2007 Osoyoos Lake Water Temperatures (°C)

Depth (m)	17-Apr-07	14-May-07	11-Jun-07	26-Jun-07	2-Aug-07	13-Aug-07	24-Aug-07	4-Sep-07	10-Sep-07	18-Sep-07	25-Sep-07	4-Oct-07	9-Oct-07	5-Nov-07
1	9.1	14.4	17.6	20.2	24.2	22.7	21.1	20.1	19.1	18.0	16.8		13.8	10.5
2	8.4	13.8	17.5	20.1	23.5	22.0	20.8	20.0	18.9	18.0	16.7		13.8	10.4
3	8.2	13.6	17.5	19.7	22.9	21.8	20.8	20.0	18.8	18.0	16.7	14.9	13.9	10.4
4	8.1	13.3	17.4	19.6	22.5	21.4	20.7	20.0	18.8	18.0	16.7	14.9	13.9	10.3
5	8.0	13.2	17.0	19.4	22.3	21.2	20.6	20.0	18.8	18.0	16.7	14.9	13.9	10.3
6	7.9	13.2	16.6	18.9	22.0	21.1	20.5	19.9	18.7	18.0	16.7		13.9	10.3
7	7.9	13.1	16.5	18.5	22.0	21.4	20.5	19.9	18.7	18.0	16.7		13.9	10.3
8	7.8	12.9	16.3	18.3	21.9	20.9	20.5	19.8	18.7	18.0	16.6	14.9	13.9	10.3
9	7.7	12.6	15.6	17.9	21.6	20.8	20.4	19.7	18.7	18.0	16.6		13.9	10.2
10	7.7	11.9	14.2	17.1	21.2	20.7	20.3	19.6	18.6	17.9	16.6		13.9	10.2
11	7.7	10.9	13.6	16.2	21.1	20.6	20.1	19.5	18.5	17.9	16.6		13.9	10.2
12	7.7	10.3	13.3	14.8	20.8	19.3	20.0	19.2	18.4	17.8	16.6	14.9	13.9	10.2
13	7.6	9.5	12.9	13.3	19.4	18.9	19.9	18.9	18.3	17.8	16.6		13.8	10.2
14	7.6	9.2	12.4	12.3	17.7	17.6	15.7	16.7	18.3	17.6	16.4		13.8	10.2
15	7.5	8.6	11.7	11.1	16.6	15.4	12.8	13.4	17.9	16.8	15.7		13.8	10.2
16	7.4	8.4	11.3	10.4	15.1	13.1	11.2	11.8	16.0	14.1	14.5	14.9	13.6	10.2
17	7.4	8.3	9.8	9.9	13.4	10.8	10.5	10.7	11.0	12.0	12.3		13.2	10.2
18	7.4	8.2	9.3	9.6	13.4	10.5	10.1	10.1	10.4	10.9	10.2	13.8	13.2	10.2
19	7.3	8.1	8.9	9.4	10.5	10.4	9.7	9.8	10.0	10.5	9.8		12.4	10.1
20	7.2	8.0	8.7	9.2	10.1	9.9	9.5	9.6	9.8	10.0	9.6	11.6	11.7	10.1
24	7.2	7.7	8.4	8.9	9.9	9.5	9.3	9.3	9.4	9.5	9.4	9.6	9.8	10.1
28	6.9	7.5	8.2	8.7	9.6	9.3	9.1	9.2	9.2	9.3	9.3	9.4	9.5	10.0
32	6.7	7.5	8.1	8.5	9.4	9.1	9.0	9.1	9.1	9.2	9.2	9.3	9.3	9.9
36	6.5	7.4	8.1	8.5		9.1	9.0	9.1	9.1	9.1	9.2	9.2	9.3	9.7
40	6.2	7.4	8.1	8.5		9.1	9.0	9.0	9.1	9.1	9.1	9.2	9.2	9.5
44	6.1	7.3	8.0	8.4		9.0	9.0	9.0	9.0	9.1	9.1	9.1	9.2	9.3
48	6.1	7.3	8.0	8.4		9.0	8.9	9.0	9.0	9.1	9.1	9.1	9.1	9.2
52	6.0	7.2	8.0	8.4		8.9	8.9	9.0	9.0	9.0	9.0		9.1	9.2

Year 2008 Osoyoos Lake Water Temperatures (°C)

Depth (m)	18-Mar-08	07-Apr-08	17-Apr-08	20-May-08	09-Jun-08	24-Jun-08	07-Jul-08	21-Jul-08	28-Jul-08	11-Aug-08	27-Aug-08	07-Sep-08	22-Sep-08	19-Oct-08	18-Nov-08	04-Dec-08
1	4.3	7.0	8.3	14.2	16.3	18.7	21.5	24.0	22.2	21.7	20.1	18.3	16.8	12.3	9.1	6.4
2	4.2	6.8	7.9	14.2	16.2	18.7	21.4	23.7	22.2	21.5	20.2	18.3	17.0	12.4	9.1	6.6
3	4.2	6.6	7.6	14.1	16.0	18.7	21.1	23.5	22.2	21.4	20.2	18.3	17.0	12.4	9.1	6.6
4	4.2	6.4	7.5	13.6	15.9	18.6	21.0	23.0	22.2	21.2	20.2	18.3	17.1	12.4	9.1	6.7
5	4.2	6.3	7.3	12.8	15.8	18.6	20.8	22.6	22.2	21.0	20.2	18.3	17.1	12.4	9.1	6.7
6	4.2	6.2	7.1	12.4	15.7	18.6	20.3	21.6	22.1	21.0	20.2	18.2	17.1	12.4	9.1	6.7
7	4.2	6.1	6.9	12.2	15.6	17.3	19.1	20.9	22.0	20.7	20.2	18.2	17.1	12.4	9.1	6.7
8	4.4	6.1	6.8	11.2	15.1	16.9	18.1	20.3	21.9	20.7	20.2	18.2	17.1	12.4	9.1	6.8
9	4.2	6.0	6.7	10.9	14.7	16.3	17.3	19.0	21.6	20.4	20.0	18.1	17.1	12.4	9.1	6.8
10	4.2	5.9	6.5	10.7	14.0	15.6	17.0	17.9	20.3	19.3	19.8	18.0	17.1	12.4	9.1	6.8
11	4.1	5.8	6.4	10.5	12.9	15.1	16.2	17.3	17.4	18.6	19.5	18.0	17.0	12.4	9.1	6.8
12	4.2	5.7	6.3	10.3	12.0	14.3	14.0	15.9	15.7	17.7	17.9	18.0	16.9	12.4	9.1	6.8
13		5.5	6.3	10.0	11.0	12.6	12.2	14.1	12.9	15.5	16.9	17.6	16.8	12.4	9.1	6.8
14	4.2	5.4	6.2	9.5	9.9	11.7	10.1	12.3	11.8	13.6	15.0	17.1	15.6	12.4	9.1	6.8
15		5.4	6.1	9.0	9.1	9.6	9.4	11.3	10.9	11.9	14.3	13.0	13.7	12.3	9.1	6.8
16	4.2	5.4	6.0	8.5	8.4	8.8	9.0	10.4	10.0	11.1	12.9	12.0	11.8	12.0	9.1	6.8
17		5.3	6.0	8.2	8.2	8.6	8.9	10.0	9.6	10.5	11.7	10.9	10.7	12.0	9.1	6.8
18	4.2	5.3	6.0	7.9	8.1	8.5	8.6	9.7	9.4	10.2	10.8	10.2	10.3	11.9	9.1	6.8
19		5.3	5.9	7.6	8.0	8.4	8.5	9.6	9.2	9.7	10.3	9.9	9.9	11.8	9.1	6.8
20	4.2	5.3	5.9	7.5	7.9	8.3	8.4	9.2	9.0	9.4	9.9	9.8	9.6	11.5	9.0	6.8
24	4.2	5.2	5.8	7.3	7.8	8.1	8.2	8.9	8.8	9.1	9.3	9.6	9.3	9.7	9.0	6.9
28	4.2	5.1	5.7	7.1	7.6	8.0	8.0	8.7	8.6	8.9	9.1	9.3	9.1	9.4	9.0	6.8
32	4.2	4.9	5.5	7.1	7.6	7.9	8.0	8.5	8.5	8.8	8.9	9.2	9.0	9.2	8.9	6.7
36	4.1	4.8	5.5	7.0	7.5	7.9	8.0	8.5	8.5	8.8	8.9	9.3	9.0	9.2	9.1	6.9
40	4.1	4.8	5.5	6.9	7.5	7.8	8.0	8.5	8.4	8.7	8.8	9.2	9.0	9.2	9.0	6.9
44	4.1	4.7	5.4	6.8	7.5	7.8	7.9	8.4	8.4	8.7	8.7	9.1	8.9	9.1	9.0	6.9
48		4.7	5.3	6.7	7.5	7.8	7.9	8.4	8.3	8.7	8.7	9.0	8.9	9.1	9.0	6.9
52		4.7	5.3	6.5	7.5	7.8	7.9	8.4	8.3	8.6	8.7	8.9	8.9	9.0	9.0	6.9

Year 2009 Osoyoos Lake Water Temperatures (°C)

Depth (m)	15-Apr-09	11-May-09	25-May-09	08-Jun-09	29-Jun-09	13-Jul-09	27-Jul-09	11-Aug-09	24-Aug-09	31-Aug-09	10-Sep-09	14-Sep-09	21-Sep-09	28-Sep-09	05-Oct-09	22-Oct-09	27-Nov-09	17-Dec-09
1	5.9	12.5	15.8	19.1	19.0	21.8	24.5	22.1	21.7	22.5	19.7	19.8	18.7	17.7	15.1	12.0	7.0	3.7
2	5.8	12.3	15.6	18.9	18.9	21.7	24.1	22.3	21.3	22.0	19.7	19.6	18.8	17.8	15.2	11.9	7.1	3.7
3	5.8	12.2	15.4	18.8	18.9	21.6	23.4	22.3	21.0	21.6	19.6	19.5	18.8	17.8	15.2	11.9	7.2	3.7
4	5.7	11.9	15.3	18.7	18.8	21.3	23.1	22.4	21.0	21.5	19.6	19.5	18.8	17.8	15.1	11.9	7.2	3.7
5	5.7	11.7	15.0	18.6	18.6	21.1	22.9	22.4	20.9	21.3	19.6	19.5	18.6	17.8	15.1	11.9	7.3	3.7
6	5.7	11.6	14.8	18.5	18.2	20.8	22.6	22.2	20.8	21.2	19.6	19.4	18.8	17.8	15.1	11.9	7.3	3.7
7	5.7	11.1	14.5	18.0	17.8	20.2	21.9	22.0	20.7	21.1	19.6	19.3	18.8	17.8	15.1	11.9	7.3	3.7
8	5.6	10.0	14.2	15.7	17.2	19.4	21.0	21.8	20.5	21.0	19.6	19.2	18.7	17.8	15.1	11.9	7.3	3.7
9	5.6	9.1	13.9	13.5	16.6	18.3	19.9	21.1	20.3	20.9	19.5	19.2	18.7	17.8	15.1	11.9	7.3	3.7
10	5.5	8.5	13.2	12.3	15.5	16.2	19.0	20.4	19.8	20.6	19.3	19.1	18.6	17.8	15.1	11.9	7.3	3.7
11	5.5	8.4	12.2	11.6	13.6	13.8	17.6	17.7	19.4	19.9	18.6	19.0	18.6	17.8	15.0	11.9	7.3	3.7
12	5.4	8.0	10.6	10.8	11.8	11.8	15.6	15.1	18.3	18.6	18.3	18.8	18.4	17.8	15.0	11.9	7.3	3.7
13	5.4	7.7	10.0	10.3	10.8	10.3	13.2	12.7	15.4	16.6	17.7	17.8	17.9	17.8	15.0	11.9	7.3	3.7
14	5.4	7.3	9.5	9.8	10.3	9.6	12.1	11.3	11.0	12.1	14.0	15.7	16.8	17.6	14.7	11.9	7.3	3.7
15	5.3	7.2	8.9	9.5	9.3	9.2	10.8	10.7	9.6	10.9	13.1	12.7	15.8	15.4	14.3	11.9	7.3	3.7
16	5.3	7.1	8.5	9.1	8.9	8.9	10.3	10.1	8.8	10.2	12.0	11.0	11.6	10.4	13.7	11.9	7.3	3.7
17	5.3	7.1	8.2	8.9	8.6	8.7	9.7	9.7	8.6	9.4	10.8	9.8	10.1	9.9	12.4	11.9	7.3	3.7
18	5.2	6.6	8.1	8.8	8.4	8.6	9.1	9.3	8.3	9.2	9.8	9.3	9.4	9.2	11.3	11.7	7.3	3.7
19	5.2	6.9	8.0	8.7	8.2	8.5	8.8	9.0	8.3	8.9	9.3	8.9	9.0	8.8	10.0	10.1	7.4	3.7
20	5.2	6.8	7.9	8.4	8.2	8.4	8.7	8.7	8.2	8.7	8.9	8.7	8.7	8.7	9.7	9.6	7.4	3.7
24	5.2	6.7	7.5	7.8	7.9	8.2	8.3	8.3	8.1	8.5	4.4	8.4	8.4	8.4	8.8	8.9	7.3	3.7
28	5.0	6.6	7.4	7.6	7.9	8.1	8.1	8.1	8.3	8.3	8.2	8.2	8.2	8.3	8.6	8.6	7.3	3.7
32	5.0	6.5	7.3	7.5	7.8	8.0	8.0	8.0	8.0	8.2	8.1	8.1	8.2	8.3	8.4	8.5	7.3	3.7
36	5.1	6.5	7.3	7.4	7.8	8.0	8.0	7.9	8.0	8.2	8.1	8.1	8.1	8.2	8.3	8.5	7.4	3.8
40	5.1	6.5	7.2	7.4	7.7	7.9	8.0	7.9	8.0	8.1	8.1	8.1	8.1	8.2	8.3	8.4	7.4	3.8
44	5.0	6.4	7.1	7.4	7.7	7.8	7.9	7.9		8.1	8.0	8.1	8.1	8.2	8.2	8.4	7.4	3.8
48	4.9	6.4	7.1	7.3	7.7	7.8	7.9	7.9		8.0	8.0	8.0	8.0	8.1	8.2	8.4	7.4	3.8
52	4.8	6.4	7.0	7.3	7.7	7.7	7.9	7.8		8.0	8.0	8.0	8.0	8.1	8.1	8.3	7.4	3.8

Year 2010 Osoyoos Lake Water Temperatures (°C)

Depth (m)	16-Feb-10	16-Apr-10	10-May-10	01-Jun-10	14-Jun-10	29-Jun-10	19-Jul-10	26-Jul-10	09-Aug-10	16-Aug-10	23-Aug-10	30-Aug-10	06-Sep-10	14-Sep-10	20-Sep-10	27-Sep-10	02-Oct-10	18-Oct-10	15-Nov-10	15-Dec-10
1	3.1	10.0	12.2	16.3	17.9	19.8	21.7	22.7	22.3	23.7	21.0	19.7	18.3	17.6	17.1	17.1	17.0	13.4	9.8	4.4
2	3.1	9.6	12.0	16.0	17.7	19.9	21.4	22.7	22.3	23.3	21.0	19.6	18.3	17.7	17.1	17.0	17.0	13.5	9.9	4.5
3	3.1	8.8	11.6	16.0	17.3	19.9	21.3	22.7	22.3	22.9	21.0	19.5	18.3	17.7	17.2	17.0	16.8	13.5	9.9	4.5
4	3.1	7.9	11.3	16.2	16.6	19.9	21.1	22.3	22.3	22.3	21.0	19.5	18.4	17.6	17.2	16.9	16.7	13.5	9.9	4.5
5	3.1	7.6	11.1	16.2	16.3	19.8	20.4	21.8	22.3	22.2	20.9	19.4	18.4	17.6	17.2	16.8	16.5	13.6	9.9	4.5
6	3.1	7.3	11.0	16.0	15.9	19.1	19.9	21.3	22.2	21.9	20.9	19.4	18.3	17.6	17.2	16.8	16.4	13.6	9.9	4.5
7	3.1	7.2	10.9	15.6	14.5	17.8	19.5	20.7	21.3	21.8	20.9	19.4	18.3	17.5	17.2	16.8	16.3	13.6	9.9	4.5
8	3.1	6.9	10.8	14.8	13.6	16.3	18.4	19.9	19.8	21.6	20.9	19.3	18.3	17.4	17.2	16.7	16.2	13.6	9.9	4.5
9	3.1	6.8	10.7	14.7	13.4	15.1	17.1	18.9	18.3	21.2	20.6	19.0	18.3	17.3	17.2	16.7	16.1	13.6	9.9	4.5
10	3.2	6.7	10.3	12.0	12.5	15.0	15.4	16.4	16.2	20.1	20.3	18.7	18.3	17.2	17.2	16.7	16.1	13.6	9.9	4.5
11	3.2	6.6	10.0	10.9	11.5	14.3	13.9	15.1	14.5	17.1	18.8	18.3	18.2	17.0	17.2	16.6	16.0	13.6	9.9	4.5
12	3.2	6.6	9.7	10.4	11.3	13.0	12.8	13.4	12.9	14.5	17.4	16.6	18.1	16.3	17.2	16.6	16.0	13.6	9.9	4.5
13	3.2	6.5	9.6	10.2	10.8	12.1	11.3	11.5	11.5	12.3	15.2	13.6	17.4	15.6	17.2	16.6	15.9	13.6	9.9	4.5
14	3.2	6.5	9.3	9.5	10.6	10.6	10.6	10.2	10.8	11.3	13.3	11.8	12.6	14.7	16.1	15.4	15.9	13.6	9.9	4.5
15	3.2	6.5	9.1	9.1	10.2	9.7	9.8	9.8	10.3	10.6	11.6	11.1	11.5	12.1	14.5	14.1	14.6	13.6	9.9	4.5
16	3.2	6.5	9.0	8.8	9.5	9.2	9.6	9.6	9.8	10.1	10.3	10.3	10.8	11.0	13.7	12.1	12.5	13.6	9.9	4.5
17	3.2	6.4	8.9	8.7	9.2	9.2	9.4	9.5	9.7	9.7	10.0	10.1	10.3	10.3	11.8	11.5	12.3	13.4	9.9	4.5
18	3.2	6.4	8.7	8.6	9.0	9.1	9.3	9.4	9.5	9.6	9.7	9.9	10.0	10.0	10.4	10.4	11.3	12.7	9.9	4.5
19	3.2	6.4	8.4	8.5	8.8	8.9	9.2	9.3	9.4	9.4	9.6	9.8	9.9	9.9	9.9	10.1	10.4	11.4	9.9	4.5
20	3.2	6.4	8.4	8.4	8.7	8.8	9.2	9.3	9.3	9.3	9.5	9.6	9.7	9.7	9.7	10.0	10.1	10.5	9.9	4.5
24	3.2	6.4	8.1	8.3	8.6	8.4	9.0	9.2	9.1	9.2	9.3	9.3	9.5	9.5	9.4	9.6	9.8	9.7	9.9	4.5
28	3.2	6.3	7.9	8.2	8.6	8.1	8.9	9.1	9.0	9.1	9.2	9.2	9.4	9.3	9.3	9.5	9.6	9.5	9.8	4.5
32	3.2	6.3	7.8	8.0	8.5	8.6	8.9	9.0	9.0	9.0	9.1	9.1	9.3	9.3	9.2	9.4	9.5	9.4	9.6	4.5
36	3.1	6.3	7.7	8.1	8.4	8.5	8.9	9.0	8.9	9.0	9.1	9.1	9.2	9.2	9.2	9.3	9.4	9.4	9.3	4.5
40	3.1	6.3	7.6	8.0	8.3	8.1	8.9	8.9	8.9	9.0	9.1	9.0	9.2	9.2	9.1	9.3	9.4	9.3	9.3	4.5
44	3.2	6.3	7.5	8.0	8.3	8.5	8.8	8.9	8.9	8.9	9.2	9.0	9.1	9.1	9.1	9.2	9.3	9.2	9.2	4.5
48	3.1	6.2	7.4	8.0	8.3	8.5	8.8	8.9	8.9	8.9	9.1	9.0	9.1	9.1	9.1	9.2	9.3	9.2	9.2	4.5
52	3.1	6.3	7.3	7.9	8.2	8.4	8.9	8.9	8.8	8.9	9.0	9.0	9.1	9.1	9.0	9.2	9.3	9.2	9.2	4.5

Year 2011 Osoyoos Lake Water Temperatures (°C)

Depth(m)	20-Apr-11	10-May-11	31-May-11	16-Jun-11	20-Jun-11	14-Jul-11	18-Jul-11	03-Aug-11	09-Aug-11	16-Aug-11	22-Aug-11	29-Aug-11	07-Sep-11	15-Sep-11	22-Sep-11	28-Sep-11	06-Oct-11	11-Oct-11	16-Oct-11	03-Nov-11	16-Nov-11	29-Nov-11	18-Dec-11
1	6.9	11.6	13.5	16.2	15.3	20.0	20.2	20.7	22.6	21.0	22.6	23.1	21.8	20.7	18.7	17.9	15.9	15.9	13.9	10.6	8.3	6.9	4.8
2	6.9	11.5	13.4	16.2	15.2	20.0	20.0	20.7	22.6	21.0	22.5	23.0	21.3	20.7	18.7	17.9	15.9	15.9	14.0	10.7	8.3	6.9	4.7
3	6.8	11.2	13.1	16.1	14.9	20.1	20.0	20.8	22.6	21.0	22.3	22.9	21.1	20.7	18.7	17.9	16.0	16.0	14.0	10.7	8.4	6.9	4.7
4	6.8	10.8	12.6	16.0	14.9	20.1	19.9	20.7	22.6	21.0	22.1	22.7	20.8	20.7	18.7	17.9	16.0	16.0	14.1	10.7	8.4	6.9	4.7
5	6.8	10.5	12.3	15.8	14.8	20.0	19.9	20.7	22.6	21.0	21.8	22.6	20.6	20.7	18.6	17.8	16.0	16.0	14.1	10.8	8.4	6.9	4.7
6	6.7	10.2	12.1	15.7	14.7	20.0	19.9	20.7	22.1	21.0	21.7	22.2	20.5	20.7	18.6	17.8	16.0	16.0	14.1	10.8	8.4	6.9	4.7
7	6.7	9.9	11.9	15.2	14.5	19.9	19.7	20.6	21.8	21.0	21.4	22.0	20.3	20.5	18.6	17.7	16.0	16.0	14.1	10.8	8.4	6.9	4.7
8	6.7	10.0	11.7	14.9	14.4	19.8	19.7	20.5	21.5	21.0	21.2	21.5	20.1	20.3	18.6	17.7	16.0	16.0	14.1	10.8	8.4	7.0	4.7
9	6.6	9.9	11.5	14.8	14.4	19.7	19.4	20.4	21.3	20.9	21.1	21.1	20.0	20.1	18.5	17.6	16.0	16.0	14.1	10.8	8.4	7.0	4.7
10	6.4	9.9	11.3	14.1	14.2	19.1	18.9	20.2	21.0	20.8	20.8	20.7	20.0	20.0	18.5	17.6	15.9	15.9	14.1	10.8	8.5	7.0	4.7
11	6.3	9.8	11.2	13.8	14.1	18.9	18.6	19.8	20.7	19.8	20.1	20.3	19.9	19.8	18.5	17.6	15.9	15.9	14.1	10.8	8.5	7.0	4.7
12	6.3	9.8	11.0	13.2	14.0	17.8	18.4	18.9	19.4	19.3	15.1	19.0	19.8	19.2	18.5	17.5	15.8	15.8	14.1	10.8	8.5	6.9	4.7
13	6.2	9.7	11.0	12.8	13.5	16.7	16.8	17.2	18.0	18.6	18.4	17.3	19.4	17.4	18.5	17.2	15.8	15.8	14.1	10.8	8.5	6.9	4.7
14	6.1	9.6	10.9	11.8	12.8	15.1	15.2	15.6	16.4	17.2	16.8	16.6	17.8	16.1	18.3	17.0	15.8	15.8	14.0	10.8	8.5	6.9	4.7
15	5.9	9.5	10.8	10.9	12.6	13.0	13.7	13.9	13.3	15.0	15.7	14.7	15.9	15.1	18.1	16.1	15.7	15.7	13.9	10.8	8.5	6.9	4.7
16	5.7	8.9	10.6	10.5	12.0	11.5	12.3	13.1	12.2	13.8	13.6	13.0	13.9	12.2	14.6	14.3	15.6	15.6	13.9	10.8	8.5	6.9	4.7
17	5.6	8.6	10.3	10.2	11.5	11.0	11.7	12.3	11.2	12.4	11.9	12.0	12.4	11.4	11.7	13.9	15.5	15.5	13.9	10.8	8.5	7.0	4.7
18	5.6	8.2	10.1	9.9	11.1	10.3	10.9	11.3	10.5	11.3	10.9	11.2	11.4	10.8	11.0	12.1	15.3	15.3	13.7	10.8	8.5	6.9	4.6
19	5.6	8.0	9.9	9.5	10.6	9.9	10.3	10.6	10.1	10.7	10.3	10.3	11.0	10.3	10.6	11.4	13.3	13.3	13.6	10.8	8.5	6.9	4.6
20	5.6	7.8	9.5	9.1	10.4	9.5	9.8	10.2	9.8	10.4	10.1	10.0	10.5	9.9	10.3	10.8	11.5	11.5	12.9	10.9	8.5	6.9	4.6
24	5.6	7.1	8.4	8.6	9.2	9.2	9.2	9.5	9.3	9.6	9.5	9.4	9.7	9.3	9.6	9.7	9.8	9.8	10.0	10.6	8.5	6.9	4.6
28	5.6	7.0	7.7	8.2	8.5	8.9	8.9	9.1	9.1	9.3	9.2	9.2	9.4	9.2	9.4	9.4	9.4	9.4	9.5	10.4	8.5	6.9	4.6
32	5.5	6.8	7.5	8.0	8.3	8.7	8.7	9.0	8.9	9.1	9.1	9.1	9.2	9.1	9.2	9.3	9.3	9.3	9.4	9.8	8.4	6.8	4.6
36	5.6	6.8	7.3	8.0	8.0	8.6	8.6	8.9	8.9	9.1	9.0	9.0	9.1	9.0	9.2	9.2	9.1	9.1	9.3	9.4	8.6	7.0	4.6
40	5.5	6.7	7.2	7.8	7.8	8.4	8.4	8.7	8.8	8.9	8.8	8.9	8.9	8.8	9.1	9.1	9.0	9.0	9.2	9.1	8.6	7.0	4.6
44	5.4	6.6	7.2	7.6	7.6	8.3	8.3	8.5	8.7	8.8	8.7	8.8	8.8	8.7	9.0	9.0	8.9	8.9	9.0	8.9	8.5	6.9	4.6
48	5.4	6.6	7.0	7.5	7.5	8.1	8.0	8.4	8.6	8.6	8.5	8.6	8.6	8.5	8.9	8.9	8.8	8.8	8.8	8.8	8.5	6.9	4.6
52	5.4	6.6	6.9	7.2	7.3	8.0	7.8	8.2	8.5	8.4	8.4	8.3	8.4	8.3	8.6	8.5	8.7	8.7	8.7	8.6	8.5	6.9	4.6

Year 2012 Osoyoos Lake Water Temperatures (°C)

Depth (m)	20-Apr-12	29-Apr-12	22-May-12	11-Jun-12	16-Jul-12	26-Jul-12	07-Aug-12	13-Aug-12	20-Aug-12	27-Aug-12	04-Sep-12	11-Sep-12	17-Sep-12	24-Sep-12	30-Sep-12	11-Oct-12	29-Oct-12	17-Nov-12
1	6.9	12.0	13.6	14.9	22.5	22.4	23.8	23.8	24.4	21.9	20.2	19.0	18.6	18.6	18.0	15.6	11.5	8.8
2	6.9	12.0	13.3	14.6	22.5	22.0	23.6	23.8	24.4	21.9	20.1	19.2	18.6	18.6	18.0	15.6	11.5	8.8
3	6.8	11.9	13.3	14.6	22.4	21.9	23.2	23.6	24.4	21.9	20.0	19.0	18.5	18.6	18.0	15.4	11.5	8.8
4	6.8	11.6	13.2	14.0	22.2	21.8	23.0	23.3	24.4	21.9	20.0	19.1	18.5	18.5	18.0	15.3	11.5	8.8
5	6.8	10.8	13.0	13.9	21.8	21.8	22.4	23.2	24.3	21.9	19.9	19.1	18.5	18.5	17.9	15.3	11.5	8.8
6	6.7	9.7	12.9	13.7	21.6	21.6	22.0	22.8	24.3	21.9	19.9	19.1	18.4	18.4	17.8	15.2	11.5	8.8
7	6.7	9.4	12.6	13.5	20.3	21.3	21.8	22.5	24.0	21.8	19.9	19.1	18.4	18.3	17.8	15.2	11.5	8.8
8	6.7	9.2	12.2	13.5	18.6	21.1	21.6	22.4	23.7	21.8	19.8	19.0	18.3	18.2	17.8	15.2	11.5	8.8
9	6.6	8.8	12.0	13.4	17.6	20.6	21.4	22.2	22.8	21.8	19.8	18.9	18.2	18.1	17.8	15.2	11.5	8.8
10	6.4	8.4	11.8	13.4	16.7	20.0	20.3	20.7	22.0	21.7	19.7	18.9	18.2	18.0	17.7	15.1	11.5	8.8
11	6.3	8.0	11.4	12.8	16.1	18.9	19.3	18.6	19.8	21.6	19.6	18.7	18.0	18.0	17.7	15.1	11.4	8.8
12	6.3	7.7	10.5	12.4	15.5	17.0	18.0	17.2	16.2	19.9	19.3	18.5	17.8	17.8	17.6	15.0	11.4	8.8
13	6.2	7.5	9.3	11.4	13.7	15.3	15.4	15.8	13.8	14.9	18.2	17.4	17.7	17.7	17.3	14.9	11.4	8.8
14	6.1	7.3	8.5	11.0	12.8	14.0	13.5	13.3	11.4	12.2	16.1	15.2	17.0	17.2	16.8	14.9	11.4	8.8
15	5.9	7.1	8.1	9.4	11.3	12.8	12.6	11.8	10.2	11.1	11.8	12.6	14.8	15.7	16.3	14.7	11.4	8.8
16	5.7	7.0	7.9	8.8	9.8	11.6	11.5	10.1	9.5	9.6	10.5	10.6	11.6	11.7	14.6	14.0	11.4	8.8
17	5.6	6.8	7.7	8.2	9.1	10.3	10.1	9.3	9.0	9.1	9.7	9.4	10.3	10.0	12.3	12.9	11.4	8.8
18	5.6	6.7	7.6	7.9	8.7	9.5	9.5	8.8	8.7	8.9	8.9	9.2	9.7	9.4	10.1	11.3	11.4	8.8
19	5.6	6.6	7.5	7.7	8.4	9.1	8.9	8.5	8.5	8.7	8.6	9.0	9.2	9.0	9.4	10.5	11.4	8.8
20	5.6	6.5	7.4	7.6	8.2	8.7	8.5	8.3	8.4	8.4	8.5	8.8	8.9	8.8	9.0	9.5	11.1	8.8
24	5.6	6.4	7.1	7.3	7.8	8.0	8.1	8.1	8.1	8.1	8.2	8.5	8.5	8.5	8.5	8.9	10.4	8.8
28	5.6	6.3	7.0	7.3	7.6	7.8	7.9	7.9	8.0	8.0	8.1	8.4	8.4	8.4	8.4	8.6	8.9	8.8
32	5.5	6.2	6.9	7.2	7.5	7.7	7.8	7.9	7.9	7.9	8.0	8.3	8.2	8.3	8.3	8.4	8.8	8.8
36	5.6	6.1	6.9	7.2	7.5	7.7	7.8	7.8	7.8	7.9	8.0	8.2	8.2	8.3	8.3	8.5	8.6	8.8
40	5.5	6.0	6.8	7.2	7.5	7.7	7.7	7.8	7.8	7.9	8.0	8.2	8.2	8.2	8.2	8.5	8.6	8.8
44	5.4	6.0	6.8	7.2	7.5	7.6	7.7	7.8	7.8	7.9	7.9	8.2	8.2	8.2	8.2	8.4	8.5	8.7
48	5.4	5.9	6.7	7.1	7.5	7.6	7.6	7.7	7.7	7.8	7.9	8.2	8.2	8.2	8.2	8.4	8.5	8.7
52	5.4	5.9	6.7	7.1	7.4	7.5	7.6	7.7	7.7	7.8	7.9	8.1	8.2	8.2	8.1	8.4	8.5	8.5

Year 2013 Osoyoos Lake Water Temperatures (°C)

Depth (m)	24-Apr-13	15-May-13	21-May-13	28-May-13	06-Jun-13	19-Jun-13	24-Jun-13	03-Jul-13	09-Jul-13	15-Jul-13	22-Jul-13	30-Jul-13	06-Aug-13	15-Aug-13	19-Aug-13	26-Aug-13	05-Sep-13	12-Sep-13	16-Sep-13	23-Sep-13	10-Oct-13	16-Oct-13	23-Oct-13	06-Nov-13	13-Nov-13	19-Dec-13
1	9.1	15.0	14.5	15.1	17.5	18.3	19.0	21.8	22.0	21.0	22.6	23.2	23.5	24.5	23.9	22.1	21.7	22.1	21.9	19.5	14.3	13.4	12.7	10.3	9.6	3.3
2	9.0	14.1	14.5	15.1	16.6	18.2	19.0	21.5	22.0	21.0	22.6	23.2	23.3	24.5	23.9	22.1	21.7	22.0	21.7	19.5	14.3	13.4	12.7	10.3	9.7	3.3
3	8.9	13.6	14.5	15.0	16.1	18.0	18.9	21.4	21.9	21.0	22.5	22.9	23.2	24.5	23.8	22.2	21.7	21.8	21.6	19.5	14.3	13.4	12.7	10.3	9.7	3.4
4	8.9	13.0	14.4	15.0	15.7	17.9	18.8	21.1	21.9	20.9	22.4	22.9	23.1	24.5	23.6	22.2	21.7	21.5	21.6	19.5	14.3	13.4	12.7	10.3	9.7	3.4
5	8.6	12.9	14.4	14.9	15.4	17.9	18.6	20.6	21.8	20.9	22.1	22.7	23.0	24.8	23.5	22.2	21.7	21.3	21.6	19.5	14.3	13.4	12.7	10.3	9.7	3.4
6	8.2	12.7	14.2	14.9	15.3	17.8	17.9	20.2	21.7	20.9	21.7	22.5	22.9	24.1	23.4	22.2	21.6	21.2	21.6	19.5	14.3	13.4	12.7	10.3	9.7	3.4
7	8.1	12.6	14.2	14.7	15.2	17.8	17.7	20.1	21.6	20.8	21.5	22.4	22.9	23.4	23.4	22.2	21.6	21.2	21.5	19.5	14.3	13.4	12.7	10.3	9.7	3.4
8	7.8	12.4	14.1	14.6	15.1	17.6	17.5	19.7	21.6	20.7	21.3	22.4	22.6	23.1	23.3	22.2	21.5	21.2	21.5	19.5	14.3	13.4	12.7	10.3	9.7	3.4
9	7.8	12.2	14.0	14.5	14.9	17.5	17.2	18.9	21.4	20.4	21.3	22.3	22.4	22.6	22.6	22.2	21.4	21.2	21.5	19.5	14.3	13.4	12.7	10.3	9.7	3.4
10	7.8	12.2	13.8	13.3	14.6	16.6	16.9	18.3	20.8	19.9	21.1	22.1	22.2	21.6	21.8	22.1	21.4	21.1	21.5	19.5	14.3	13.4	12.7	10.3	9.7	3.4
11	7.7	11.7	13.5	13.0	14.4	15.9	16.8	17.9	20.0	19.3	20.6	21.6	21.9	20.4	21.3	22.1	20.9	20.9	21.5	19.4	14.2	13.4	12.7	10.3	9.7	3.4
12	7.7	11.5	11.8	12.6	14.3	15.3	16.5	17.3	17.1	18.1	19.6	20.2	21.4	19.0	20.3	21.8	20.5	20.8	21.3	19.4	14.2	13.4	12.7	10.3	9.6	3.4
13	7.6	11.1	11.5	12.3	14.1	14.7	16.0	17.0	15.5	15.9	17.8	18.7	18.6	17.3	19.0	17.8	20.2	20.5	20.7	19.4	14.2	13.4	12.7	10.3	9.6	3.4
14	7.5	10.8	10.7	11.7	13.3	14.4	15.1	16.5	14.5	15.4	16.6	16.8	16.0	15.6	17.9	16.5	16.6	19.9	18.3	19.1	14.2	13.4	12.7	10.3	9.6	3.4
15	7.4	10.5	9.7	11.5	13.0	14.0	14.3	14.7	13.6	15.1	15.2	15.4	14.8	13.6	16.4	15.1	14.6	16.2	14.0	18.5	14.2	13.4	12.6	10.3	9.6	3.4
16	7.3	10.1	8.9	11.2	12.4	13.0	13.1	13.3	12.4	14.2	13.7	14.1	13.4	11.6	15.0	12.9	13.8	13.5	12.9	15.8	14.0	13.3	12.6	10.3	9.6	3.4
17	7.1	9.7	8.7	10.7	11.0	11.7	11.7	11.9	11.0	13.3	12.9	13.0	12.2	11.2	13.4	12.0	12.0	12.3	11.4	13.3	13.8	13.1	12.6	10.3	9.6	3.4
18	7.0	9.3	8.7	10.1	10.2	11.0	10.6	10.7	10.2	12.0	11.2	11.5	11.1	10.9	12.2	11.0	10.9	11.5	11.1	10.8	13.4	12.9	12.5	10.3	9.6	3.4
19	6.9	9.0	8.5	9.4	9.7	10.5	10.2	10.0	9.9	10.7	10.5	10.5	10.2	10.3	11.2	10.5	10.4	10.8	10.7	10.4	13.2	12.6	12.5	10.3	9.6	3.4
20	6.9	8.5	8.3	9.2	9.4	9.9	9.7	9.6	9.6	10.2	10.4	10.2	9.9	10.1	10.4	10.0	10.1	10.3	10.3	10.2	12.3	12.2	12.3	10.3	9.6	3.4
24	6.7	7.9	8.0	8.5	8.6	9.0	8.9	9.0	9.1	9.4	9.5	9.4	9.5	9.5	9.6	9.7	9.6	9.6	9.7	9.7	9.9	10.3	10.2	10.3	9.6	3.4
28	6.6	7.6	7.7	8.2	8.4	8.8	8.8	8.9	8.9	9.1	9.2	9.2	9.2	9.3	9.3	9.4	9.4	9.4	9.5	9.5	9.7	9.6	9.8	10.1	9.6	3.4
32	6.3	7.4	7.5	8.0	8.2	8.6	8.7	8.7	8.8	9.0	9.0	9.1	9.1	9.2	9.2	9.3	9.3	9.3	9.4	9.4	9.6	9.4	9.7	9.8	9.5	3.4
36	6.3	7.4	7.5	8.0	8.2	8.5	8.5	8.8	8.7	9.0	9.0	9.0	9.1	9.2	9.1	9.2	9.3	9.2	9.3	9.3	9.4	9.4	9.5	9.6	9.5	3.4
40	6.2	7.1	7.4	7.9	8.0	8.4	8.4	8.4	8.6	8.8	8.9	8.9	9.0	9.1	9.0	9.1	9.1	9.1	9.2	9.2	9.3	9.3	9.4	9.4	9.4	3.4
44	6.0	7.0	7.1	7.8	7.7	8.2	8.1	8.3	8.3	8.5	8.5	8.7	8.7	8.8	8.9	9.0	8.9	8.9	9.0	9.1	9.0	9.1	9.3	9.1	9.2	3.4
48	5.8	6.6	6.8	7.4	7.5	7.9	7.9	8.0	8.1	8.3	8.3	8.3	8.4	8.5	8.8	8.8	8.7	8.8	8.8	8.8	8.9	9.0	9.0	9.0	9.2	3.4
52	5.7	6.5	6.6	7.1	7.4	7.6	7.7	7.9	7.9	8.3	8.0	8.2	8.1	8.5	8.5	8.3	8.6	8.7	8.6	8.6	8.8	8.8	8.9	8.8	9.0	3.4

OSOYOOS LAKE OXYGEN CONCENTRATIONS

Table 2. Osoyoos Lake oxygen profiles (mg/L). Profiles are averaged from data collected at the north end of the North Basin (#1, Figure 3) and the Monashee sites (#5, Figure 3). Shaded area (when present) approximates oxygen concentrations known to be generally avoided by juvenile sockeye (i.e. oxygen < 4µg L^{-1}, Davis 1975, Brett and Blackburn 1981). No data available for blank cells.

Year 2005 Osoyoos Lake oxygen concentrations µg L^{-1}

Depth (m)	27-Apr-05	17-May-05	31-May-05	20-Jun-05	12-Jul-05	2-Aug-05	22-Aug-05	22-Sep-05	4-Oct-05	4-Nov-05
1	12.1	10.4	10.2	9.9	10.1	9.4	9.5	9.2	9.6	10.1
2	12.5	10.5	10.3	9.9	10.2	9.4	9.5	9.2	9.6	10.0
3	12.7	10.6	10.4	9.9	10.2	9.4	9.5	9.2	9.6	10.0
4	12.8	10.6	10.4	9.9	10.2	9.4	9.5	9.2	9.6	10.0
5	12.8	10.6	10.7	9.9	10.2	9.4	9.5	9.2	9.6	10.0
6	12.9	10.7	11.1	9.9	10.1	9.4	9.5	9.2	9.5	10.0
7	12.9	10.8	11.2	9.9	10.1	9.4	9.5	9.2	9.5	10.0
8	13.0	11.1	11.2	10.1	10.2	9.4	9.5	9.1	9.5	10.0
9	13.0	11.3	11.2	10.1	10.3	9.5	9.5	9.1	9.5	10.0
10	13.0	11.5	11.2	10.2	10.5	9.6	10.0	9.1	9.5	10.0
11	13.0	11.6	11.1	10.3	10.8	9.8	10.1	9.1	9.5	10.0
12	13.0	11.7	11.1	10.2	10.8	10.0	10.1	9.1	9.5	10.0
13	13.0	11.7	11.0	10.7	10.9	10.4	10.0	8.9	9.5	10.0
14	12.9	11.7	11.0	10.5	10.9	10.2	10.1	8.9	9.5	10.0
15	12.9	11.7	11.0	10.4	10.9	10.1	10.0	8.8	8.9	10.0
16	12.9	11.8	11.0	10.5	10.9	10.2	9.8	8.1	8.6	9.7
17	12.9	11.8	11.0	10.5	10.8	10.1	9.8	7.9	8.2	9.6
18	12.9	11.9	11.0	10.5	10.7	10.0	9.7	7.9	8.0	9.5
19	12.8	11.8	11.1	10.6	10.7	10.0	9.7	7.9	7.8	9.3
20	12.8	11.8	11.1	10.6	10.8	9.9	9.6	7.8	7.8	9.1
24	12.8	11.9	11.4	10.7	10.8	9.9	9.5	7.8	7.6	8.3
28	12.7	11.9	11.6	10.8	10.9	10.0	9.7	7.9	7.6	8.0
32	12.6	12.0	11.6	10.8	11.0	10.1	9.4	7.6	7.7	7.7
36	12.5	11.9	11.6	10.5	11.6	10.0	9.2	6.8	7.6	7.3
40	12.6	11.3	11.6	11.1	11.5	9.7	10.1	7.3	7.8	6.9
44	12.5	11.3	11.5	10.9	11.4	10.0	9.2	5.9	7.4	6.4
48	12.3	11.2	11.2	10.7	10.1	7.7	7.7	4.6	6.7	
52	11.9		10.7	10.5	9.7	7.5	4.1	4.3	5.1	

Year 2006 Osoyoos Lake oxygen concentrations µg L^{-1}

Depth (m)	24-Jan-06	24-Apr-06	23-May-06	12-Jun-06	04-Jul-06	18-Jul-06	21-Aug-06	30-Aug-06	06-Sep-06	11-Sep-06	19-Sep-06	26-Sep-06	02-Oct-06	16-Oct-06	23-Oct-06
1	12.7	11.9	10.2	9.9	9.0	8.6	9.5	8.6	9.2	9.4	9.4	9.7	9.3	9.5	9.8
2	12.6	12.2	10.2	9.8	8.9	8.4	9.5	8.6	9.3	9.5	9.3	9.7	9.2	9.5	9.5
3	12.5	12.1	10.2	9.7	9.0	8.4	9.5	8.6	9.3	9.5	9.3	9.8	9.1	9.5	9.5
4	12.5	12.2	10.2	9.7	9.2	8.4	9.5	8.6	9.3	9.5	9.3	9.8	9.1	9.4	9.5
5	12.5	12.1	10.2	9.6	9.1	8.4	9.4	8.6	9.2	9.5	9.3	9.8	9.1	9.4	9.5
6	12.4	12.3	10.3	9.6	9.1	8.4	9.3	8.6	9.1	9.4	9.2	9.8	9.0	9.4	9.4
7	12.4	12.1	10.2	9.4	8.8	8.4	9.1	8.6	8.9	9.3	9.2	9.7	9.0	9.4	9.4
8	12.4	12.3	10.3	9.3	8.5	8.4	8.8	8.3	8.5	9.0	9.2	9.6	9.0	9.4	9.4
9	12.4	12.1		9.2	8.3	8.1	8.3	8.3	8.3	8.9	9.1	9.6	8.9	9.3	9.4
10	12.4	12.2	10.3	9.2	8.0	7.6	8.1	8.1	8.2	8.7	9.0	9.5	8.7	9.3	9.4
11	12.4	12.1		9.1	7.7	7.5	7.7	7.6	8.1	8.6	9.0	9.4	8.4	9.3	9.4
12	12.4	12.2	10.4	8.9	7.5	6.9	6.9	7.0	7.9	8.4	9.0	9.5	8.3	9.3	9.4
13	12.4	12.1		8.9	7.4	6.3	3.6	6.3	7.3	8.2	8.9	9.5	8.2	9.2	9.4
14	12.4	12.2	10.4	8.9	7.2	6.3	3.6	4.6	4.7	7.0	7.9	9.4	8.0	9.3	9.4
15	12.3	12.1		9.0	7.1	6.3	3.8	3.5	3.5	4.0	6.1	9.3	7.7	9.3	9.4
16	12.3	12.1	10.3	9.0	7.2	6.3	4.1	3.6	3.4	3.7	3.6	7.4	6.8	9.3	9.4
17	12.3			9.1	7.3	6.3	4.4	4.0	3.7	3.8	3.2	3.9	5.4	8.4	9.4
18	12.3	12.2	10.3	9.2	7.5	6.4	4.7	4.2	3.9	4.1	3.2	3.5	3.4	6.0	9.4
19	12.3			9.2	7.5	6.5	4.9	4.4	4.0	4.2	3.3	3.4	2.9	4.1	8.8
20	12.3	12.1	10.4	9.2	7.6	6.6	5.0	4.3	4.2	4.3	3.6	3.4	2.8	2.8	7.6
24	12.3	12.1	10.3	9.2	7.5	6.6	5.1	4.4	4.3	4.3	3.7	3.2	2.8	2.3	3.5
28	12.3	12.0	10.2	9.1	7.4	6.6	4.9	4.0	4.1	3.9	3.1	3.1	2.5	2.0	2.1
32	12.3	12.0	10.3	8.9	7.1	6.4	4.6	4.0	3.8	3.5	3.1	3.0	2.2	1.8	1.7
36	8.9	11.8	10.1	8.5	6.3	6.6	4.6	3.3	2.5	3.0	2.3	2.9	2.1	1.6	1.6
40	12.2	11.8	10.1	8.8	7.0		4.5	3.9	3.7	3.5	2.9	2.7	2.1	1.5	1.4
44	12.2	11.8	10.0	8.7	7.0		4.5	3.9	3.6	3.4	2.9	2.6	2.0	1.5	1.3
48	12.3	11.8	10.0	8.7	7.0		4.5	3.9	3.6	3.4	2.8	2.5	2.0	1.5	1.2
52	12.3	11.8	10.0		6.9		4.4	3.8	3.5	3.1	2.6	2.4	2.0	1.5	1.1

Year 2007 Osoyoos Lake oxygen concentrations µg L^{-1}

Depth (m)	17-Apr-07	14-May-07	11-Jun-07	26-Jun-07	2-Aug-07	13-Aug-07	24-Aug-07	4-Sep-07	10-Sep-07	18-Sep-07	25-Sep-07	3-Oct-07	9-Oct-07	5-Nov-07
1	12.1	11.7	9.9	9.9	8.1	7.2	9.8	8.9	9.6	9.8	10.6		10.0	10.6
2	12.7	11.8	9.8	10.0	7.9	8.3	9.8	8.9	9.4	9.7	10.5		9.9	10.1
3	12.9	11.9	9.8	10.1	8.6	8.7	9.8	8.9	9.4	9.7	10.5	9.3	9.8	9.8
4	12.9	11.9	9.8	10.2	8.8	8.8	9.8	8.9	9.4	9.6	10.6	9.3	9.8	9.6
5	13.0	11.8	9.8	10.1	8.8	8.7	9.7	8.8	9.3	9.6	10.6	9.2	9.8	9.5
6	13.0	11.8	9.8	10.2	8.4	8.7	9.7	8.9	9.3	9.6	10.6		9.8	9.4
7	13.0	11.7	9.7	10.1	8.4	8.7	9.7	8.9	9.2	9.6	10.6		9.7	9.4
8	12.9	11.7	9.7	9.8	8.3	8.6	9.6	8.8	9.1	9.6	10.6	9.2	9.7	9.3
9	12.9	11.7	9.7	9.6	8.2	8.6	9.5	8.7	9.0	9.6	10.6		9.7	9.3
10	12.9	11.7	9.6	9.6	7.7	8.6	9.3	8.4	9.0	9.2	10.6		9.7	9.2
11	12.9	11.7	9.4	9.5	7.7	8.9	9.0	8.2	9.0	9.2	10.6		9.5	9.2
12	12.9	11.7	9.1	9.0	7.3	8.5	8.5	7.7	8.8	9.1	10.5	9.2	9.6	9.1
13	12.8	11.7	9.1	8.6	6.8	8.0	8.0	7.4	8.4	9.0	10.5		9.5	9.1
14	12.8	11.6	9.1	8.4	6.5	6.8	5.1	6.2	8.3	8.5	10.4		9.5	9.0
15	12.8	11.6	9.0	8.4	6.0	6.4	4.6	4.0	7.9	6.8	9.9		9.4	8.4
16	12.8	11.6	9.0	8.4	6.0	6.1	5.0	3.8	5.8	5.3	7.1	9.2	9.2	8.7
17	12.8	11.5	9.2	8.4	6.0	6.1	5.3	4.6	4.5	5.0	5.7		8.4	8.5
18	12.8	11.5	9.2	8.5	5.8	5.6	5.5	4.3	4.2	4.5	4.9	6.3	8.3	8.0
19	12.8	11.5	9.3	8.4	6.0	5.6	5.8	4.2	4.2	4.3	4.4		8.1	8.3
20	12.8	11.5	9.3	8.4	5.9	5.8	5.9	4.4	4.3	4.2	3.8	6.0	6.1	8.2
24	12.8	11.5	9.4	8.5	5.9	5.8	5.9	4.4	4.3	3.8	3.8	3.3	4.6	8.2
28	12.9	11.3	9.4	8.4	5.9	5.8	5.7	4.4	4.2	4.2	3.7	2.7	3.3	8.4
32	12.8	11.2	9.2	8.1	5.9	5.7	5.5	4.2	3.9	4.1	3.6	2.5	2.8	8.0
36	12.8	11.2	9.2	8.5		5.6	5.6	4.2	4.1	3.7	3.5	2.5	2.4	6.3
40	12.7	11.2	9.1	8.4		5.6	5.6	4.2	4.0	3.6	3.4	2.5	2.3	5.0
44	12.7	11.2	9.1	8.4		5.5	5.6	4.2	3.9	3.6	3.4	2.5	2.2	2.8
48	12.6	11.2	9.1	8.3		5.4	5.5	4.1	3.8	3.6	3.3	2.4	2.2	1.9
52	12.6	11.2	9.1	8.3		5.4	5.4	4.1	3.8	3.5	3.3		2.1	1.5

Year 2008 Osoyoos Lake oxygen concentrations µg L^{-1}

Depth (m)	18-Mar-08	07-Apr-08	17-Apr-08	20-May-08	09-Jun-08	24-Jun-08	07-Jul-08	21-Jul-08	28-Jul-08	11-Aug-08	27-Aug-08	07-Sep-08	22-Sep-08	19-Oct-08	18-Nov-08	04-Dec-08
1	13.3	14.5	14.0	11.2	10.5	9.2	9.2	9.7	9.1	9.3	9.2	9.9	11.3	12.1	10.2	11.7
2	13.6	14.8	14.3	11.2	10.4	9.2	9.3	9.7	9.1	9.3	9.2	9.9	11.1	11.9	9.8	11.2
3	13.6	15.2	14.6	11.2	10.3	9.2	9.3	9.7	9.1	9.4	9.1	9.9	11.0	11.8	9.5	10.9
4	13.6	15.4	14.8	11.3	10.3	9.2	9.3	9.7	9.1	9.3	9.1	9.9	10.9	11.7	9.4	10.7
5	13.7	15.4	15.0	11.5	10.2	9.2	9.3	9.7	9.1	9.2	9.1	9.9	11.0	11.6	9.2	10.5
6	13.7	15.5	15.1	11.6	10.2	9.1	9.2	9.7	9.1	9.2	9.0	9.9	10.9	11.6	9.2	10.4
7	13.6	15.6	15.1	11.7	10.2	8.9	9.0	9.5	9.1	8.9	9.0	9.9	11.0	11.6	9.1	10.4
8	13.8	15.6	15.1	11.8	9.9	8.8	8.8	9.3	9.1	8.8	8.9	9.8	11.0	11.6	9.1	10.3
9	13.6	15.7	15.2	11.7	9.8	8.6	8.5	9.0	9.0	8.8	8.8	9.7	11.0	11.5	9.1	10.2
10	13.7	15.7	15.2	11.7	9.6	8.5	8.4	8.7	8.5	8.3	8.5	9.7	11.0	11.4	9.0	10.2
11	13.6	15.8	15.2	11.7	9.5	8.2	8.1	8.1	7.6	7.9	8.2	9.7	11.0	11.4	9.0	10.1
12	13.7	15.7	15.2	11.6	9.5	7.9	7.8	7.6	7.6	7.4	8.0	9.6	10.9	11.3	9.0	10.1
13		15.7	15.2	11.6	9.6	8.2	7.9	7.5	6.9	6.7	7.1	9.6	10.7	11.3	9.0	10.1
14	13.7	15.5	15.2	11.6	9.7	8.1	8.2	7.6	6.8	6.3	6.0	9.2	9.0	11.2	9.0	10.0
15		15.5	15.2	11.6	9.9	8.3	8.3	7.7	6.8	6.2	5.5	7.4	7.1	11.1	9.0	10.0
16	13.7	15.5	15.2	11.7	10.0	8.2	8.3	7.8	7.0	6.1	5.3	6.7	7.2	10.8	9.0	10.0
17		15.5	15.2	11.7	10.1	8.2	8.4	7.9	7.2	6.2	5.1	5.9	6.3	10.5	9.0	10.0
18	13.7	15.4	15.2	11.7	10.1	8.3	8.4	8.0	7.3	6.2	5.2	5.8	5.8	10.3	9.0	10.0
19		15.4	15.1	11.7	10.1	8.3	8.4	8.0	7.2	6.3	5.2	5.7	5.7	10.0	9.0	10.0
20	13.7	15.4	15.1	11.8	10.1	8.3	8.4	8.0	7.4	6.4	5.3	5.6	5.5	9.7	9.0	10.0
24	13.7	15.4	15.1	11.8	10.1	8.3	8.4	8.0	7.4	6.4	5.5	7.2	5.3	6.7	9.0	10.0
28	13.6	15.3	15.1	11.7	10.0	8.3	8.3	8.1	7.3	6.4	5.5	6.5	5.1	5.5	9.0	10.0
32	13.6	15.2	15.1	11.5	10.0	8.3	8.1	7.8	7.2	6.3	5.4	6.1	4.8	4.7	9.0	10.0
36	13.5	15.0	14.9	11.5	9.9	8.2	8.2	7.9	7.1	6.3	5.3	6.2	5.0	4.3	8.5	9.9
40	13.5	15.0	14.9	11.4	9.9	8.2	8.2	7.8	7.1	6.3	5.3	5.9	5.0	3.8	8.5	9.9
44	13.5	14.9	14.8	11.4	9.9	8.1	8.1	7.8	7.0	6.2	5.2	5.7	4.9	3.6	8.4	9.9
48		14.9	14.8	11.3	9.9	8.1	8.1	7.8	6.9	6.2	5.2	5.4	4.9	3.4	7.9	9.9
52		14.8	14.8	11.3	9.8	8.1	8.1	7.8	6.7	6.1	5.1	5.3	4.9	3.2	7.6	9.9

Year 2009 Osoyoos Lake oxygen concentrations µg L^{-1}

Depth (m)	15-Apr-09	11-May-09	25-May-09	08-Jun-09	29-Jun-09	13-Jul-09	27-Jul-09	11-Aug-09	18-Aug-09	24-Aug-09	31-Aug-09	10-Sep-09	14-Sep-09	21-Sep-09	28-Sep-09	05-Oct-09	22-Oct-09	17-Dec-09
1	14.4	11.7	11.1	9.6	9.3	9.3	9.4	8.7	8.5	9.7	8.8	9.1	9.6	9.2	9.8	9.5	10.8	12.0
2	14.5	11.9	11.1	9.7	9.4	9.4	9.5	8.6	8.6	9.7	9.1	9.0	9.6	9.1	9.7	9.4	10.6	12.0
3	14.5	11.9	11.2	9.8	9.3	9.5	9.5	8.5	8.5	9.6	9.1	9.0	9.5	8.9	9.6	9.3	10.5	12.0
4	14.5	11.9	11.2	9.8	9.3	9.6	9.5	8.5	8.4	9.5	9.1	8.9	9.4	8.8	9.5	9.2	10.4	12.0
5	14.5	11.8	11.3	9.8	9.3	9.6	9.4	8.3	8.2	9.3	9.0	8.9	9.3	8.7	9.5	9.2	10.4	12.0
6	14.5	11.8	11.3	9.7	9.3	9.6	9.3	8.2	8.1	9.1	8.9	8.8	9.1	8.6	9.4	9.1	10.3	12.0
7	14.5	11.7	11.3	9.8	9.3	9.7	9.3	8.0	7.9	8.8	8.7	8.7	8.9	8.4	9.4	9.1	10.3	12.0
8	14.5	11.8	11.3	10.2	9.2	9.8	9.1	7.9	7.8	8.0	8.6	8.7	8.8	8.2	9.3	9.0	10.3	12.0
9	14.5	11.7	11.3	10.5	9.1	9.4	8.9	7.6	7.6	7.7	8.4	8.6	8.6	8.0	9.2	9.0	10.2	12.0
1	14.5	11.5	11.3	10.4	9.0	9.2	8.9	7.4	7.4	6.9	8.2	8.4	8.4	7.7	9.2	9.0	10.2	12.0
1	14.5	11.4	11.4	10.2	8.8	9.1	9.1	6.5		6.7	7.5	7.6	8.1	7.5	9.2	8.8	10.2	12.0
1	14.4	11.4	11.2	10.0	8.6	8.6	9.3	6.3		6.1	6.5	7.1	7.8	7.3	9.1	8.7	10.2	12.0
1	14.4	11.3	11.0	9.8	8.4	7.7	8.2	5.7		4.9	5.4	5.4	7.1	7.0	9.1	8.7	10.1	12.0
1	14.4	11.3	10.8	9.7	8.2	7.7	7.4	5.6		4.9	5.6	4.5	5.6	5.9	9.0	8.6	10.1	12.0
1	14.3	11.2	10.6	9.6	8.1	7.6	7.2	5.6		5.3	4.9	4.3	4.9	5.1	7.3	8.3	10.1	12.0
1	14.4	11.2	10.8	9.6	8.2	7.5	7.0	5.6		5.7	4.8	4.3	4.1	3.9	4.4	7.7	10.1	12.0
1	14.3	11.1	10.7	9.6	8.2	7.5	7.0	5.6		5.7	4.8	4.4	4.2	3.6	4.0	6.9	10.1	12.0
1	14.3	11.1	10.7	9.6	8.2	7.5	6.9	5.7		5.8	4.9	4.3	4.2	3.7	3.9	5.5	10.0	12.0
1	14.3	11.1	10.7	9.6	8.2	7.5	6.9	5.7		5.8	5.0	4.4	4.3	3.7	3.8	4.4	9.5	12.0
2	14.3	11.0	10.7	9.6	8.2	7.5	6.8	5.8	4.9	5.9	5.0	4.5	2.3	3.8	3.8	4.1	7.0	12.0
2	14.2	11.0	10.6	9.7	8.1	7.4	6.8	5.9	5.0	5.8	5.1	4.7	4.4	3.9	3.7	3.6	5.5	12.0
2	14.1	10.9	10.6	9.6	8.1	7.3	6.7	5.8	5.0	6.0	5.0	4.6	4.3	3.8	3.7	3.4	4.3	12.0
3	14.1	10.9	10.5	9.6	7.9	7.3	6.6	5.7	4.8	5.4	4.9	4.5	4.2	3.7	3.6	3.3	3.6	12.0
3	14.1	10.8	10.5	9.5	7.9	7.4	6.6	5.6	4.8	5.4	4.7	4.5	4.2	3.7	3.7	3.3	3.3	11.9
4	14.1	10.8	10.4	9.5	7.8	7.3	6.6	5.6	4.8	5.5	4.7	4.4	4.1	3.6	3.7	3.2	2.9	11.9
4	14.1	10.1	10.4	9.4	7.8	7.1	6.5	5.5	4.7		4.6	4.4	4.1	3.5	3.6	3.1	2.7	11.9
4	13.9	10.8	10.4	9.4	7.8	7.1	6.4	5.5			4.5	4.3	4.0	3.4	3.5	3.1	2.6	11.9
5	13.9	10.8	10.3	9.4	7.7	7.0	6.3	5.5			4.5	4.2	3.9	3.3	3.4	3.0	2.5	11.9

Year 2010 Osoyoos Lake oxygen concentrations µg L^{-1}

Depth (m)	16-Feb-10	16-Apr-10	10-May-10	01-Jun-10	14-Jun-10	29-Jun-10	19-Jul-10	26-Jul-10	09-Aug-10	16-Aug-10	23-Aug-10	30-Aug-10	06-Sep-10	14-Sep-10	20-Sep-10	27-Sep-10	02-Oct-10	18-Oct-10	15-Nov-10	15-Dec-10
1	14.3	14.8	12.4	16.4	10.0	10.2	11.6	11.5	11.4	12.5	13.4	13.7	11.1	16.6	8.2	9.7	9.8	11.1	12.1	11.6
2	14.3	14.9	12.6	16.6	10.1	10.4	11.6	11.5	11.4	12.6	13.3	13.9	11.1	16.5	8.5	9.8	9.9	10.8	11.8	11.6
3	14.3	14.9	12.8	16.7	10.2	10.4	11.7	11.5	11.4	12.5	13.3	14.0	11.1	16.5	8.7	9.8	10.1	10.7	11.6	11.6
4	14.3	14.9	12.8	16.7	10.1	10.3	11.6	11.4	11.4	12.3	13.3	14.1	10.1	16.8	8.9	9.8	10.2	10.5	11.5	11.6
5	14.3	14.8	12.8	16.8	9.9	10.3	11.6	11.3	11.4	12.1	13.3	14.1	10.5	16.8	9.0	9.8	10.2	10.5	11.5	11.6
6	14.3	14.7	12.9	16.8	9.8	10.1	11.3	11.0	10.9	11.6	13.3	14.1	10.8	17.5	9.1	9.8	10.2	10.4	11.5	11.5
7	14.3	14.6	12.9	16.7	9.7	9.4	11.1	10.4	10.4	11.4	13.2	14.0	10.9	16.9	9.2	9.8	10.2	10.4	11.3	11.5
8	14.3	14.5	12.8	16.4	9.5	9.0	10.4	9.9	9.4	11.1	13.2	13.8	11.1	16.8	9.3	9.7	10.1	10.3	11.2	11.5
9	14.3	14.2	12.7	16.2	9.2	8.8	9.8	9.1	8.0	10.5	13.1	13.1	10.7	16.5	9.4	9.6	10.0	10.3	11.2	11.5
10	14.3	14.1	12.6	15.1	9.0	8.6	9.2	8.1	7.0	8.8	12.7	12.9	10.2	16.0	9.4	9.6	9.9	10.2	11.2	11.5
11	14.3	14.0	12.6	14.9	8.8	8.5	8.5	7.5	6.2	6.6	11.2	12.0	11.1	16.0	9.5	9.6	9.8	10.2	11.2	11.5
12	14.3	13.9	12.5	14.7	8.7	8.4	8.2	7.2	6.2	5.5	9.2	10.0	11.2	14.8	9.2	9.6	9.7	10.1	11.2	11.5
13	14.2	13.8	12.5	14.6	8.7	8.1	8.2	7.4	6.4	5.9	7.7	7.4	10.7	14.2	9.6	9.6	9.6	10.1	11.2	11.5
14	14.2	13.7	12.2	14.4	8.5	8.5	8.3	7.5	6.8	6.2	6.8	6.6	9.9	12.1	8.3	9.0	9.5	10.0	11.1	11.5
15	14.2	13.7	12.1	14.4	8.7	8.3	8.4	7.7	7.2	6.6	6.7	6.5	7.7	10.0	7.3	8.3	9.7	10.0	11.1	11.5
16	14.2	13.6	12.1	14.4	8.7	8.6	8.5	7.7	7.4	6.8	7.6	6.7	6.6	7.8	6.3	6.3	8.8	10.0	11.2	11.5
17	14.2	13.6	12.0	14.3	8.7	8.6	8.6	7.8	7.6	7.1	7.9	6.9	5.8	7.1	4.4	5.1	7.6	10.0	11.1	11.5
18	14.2	13.6	11.9	14.3	8.6	8.1	8.6	7.8	7.7	7.2	8.2	7.2	5.6	6.9	4.3	4.0	6.7	9.7	11.1	11.5
19	14.2	13.6	11.8	14.1	8.6	8.5	8.6	7.8	7.8	7.3	8.4	7.3	5.5	6.8	3.7	3.7	5.4	9.0	11.1	11.5
20	14.2	13.6	11.7	14.3	8.6	8.5	8.6	7.9	7.9	7.4	8.5	7.4	5.4	6.7	3.5	3.4	4.7	7.8	11.1	11.5
24	14.2	13.6	11.7	14.1	8.6	8.5	8.5	7.9	7.9	7.5	8.7	7.5	5.2	6.7	3.4	3.0	4.1	4.4	11.1	11.5
28	14.2	13.5	11.6	14.3	8.5	8.4	8.5	7.9	7.7	7.2	8.7	7.4	5.1	6.7	3.4	2.9	3.7	3.6	9.7	11.5
32	14.1	13.5	11.6	14.1	8.5	8.3	8.2	7.7	7.5	7.0	8.5	7.4	5.0	6.6	3.2	2.7	3.3	3.1	7.8	11.5
36	14.1	13.6	11.5	14.3	8.4	8.2	8.3	7.8	7.8	7.0	8.5	6.8	5.2	6.6	2.9	2.6	3.0	3.0	2.8	11.5
40	14.1	13.6	11.5	14.3	8.3	8.2	8.3	7.6	7.6	6.9	8.3	6.8	5.1	6.5	2.9	2.6	2.8	2.7	2.1	11.5
44	14.1	13.6	11.5	14.0	8.3	8.2	8.2	7.6	7.5	6.9	9.6	6.8	5.1	6.4	2.9	2.5	2.7	2.3	1.9	11.5
48	14.0	13.5	11.5	14.3	8.2	8.1	8.2	7.5	7.4	6.8	8.7	6.7	5.0	6.2	2.9	2.5	2.6	2.2	1.7	11.5
52	14.0	13.5	11.4	14.3	8.2	8.1	8.1	7.5	7.3	6.7	8.4	6.7	5.0	6.0	2.8	2.4	2.6	2.1	1.6	11.5

Year 2011 Osoyoos Lake oxygen concentrations µg L^{-1}

Depth (m)	20-Apr-11	03-May-11	10-May-11	24-May-11	31-May-11	16-Jun-11	20-Jun-11	14-Jul-11	18-Jul-11	03-Aug-11	09-Aug-11	16-Aug-11	22-Aug-11	29-Aug-11	07-Sep-11	15-Sep-11	22-Sep-11	28-Sep-11	06-Oct-11	11-Oct-11	16-Oct-11	03-Nov-11	16-Nov-11	29-Nov-11	18-Dec-11
1	15.5	14.2	11.5	10.8	10.5	10.5	10.4	10.3	9.5	13.5	9.4	8.6	9.5	9.8	10.3	9.5	8.6	8.1	6.1	6.1	9.9	10.5	6.2	13.5	18.1
2	15.5	14.2	11.6	11.0	10.6	10.1	10.4	10.3	9.4	13.3	9.5	8.6	9.5	9.9	10.4	9.6	8.6	8.0	6.0	6.0	9.7	9.9	6.2	13.2	17.7
3	15.5	14.3	11.7	11.1	10.6	10.1	10.4	10.2	9.3	13.3	9.5	8.5	9.5	9.9	10.4	9.6	8.6	8.0	6.0	6.0	9.3	9.6	6.1	13.0	17.6
4	15.5	14.3	11.8	11.0	10.6	10.1	10.3	10.2	9.2	13.2	9.5	8.5	9.4	9.9	10.3	9.6	8.6	8.0	6.1	6.1	9.3	9.6	6.1	12.9	17.6
5	15.5	14.4	11.8	11.1	10.5	10.1	10.3	10.2	9.2	13.1	9.5	8.4	9.3	9.8	10.1	9.6	8.5	8.0	6.0	6.0	9.3	9.5	6.1	12.9	17.6
6	15.5	14.4	11.9	11.1	10.5	10.1	10.3	10.2	9.2	13.1	9.4	8.4	9.3	9.6	9.9	9.7	8.5	7.9	6.0	6.0	9.3	9.4	6.1	12.9	17.7
7	15.6	14.6	11.8	11.1	10.6	10.1	10.3	10.1	9.1	13.0	9.3	8.9	9.2	9.4	9.5	9.5	8.5	7.7	6.0	6.0	9.3	9.4	6.1	12.9	17.7
8	15.5	14.6	11.8	11.1	10.6	10.1	10.3	10.1	9.1	12.9	9.2	8.3	9.1	8.7	9.3	8.7	8.5	7.8	6.0	6.0	9.3	9.4	6.0	12.9	17.7
9	15.5	14.6	11.8	11.1	10.6	10.1	10.3	9.9	8.9	12.7	9.0	8.3	8.8	7.9	9.0	8.4	8.4	7.7	6.0	6.0	9.3	9.4	6.0	12.9	17.8
10	15.5	14.6	11.7	11.1	10.6	10.0	10.3	9.8	8.7	12.6	8.8	8.3	8.6	7.3	8.9	8.2	8.4	7.7	5.9	5.9	9.3	9.4	6.0	12.9	17.8
11	15.4	14.6	11.7	11.1	10.6	10.1	10.2	9.6	8.6	12.2	8.3	7.4	7.9	6.8	8.7	7.9	8.4	7.6	5.8	5.8	9.3	9.4	6.0	12.8	17.9
12	15.4	14.6	11.7	11.1	10.6	10.1	10.2	9.5	8.5	11.6	7.9	6.9	7.0	6.3	8.5	7.4	8.4	7.6	5.8	5.8	9.2	9.4	6.0	12.8	17.9
13	15.4	14.6	11.8	11.1	10.5	10.1	10.1	9.2	8.3	11.0	7.2	6.3	6.4	5.6	8.2	5.5	8.3	7.5	5.8	5.8	9.2	9.4	6.0	12.8	18.0
14	15.4	14.6	11.8	11.1	10.5	10.1	10.1	9.1	8.2	10.5	7.0	6.1	5.7	5.3	6.8	4.6	8.3	7.1	5.7	5.7	9.1	9.4	6.0	12.8	18.0
15	15.4	14.6	11.8	11.2	10.5	10.1	10.1	9.0	8.2	10.3	6.6	5.9	5.5	5.2	5.3	4.2	8.0	6.5	5.8	5.8	8.9	9.4	6.0	12.8	18.0
16	15.4	14.7	11.9	11.2	10.5	10.1	10.1	9.1	8.3	10.2	6.7	5.8	5.6	5.4	5.1	4.3	5.3	5.7	5.8	5.8	8.9	9.4	6.0	12.8	18.1
17	15.3	14.6	11.9	11.2	10.5	10.1	10.1	9.1	8.4	10.5	6.9	5.9	5.8	5.6	5.1	4.5	4.7	4.6	5.8	5.8	8.9	9.4	6.0	12.8	18.1
18	15.3	14.6	11.9	11.3	10.5	10.1	10.1	9.2	8.5	10.8	7.0	6.1	6.1	5.7	5.3	4.7	4.2	4.0	5.5	5.5	8.8	9.4	6.0	12.8	18.1
19	15.2	14.6	12.0	11.3	10.6	10.2	10.1	9.2	8.6	10.9	7.1	6.1	6.2	5.8	5.3	4.7	4.2	3.7	3.9	3.9	8.7	9.4	6.0	12.8	18.1
20	15.2	14.6	12.0	11.3	10.6	10.2	10.1	9.2	8.6	11.1	7.1	6.1	6.2	5.9	5.4	4.8	4.1	3.6	3.1	3.1	8.6	9.4	6.0	12.8	18.2
24	15.1	14.6	12.0	11.4	10.7	10.2	10.2	9.2	8.6	11.3	7.0	6.2	6.2	6.0	5.4	4.7	3.9	3.3	2.5	2.5	7.4	8.9	6.0	12.8	18.2
28	15.1	14.6	12.0	11.4	10.8	10.1	10.2	9.1	8.5	11.1	6.8	6.5	6.0	5.6	5.2	4.1	3.7	3.1	2.2	2.2	4.3	7.8	6.0	12.8	18.2
32	15.0	14.6	12.0	11.4	10.7	10.0	10.1	8.8	8.1	11.0	6.5	6.0	5.7	5.3	4.8	3.6	3.2	2.9	2.0	2.0	3.1	6.2	6.0	12.8	18.3
36	15.2	14.6	12.0	11.4	10.8	9.9	9.9	9.0	8.2	10.9	6.5	5.8	5.7	5.1	4.7	3.8	3.4	2.7	1.8	1.8	2.6	2.9	5.8	12.6	18.0
40	15.2	14.6	11.9	11.3	10.8	9.9	9.9	9.0	8.2	10.8	6.4	5.6	5.6	5.0	4.6	3.8	3.3	2.6	1.8	1.8	2.3	1.4	5.7	12.6	18.0
44	15.1	14.5	11.9	11.4	10.8	9.9	9.9	8.9	8.3	10.8	6.4	5.6	5.6	5.1	4.6	4.1	3.2	2.5	1.8	1.8	2.2	1.3	5.4	12.6	18.1
48	15.0	14.5	11.9	11.4	10.8	9.9	9.9	8.9	8.3	10.8	6.4	5.6	5.6	5.2	4.7	4.3	3.2	2.5	1.8	1.8	2.2	1.3	5.1	12.6	18.1
52	15.0	14.5	11.9	11.4	10.8	10.0	9.9	8.9	8.3	10.8	6.4	5.5	5.6	5.1	4.7	4.0	3.3	2.5	1.8	1.8	2.1	1.2	4.7	12.6	18.2

Year 2012 Osoyoos Lake oxygen concentrations µg L^{-1}

Depth (m)	29-Apr-12	22-May-12	11-Jun-12	16-Jul-12	26-Jul-12	07-Aug-12	13-Aug-12	20-Aug-12	27-Aug-12	04-Sep-12	11-Sep-12	17-Sep-12	24-Sep-12	30-Sep-12	11-Oct-12	29-Oct-12	17-Nov-12
1	10.8	nd	11.1	nd	8.5	8.7	8.8	8.9	8.7	8.8	9.0	9.2	9.7	9.7	10.1	10.1	10.5
2	11.0	nd	11.0	nd	8.4	8.7	8.9	8.9	8.7	8.7	8.8	9.2	9.7	9.6	10.0	9.9	10.1
3	11.2	nd	11.0	nd	8.3	8.6	8.9	9.0	8.7	8.6	8.8	9.2	9.8	9.6	10.1	9.9	10.0
4	11.3	nd	10.9	nd	8.2	8.6	8.9	9.0	8.8	8.6	8.8	9.2	9.8	9.6	10.0	9.9	9.9
5	11.3	nd	10.7	nd	8.3	8.6	8.9	9.1	8.7	8.6	8.8	9.2	9.7	9.5	10.0	9.8	9.8
6	11.3	nd	10.5	nd	8.3	8.4	8.7	9.1	8.7	8.5	8.8	9.1	9.7	9.4	9.9	9.8	9.8
7	11.1	nd	10.5	nd	8.0	8.3	8.6	9.0	8.7	8.5	8.8	9.1	9.7	9.2	9.8	9.8	9.8
8	11.1	nd	10.5	nd	8.0	8.1	8.5	9.0	8.7	8.4	8.7	9.1	9.3	9.2	9.8	9.8	9.8
9	11.1	nd	10.5	nd	7.8	7.9	8.2	8.6	8.7	8.2	8.6	8.9	9.0	9.1	9.7	9.8	9.8
10	10.7	nd	10.4	nd	7.7	7.6	7.2	8.1	8.7	8.2	8.5	8.8	8.7	9.0	9.6	9.7	9.8
11	11.0	nd	10.5	nd	7.5	7.0	6.0	7.6	8.6	8.3	8.3	8.7	8.6	9.0	9.5	8.6	9.8
12	11.2	nd	10.4	nd	7.1	6.6	5.6	5.9	8.0	8.2	8.2	8.5	8.5	9.0	9.4	9.8	9.8
13	11.1	nd	10.4	nd	6.8	6.2	5.6	5.5	5.5	7.5	7.5	8.4	8.3	8.8	9.3	9.8	9.8
14	11.1	nd	10.1	nd	6.6	6.3	5.7	5.5	5.2	5.9	5.5	7.5	8.0	8.3	9.2	9.8	9.8
15	11.1	nd	10.0	nd	6.6	6.2	5.8	5.6	5.1	5.2	5.2	6.2	7.2	7.7	9.1	9.8	9.8
16	11.1	nd	10.0	nd	6.7	6.2	6.1	5.7	5.3	4.8	4.8	4.6	6.6	6.7	8.7	9.8	9.8
17	10.5	nd	10.1	nd	6.7	6.4	6.2	5.9	5.5	4.8	4.5	4.2	4.6	5.2	8.2	9.8	9.8
18	10.4	nd	10.1	nd	6.8	6.4	6.3	6.0	5.5	4.9	4.4	4.1	4.2	4.1	6.8	9.8	9.8
19	10.9	nd	10.1	nd	6.8	6.5	6.3	6.1	5.6	5.0	4.4	4.1	4.1	3.6	5.1	9.8	9.8
20	10.9	nd	10.1	nd	6.8	6.5	6.3	6.1	5.6	5.0	4.4	4.1	4.0	3.5	4.1	9.7	9.8
24	10.9	nd	10.0	nd	6.7	6.5	6.2	6.1	5.6	4.9	4.4	4.1	3.9	3.5	3.6	7.6	9.8
28	10.9	nd	10.0	nd	6.7	6.5	6.1	5.9	5.4	4.8	4.4	4.1	3.8	3.5	3.2	5.4	9.8
32	10.9	nd	9.8	nd	6.7	6.3	5.9	5.7	5.2	4.6	4.3	4.0	3.6	3.2	2.8	4.1	9.8
36	10.9	nd	9.8	nd	6.3	6.2	5.9	5.7	5.1	4.4	4.2	3.8	3.8	3.5	2.9	2.5	9.4
40	10.4	nd	9.8	nd	6.3	6.1	5.8	5.7	5.0	4.2	4.1	3.8	3.7	3.4	2.7	2.3	9.4
44	10.0	nd	9.8	nd	6.2	6.0	5.7	5.7	4.9	4.2	4.1	3.8	3.7	3.4	2.6	2.2	8.5
48	10.3	nd	9.6	nd	6.2	6.0	5.7	5.5	4.9	4.2	4.0	3.8	3.7	3.3	2.6	2.0	6.9
52	10.6	nd	9.6	nd	6.1	5.9	5.6	5.4	4.9	4.2	4.0	3.8	3.6	3.1	2.5	1.9	4.9

Year 2013 Osoyoos Lake oxygen concentrations μg L^{-1}

Depth (m)	24-Apr-13	15-May-13	21-May-13	28-May-13	06-Jun-13	19-Jun-13	24-Jun-13	03-Jul-13	09-Jul-13	15-Jul-13	22-Jul-13	30-Jul-13	06-Aug-13	15-Aug-13	19-Aug-13	05-Sep-13	16-Sep-13	23-Sep-13	10-Oct-13	16-Oct-13	23-Oct-13	06-Nov-13	13-Nov-13	19-Dec-13
1	13.4	11.0	10.4	10.9	10.2	9.8	10.0	9.9	10.4	10.1	9.5	9.6	10.3	8.0	8.6	7.2	8.1	7.8	9.1	9.7	10.2	10.3	9.7	13.4
2	13.5	11.2	10.3	10.9	10.3	9.6	10.0	9.8	10.1	9.9	9.4	9.4	10.2	8.0	8.3	6.9	8.2	7.6	8.8	9.6	10.0	9.8	9.4	12.6
3	13.4	11.0	10.3	10.9	10.1	9.4	9.9	9.7	10.0	9.7	9.3	9.1	10.1	7.8	8.1	6.5	8.3	7.8	8.9	9.5	9.8	9.5	9.3	12.3
4	13.3	10.9	10.2	10.8	10.0	9.3	9.8	9.6	9.9	9.6	9.2	8.9	10.1	7.7	7.8	6.4	8.3	7.8	8.9	9.5	9.7	9.4	9.2	12.1
5	13.3	10.7	10.2	10.9	9.9	9.2	9.7	9.7	10.0	9.6	9.0	8.7	9.9	7.4	7.6	6.5	8.1	8.2	8.9	9.5	9.7	9.3	9.2	12.0
6	13.2	10.7	10.1	10.8	9.8	9.1	9.5	9.4	9.8	9.4	8.9	8.5	9.8	7.3	7.5	6.5	8.1	8.1	8.8	9.5	9.7	9.3	9.2	11.9
7	13.2	10.6	10.1	10.8	9.7	9.1	9.4	9.3	9.8	9.4	8.6	8.4	9.6	6.9	7.4	6.4	8.0	8.2	8.8	9.5	9.7	9.3	9.1	11.9
8	13.1	10.6	10.0	10.8	9.6	9.0	9.3	9.3	9.7	9.3	8.5	8.2	9.4	6.6	7.3	6.4	7.9	8.2	8.8	9.5	9.7	9.3	9.1	11.8
9	13.0	10.5	10.0	10.8	9.6	8.9	9.0	9.3	9.6	9.2	8.3	8.1	9.0	6.3	6.7	6.8	7.9	7.9	8.8	9.5	9.6	9.2	9.1	11.8
10	12.9	10.5	10.0	10.9	9.5	8.9	8.9	9.1	9.4	9.1	8.2	8.0	8.7	5.8	6.0	6.3	7.8	8.1	8.8	9.5	9.6	9.2	9.1	11.8
11	12.9	10.6	10.0	10.6	9.5	8.7	8.9	8.9	9.2	8.9	8.0	7.7	8.4	5.1	5.5	6.0	7.8	7.9	8.7	9.5	9.6	9.2	9.1	11.7
12	12.9	10.6	10.2	10.5	9.4	8.5	8.8	8.8	9.1	8.6	7.7	7.3	7.9	4.9	5.0	5.5	7.8	8.0	8.6	9.5	9.6	9.2	9.0	11.7
13	12.8	10.7	10.1	10.4	9.4	8.3	8.7	8.7	8.8	8.5	7.2	7.1	7.7	4.7	4.6	5.2	7.7	7.9	8.6	9.5	9.7	9.2	9.0	11.7
14	12.7	10.7	10.2	10.4	9.4	8.2	8.5	8.6	8.6	8.2	6.9	6.7	7.0	4.8	4.6	4.5	6.2	7.8	8.5	9.5	9.7	9.2	9.0	11.7
15	12.6	10.7	10.4	10.3	9.3	8.2	8.1	8.5	8.6	8.0	7.0	6.6	7.0	5.0	4.7	3.2	4.6	7.3	8.5	9.4	9.8	9.2	9.0	11.7
16	12.6	10.8	10.5	10.1	9.3	8.2	8.2	8.4	8.6	8.0	7.1	6.9	7.1	5.3	4.8	2.9	3.5	6.5	8.5	9.3	9.8	9.2	9.0	11.7
17	12.6	10.9	10.4	10.1	9.4	8.3	8.3	8.2	8.6	8.0	7.0	6.9	7.2	5.2	4.9	3.0	3.1	5.7	8.4	9.3	9.8	9.3	9.0	11.7
18	12.5	10.9	10.3	10.1	9.4	8.3	8.2	8.3	8.6	8.1	7.2	7.1	7.3	5.2	5.1	3.1	3.0	4.1	8.2	9.0	9.8	9.3	9.0	11.7
19	12.5	10.9	10.2	10.1	9.2	8.2	8.2	8.3	8.4	8.1	7.3	7.1	7.3	5.2	5.2	3.1	2.9	3.7	7.8	8.2	9.7	9.2	9.0	11.7
20	12.5	10.9	10.2	10.0	9.1	8.3	8.2	8.2	8.3	8.0	7.2	7.1	7.3	5.2	5.4	3.2	2.9	3.5	7.1	7.5	9.5	9.2	9.0	11.7
24	12.5	10.9	10.1	10.1	9.1	8.3	8.1	8.1	8.3	8.0	7.2	7.1	7.3	5.2	5.3	3.3	2.9	3.5	5.5	5.5	8.7	9.2	9.0	11.7
28	12.5	10.8	10.1	9.9	9.1	8.2	8.0	7.9	8.1	7.9	7.2	7.0	7.2	5.2	5.1	3.3	2.9	3.5	4.0	3.0	5.1	8.7	9.0	11.7
32	12.5	10.6	10.0	9.9	8.9	8.5	7.8	7.8	7.9	7.7	6.9	6.9	6.9	4.9	4.8	3.2	2.8	3.3	3.1	2.2	3.5	7.8	8.7	11.7
36	12.1	10.5	9.9	9.8	8.7	8.0	7.9	7.9	8.1	7.7	6.5	6.7	7.2	4.9	4.6	3.1	2.7	3.5	2.5	2.0	2.9	3.4	7.9	11.6
40	12.1	10.5	9.8	9.7	8.6	8.0	7.9	7.8	8.0	7.6	6.6	6.6	7.0	4.8	4.7	3.0	2.6	3.2	2.1	1.6	2.2	1.5	7.1	11.6
44	12.1	10.4	9.9	9.7	8.6	8.0	8.0	7.8	8.0	7.5	6.6	6.5	6.9	4.7	4.8	2.9	2.5	3.2	1.8	1.5	1.7	1.0	6.1	11.6
48	12.1	10.5	9.9	9.7	8.6	8.0	8.1	7.9	8.0	7.5	6.7	6.5	6.9	4.7	4.7	2.9	2.6	3.1	1.7	1.5	1.5	0.9	5.6	11.6
52	12.1	10.4	9.8	9.7	8.5	8.0	8.0	7.8	8.1	7.4	6.6	6.5	6.7	4.5	4.6	2.8	2.5	3.1	1.6	1.4	1.4	0.8	4.5	11.6

OSOYOOS LAKE WATER CHEMISTRY

Table 3. Osoyoos Lake water chemistry summary. Chla = Chlorophyll *a*, TP and TN = total phosphorus and total nitrogen, Secchi = Secchi depth, Epi = epilimnion and Hypo = hypolimnion. Blank = no data collected.

Sampling Dates	Epi TP (µg/L)	Epi TN (µg/L)	Chla (µg/L)	Secchi m	Hypo TP (µg/L)	Hypo TN (µg/L)
10-Mar-05	6	295			6	295
26-Apr-05	13	250		2.1	6	268
01-Jun-05	10	230		3.6	9	243
12-Jul-05	13	380		4.1	12	360
22-Aug-05	10	310		4.2	12	300
12-Sep-05	4	260		4.5	12	310
04-Oct-05	8	255		4.6	24	373
06-Mar-06	13	290	3.5		9	260
24-Apr-06	11	220	7.6	4.6	10	240
23-May-06	5	230	3.9	2.3	4	200
18-Jul-06	6	230	2.7	8.1	14	270
21-Aug-06	9	230	7.6	7.1	18	300
19-Sep-06	4	260	4.0	6.9	25	360
26-Sep-06	4	250	3.2	6.6	21	400
23-Oct-06	5	210	4.1	6.0	37	360
15-Mar-07	18	370	5.7			
17-Apr-07	16	280	5.2	3.6	13	270
14-May-07			5.9	2.9		
11-Jun-07	11	250	5.1	3.5	12	280
10-Jul-07	14	260	4.5	3.9		
14-Aug-07	11	270	3.8	2.6		
10-Sep-07	11	420	4.7	3.4		
09-Oct-07			5.1	3.4		
05-Nov-07			5.0	3.4		
20-May-08	17	260	3.6	1.6	9	195
09-Jun-08	11	230	3.0	3.3	9	210
07-Jul-08	12	160	2.2	4.4	15	225
21-Jul-08	9	190	2.7	4.8	13	190
11-Aug-08	9	160	4.5	3.1	14	155
07-Sep-08	9	190	1.5	nd	15	210
10-Oct-08	9	200	4.4	3.4	15	280

Sampling Dates	Epi TP (μg/L)	Epi TN (μg/L)	Chla (μg/L)	Secchi m	Hypo TP (μg/L)	Hypo TN (μg/L)
11-May-09	9	270	2.5	2.5	9	250
08-Jun-09	7	360	4.3	2.4	7	410
13-Jul-09	7	160	4.4	3.5	7	195
11-Aug-09	7	200	5.0	3.0	6	195
14-Sep-09	8	160	4.3	3.3	8	255
22-Oct-09	8	220	3.0	4.2	9	285
10-May-10	4	100	5.4	2.7	5	100
08-Jun-10	7	240	4.0	2.0	7	205
19-Jul-10	7	200	1.1	3.1	12	240
16-Aug-10	9	120	3.0	3.8	9	290
14-Sep-10	8	320	4.4	3.5	22	360
18-Oct-10	8	220	4.1	3.3	27	315
24-May-11	9	440	2.2	1.0	9	325
20-Jun-11	9	270	1.5	2.3	14	280
18-Jul-11	7	240	2.8	3.5	18	365
16-Aug-11	8	260	3.6	3.5	22	255
15-Sep-11	6	230	3.0	3.2	7	380
11-Oct-11	9	350	3.8	3.6	51	205
12-May-12	12	267	2.1	2.3	11	298
11-Jun-12	14	258	3	2.7	13	292
16-Jul-12	11	268	2.3	2.4	14	294
13-Aug-12	7	217	2.8	4.4	19	308
24-Sep-12	9	245	2.1	3.7	21	298
29-Oct-12	13	429	4.3	4.2	24	474
21-May-13	13	245	4.8	2.1	12	252
25-Jun-13	11	261	2.1	3.3	13	304
22-Jul-13	9	244	2.3	3.8	5	293
13-Aug-13	10	276	2.5	4.2	20	340
23-Sep-13	8	247	2.8	4.3	27	343
21-Oct-13	11	208	4.3	3.9	32	320

OSOYOOS LAKE PHYTOPLANKTON BIOMASS

Table 4. Osoyoos Lake 2005-2013 TOTAL algal standing stock (divisions) expressed as $mm^3\ m^{-3}$, which approximates $\mu g \cdot L^{-1}$ wet weight.

Sampling Date	*Cyanophyta*	*Dinophyta*	*Cryptophyta*	*Euglenophyta*	*Chrysophyta*	*Haptophyta*	*Tribophyta*	*Chlorophyta*	*Raphidophyta*	*Bacillariophyta*	Total
25-Apr-05	251	19	150	0	107	8	0	91	0	649	**1275**
17-May-05	167	18	22	0	120	1	0	44	0	271	**644**
01-Jun-05	124	0	20	0	77	3	0	44	0	68	**336**
20-Jun-05	161	6	50	0	1111	11	0	351	0	185	**1874**
12-Jul-05	533	56	71	0	104	5	0	160	0	158	**1086**
22-Aug-05	345	10	94	0	42	1	0	69	0	104	**665**
13-Sep-05	433	6	47	2	21	3	0	73	0	149	**733**
04-Oct-05	321	2	49	0	24	8	0	115	0	102	**620**
02-Nov-05	186	9	112	0	28	7	0	42	0	55	**439**
24-Apr-06	360	29	130	0	26	16	0	106	0	1111	**1777**
23-May-06	244	30	252	0	182	2	0	86	0	499	**1296**
12-Jun-06	225	19	171	0	45	2	0	58	0	233	**753**
04-Jul-06	113	46	148	0	64	2	0	54	0	88	**515**
18-Jul-06	216	2	163	0	20	1	0	23	0	34	**460**
21-Aug-06	1075	0	47	0	65	5	0	99	0	56	**1346**
05-Sep-06	769	0	64	0	22	8	0	50	0	29	**941**
26-Sep-06	847	8	106	0	16	2	0	23	0	53	**1055**
23-Oct-06	343	5	107	0	56	14	0	55	0	93	**673**
14-May-07	852	26	76	0	131	8	0	66	0	338	**1498**
11-Jun-07	576	8	62	0	139	23	0	80	0	274	**1162**
10-Jul-07	1827	35	58	0	50	2	0	153	0	394	**2518**
13-Aug-07	1518	8	74	0	90	23	0	145	0	382	**2240**
10-Sep-07	823	1	82	0	49	14	0	68	0	49	**1086**
09-Oct-07	881	7	137	0	39	12	0	93	0	107	**1277**
05-Nov-07	1295	35	81	0	11	17	0	40	0	334	**1812**
17-Apr-08	358	23	47	0	52	23	1	27	0	2049	**2580**
20-May-08	151	8	53	0	57	14	1	58	0	937	**1278**
09-Jun-08	404	13	77	0	72	16	11	44	0	287	**923**
07-Jul-08	499	17	118	0	57	24	1	76	0	174	**965**
21-Jul-08	226	12	81	0	105	2	0	148	0	153	**727**
11-Aug-08	1498	13	36	0	23	9	0	121	0	50	**1751**
07-Sep-08	1862	28	95	0	23	21	1	206	0	163	**2399**
18-Oct-08	843	18	119	0	16	19	1	132	0	208	**1356**
18-Nov-08	369	10	105	0	9	3	1	36	0	608	**1142**

Sampling Date	*Cyanophyta*	*Dinophyta*	*Cryptophyta*	*Euglenophyta*	*Chrysophyta*	*Haptophyta*	*Tribophyta*	*Chlorophyta*	*Raphidophyta*	*Bacillariophyta*	**Total**
11-May-09	471	50	114	0	123	36	1	40	0	540	**1374**
08-Jun-09	688	37	150	0	304	7	17	110	0	518	**1830**
13-Jul-09	179	39	43	0	33	22	0	65	0	1909	**2291**
11-Aug-09	603	28	54	1	45	45	0	105	0	83	**964**
14-Sep-09	787	4	67	0	210	16	2	158	0	209	**1454**
22-Oct-09	542	19	98	0	125	2	3	45	0	288	**1121**
10-May-10	460	30	194	0	198	92	4	17	0	753	**1749**
14-Jun-10	417	67	413	0	55	31	5	36	0	295	**1319**
19-Jul-10	543	91	141	0	42	32	1	43	0	306	**1199**
16-Aug-10	639	142	94	7	72	33	0	433	0	306	**1725**
14-Sep-10	871	313	123	0	121	22	1	54	0	61	**1567**
18-Oct-10	826	20	125	0	86	28	3	81	0	39	**1206**
24-May-11	257	10	30	0	20	1	0	24	0	335	**677**
20-Jun-11	39	73	104	0	27	3	2	13	0	283	**544**
18-Jul-11	93	93	71	0	91	5	1	25	0	331	**710**
16-Aug-11	405	13	99	0	36	4	0	70	0	285	**913**
15-Sep-11	1037	37	64	0	95	7	0	51	0	104	**1395**
11-Oct-11	580	3	157	0	20	9	3	33	0	256	**1061**
22-May-12	148	13	166	0	73	28	2	16	0	229	**675**
11-Jun-12	109	10	151	0	36	24	1	41	0	262	**633**
16-Jul-12	154	4	43	2	24	2	4	35	0	170	**438**
13-Aug-12	350	1	73	0	24	2	2	164	0	63	**681**
24-Sep-12	618	15	71	0	13	4	2	128	0	64	**914**
29-Oct-12	370	17	28	0	16	7	5	37	0	113	**594**
21-May-13	276	8	175	0	266	2	5	52	0	521	**1304**
24-Jun-13	113	33	96	0	115	13	5	18	0	375	**769**
22-Jul-13	199	10	150	0	28	12	2	66	0	76	**542**
13-Aug-13	234	17	62	0	58	13	1	55	0	50	**490**
23-Sep-13	371	7	60	0	34	15	1	116	0	71	**674**
23-Oct-13	777	14	173	0	52	5	3	102	0	510	**1636**

Table 5. Osoyoos Lake 2005-2013 EDIBLE algal standing stock (divisions) expressed as mm^3 m^{-3} that approximates µg·L^{-1} wet weight.

Sampling Date	*Cyanophyta*	*Dinophyta*	*Cryptophyta*	*Euglenophyta*	*Chrysophyta*	*Haptophyta*	*Tribophyta*	*Chlorophyta*	*Raphidophyta*	*Bacillariophyta*	Total
25-Apr-05	1	4	150	0	105	8	0	55	0	87	**411**
17-May-05	8	0	22	0	114	1	0	9	0	62	**217**
1-Jun-05	3	0	20	0	19	3	0	25	0	41	**110**
20-Jun-05	5	0	50	0	22	11	0	278	0	49	**414**
12-Jul-05	30	9	71	0	22	5	0	92	0	17	**246**
22-Aug-05	4	4	94	2	42	1	0	62	0	24	**233**
13-Sep-05	16	6	47	2	16	3	0	60	0	30	**179**
4-Oct-05	34	2	49	0	23	8	0	109	0	24	**248**
2-Nov-05	34	6	112	0	18	7	0	27	0	26	**230**
24-Apr-06	2	25	130	0	19	16	0	36	0	143	**371**
23-May-06	22	12	252	0	54	2	0	26	0	97	**466**
12-Jun-06	3	7	171	0	44	2	0	32	0	107	**367**
04-Jul-06	4	46	148	0	53	2	0	47	0	28	**328**
18-Jul-06	3	2	163	0	16	1	0	12	0	19	**217**
21-Aug-06	27	0	47	0	62	5	0	74	0	39	**254**
05-Sep-06	22	0	64	0	15	8	0	35	0	13	**157**
26-Sep-06	25	8	106	0	16	2	0	9	0	36	**203**
23-Oct-06	34	0	107	0	45	14	0	35	0	57	**293**
14-May-07	38	3	76	0	125	8	0	17	0	124	**392**
11-Jun-07	34	4	62	0	123	23	0	34	0	26	**307**
10-Jul-07	14	10	58	0	36	2	0	111	0	23	**254**
13-Aug-07	17	8	74	0	88	23	0	76	0	36	**321**
10-Sep-07	22	1	82	0	43	14	0	47	0	25	**234**
09-Oct-07	41	2	137	0	35	12	0	70	0	42	**339**
05-Nov-07	10	0	81	0	10	17	0	7	0	35	**160**
17-Apr-08	3	2	47	0	49	23	0	5	0	596	**725**
20-May-08	5	0	53	0	28	14	1	13	0	36	**149**
09-Jun-08	17	6	77	0	62	16	11	17	0	131	**337**
07-Jul-08	5	0	118	0	57	24	1	14	0	17	**235**
21-Jul-08	12	0	81	0	43	2	0	72	0	24	**236**
11-Aug-08	34	4	36	0	21	9	0	103	0	14	**221**
07-Sep-08	28	20	95	0	16	21	1	116	0	25	**321**
18-Oct-08	25	0	119	0	11	19	1	32	0	163	**370**
18-Nov-08	3	0	105	0	9	3	0	15	0	471	**607**

Sampling Date	*Cyanophyta*	*Dinophyta*	*Cryptophyta*	*Euglenophyta*	*Chrysophyta*	*Haptophyta*	*Tribophyta*	*Chlorophyta*	*Raphidophyta*	*Bacillariophyta*	**Total**
11-May-09	0	37	114	0	64	36	1	2	0	72	**326**
08-Jun-09	3	10	150	0	304	7	17	24	0	154	**669**
13-Jul-09	4	2	43	0	33	22	0	61	0	45	**210**
11-Aug-09	13	23	54	1	45	45	0	90	0	9	**281**
14-Sep-09	63	4	67	0	210	16	2	51	0	19	**432**
22-Oct-09	55	0	98	0	125	2	3	16	0	59	**357**
10-May-10	5	7	194	0	198	92	4	10	0	315	**826**
14-Jun-10	0	36	413	0	55	31	5	18	0	69	**627**
19-Jul-10	4	6	141	0	42	32	1	21	0	21	**269**
16-Aug-10	6	10	94	7	56	33	0	271	0	11	**489**
14-Sep-10	51	30	123	0	87	22	1	24	0	17	**356**
18-Oct-10	93	1	125	0	63	28	3	63	0	12	**388**
24-May-11	0	0	30	0	14	1	0	0	0	78	**123**
20-Jun-11	0	0	104	0	25	3	2	9	0	217	**360**
18-Jul-11	2	5	71	0	91	5	1	13	0	24	**212**
16-Aug-11	9	3	99	0	36	4	0	32	0	17	**200**
15-Sep-11	63	37	64	0	95	7	0	41	0	17	**325**
11-Oct-11	17	3	157	0	16	9	3	12	0	153	**369**
11-Jun-12	1	2	151	0	33	24	1	26	0	111	**349**
16-Jul-12	1	2	43	0	21	2	4	6	0	35	**115**
13-Aug-12	4	1	73	0	18	2	2	49	0	5	**154**
24-Sep-12	14	15	71	0	13	4	2	98	0	22	**239**
29-Oct-12	12	3	28	0	13	7	5	21	0	36	**126**
21-May-13	1	0	175	0	45	2	5	30	0	251	**508**
24-Jun-13	2	10	96	0	115	13	5	11	0	38	**291**
22-Jul-13	15	8	150	0	28	12	2	55	0	19	**288**
13-Aug-13	9	16	62	0	43	13	1	38	0	27	**209**
23-Sep-13	7	7	60	0	34	15	1	67	0	15	**205**
23-Oct-13	17	0	173	0	41	5	3	66	0	255	**560**

OSOYOOS LAKE ZOOPLANKTON BIOMASS

Table 6. Osoyoos Lake zooplankton biomass 2005-2013. Units are µg per L dry weight. Rotifers were not included during the first three years of the study.

Sampling Date	Rotifer total	Nauplii total	*D. thomasi* adults & copepodids	*L. ashlandi* adults & copepodids	*Epischura*	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*	Other	**Total**
26-Apr-05		1.5	7.4	24.8	0.0	0.0	0.0	0.0	0.0	0.0	**33.8**
6-Jun-05		2.9	22.3	74.7	1.8	5.1	8.0	9.7	0.3	0.0	**124.8**
22-Jun-05		2.5	21.5	75.8	3.5	0.3	6.9	0.4	1.6	0.0	**112.5**
14-Jul-05		3.9	17.3	35.3	4.6	0.0	10.7	2.7	1.7	0.0	**76.1**
4-Aug-05		5.8	14.9	34.6	11.0	0.0	40.7	21.3	1.3	0.0	**129.7**
25-Aug-05		3.3	18.4	47.4	8.6	0.3	7.7	0.8	0.8	0.0	**87.3**
15-Sep-05		1.3	11.9	56.4	6.4	1.4	0.9	3.4	0.4	0.0	**82.0**
5-Oct-05		2.1	11.9	69.1	0.9	3.9	2.3	3.5	0.1	0.0	**93.8**
2-Nov-05		3.6	28.3	72.1	0.2	0.1	0.1	0.3	0.0	0.0	**104.6**
25-May-06		5.2	28.5	8.6	0.2	0.7	0.0	0.0	0.0	0.0	**43.2**
13-Jun-06		4.9	47.6	16.2	1.8	1.4	1.0	0.8	0.2	0.0	**73.9**
26-Jul-06		5.4	42.1	73.3	17.6	0.0	42.8	17.3	3.1	0.0	**201.6**
17-Aug-06		2.6	55.7	81.0	7.6	0.0	0.0	1.7	0.0	0.0	**148.6**
05-Sep-06		2.1	29.2	63.8	6.2	0.0	0.2	6.5	0.0	0.0	**107.9**
02-Oct-06		4.3	25.1	64.7	3.1	1.5	2.1	1.1	0.0	0.0	**102.0**
24-Oct-06		2.2	12.6	64.9	0.2	0.2	1.0	0.5	0.0	0.0	**81.7**
18-Dec-06		1.4	25.7	81.0	0.1	0.6	0.0	0.0	0.0	0.0	**108.8**
18-Apr-07		3.8	33.9	78.7	0.0	0.0	0.0	0.0	0.0	0.0	**116.4**
15-May-07		6.9	60.9	76.3	0.4	0.0	0.0	0.0	0.0	0.0	**144.5**
21-Jun-07		4.6	63.4	42.4	4.7	3.7	43.4	5.7	15.0	0.0	**182.9**
26-Jun-07		6.9	72.2	49.3	8.0	1.5	61.6	6.7	22.2	0.0	**228.5**
10-Jul-07		4.6	89.2	41.7	3.1	0.0	35.3	18.9	4.3	0.0	**197.2**
25-Jul-07		4.1	51.6	28.6	10.1	0.2	0.4	6.6	3.1	0.0	**104.6**
17-Aug-07		3.5	25.2	36.7	20.1	0.6	4.5	10.4	0.2	0.0	**101.2**
04-Sep-07		2.6	19.1	48.0	8.5	1.9	11.6	6.4	0.1	0.0	**98.1**
12-Sep-07		4.0	19.2	64.8	17.9	6.4	20.2	9.6	0.0	0.0	**142.1**
25-Sep-07		2.9	23.0	74.1	8.2	5.9	20.5	3.4	0.2	0.0	**138.4**
10-Oct-07		1.8	20.7	61.2	0.3	1.2	5.0	2.3	1.5	0.0	**94.1**
05-Nov-07		4.1	20.5	87.0	0.0	0.2	0.2	0.5	0.0	0.0	**112.4**
17-Dec-07		6.7	18.2	58.5	0.0	0.1	0.0	0.0	0.0	0.0	**83.5**

Sampling Date	Rotifer total	Nauplii total	*D. thomasi* adults & copepodids	*L. ashlandi* adults & copepodids	*Epischura*	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*	Other	**Total**
03-Mar-08	0.0	3.5	44.1	47.2	0.0	0.0	0.0	0.0	0.0	0.0	**94.8**
07-Apr-08	2.6	5.4	73.0	87.2	0.0	0.0	0.0	0.0	0.0	0.0	**168.3**
12-May-08	6.7	6.3	59.0	64.0	0.0	0.0	0.0	0.0	0.0	0.0	**136.0**
28-May-08	2.7	9.1	61.1	82.6	0.1	0.2	0.1	0.0	0.0	0.0	**155.8**
11-Jun-08	0.5	6.3	28.1	10.3	0.0	1.0	0.8	0.2	0.0	0.0	**47.2**
24-Jun-08	1.1	15.6	64.3	36.6	0.6	7.8	5.2	0.2	0.3	0.0	**131.7**
08-Jul-08	0.6	8.3	92.8	79.4	1.6	0.4	81.7	6.1	3.5	0.0	**274.3**
22-Jul-08	0.3	2.8	102.3	46.1	3.0	0.5	67.1	14.4	14.1	0.0	**250.6**
28-Jul-08	0.8	2.1	63.1	62.9	5.5	0.0	10.4	12.1	5.4	0.0	**162.3**
12-Aug-08	0.6	1.5	44.4	41.0	6.3	0.0	0.9	8.8	1.8	0.0	**105.4**
27-Aug-08	0.5	5.1	45.3	48.1	7.6	0.3	0.5	9.2	0.0	0.0	**116.6**
07-Sep-08	0.5	2.9	31.2	40.6	10.3	0.1	0.1	9.5	0.0	0.0	**95.3**
22-Sep-08	0.3	3.2	24.5	27.1	5.0	0.8	0.0	9.5	0.0	0.0	**70.4**
17-Oct-08	0.4	3.1	31.4	40.5	0.2	2.4	0.0	1.6	0.0	0.0	**79.6**
18-Nov-08	0.6	4.4	28.0	50.9	0.0	0.1	0.0	0.4	0.0	0.0	**84.3**
04-Dec-08	1.4	7.8	29.9	62.6	0.1	0.1	0.0	0.1	0.0	0.0	**102.0**
11-May-09	14.3	13.8	118.7	148.8	0.0	0.0	0.0	0.0	0.0	0.0	**295.6**
25-May-09	10.6	13.7	113.5	77.6	0.4	0.7	0.1	0.0	0.0	0.0	**216.5**
08-Jun-09	14.0	32.9	152.4	82.4	0.7	2.3	7.7	0.1	0.0	0.0	**292.5**
29-Jun-09	6.7	14.9	93.5	41.4	1.2	4.8	158.7	0.8	3.3	0.0	**325.4**
13-Jul-09	3.0	8.1	87.6	38.2	1.6	0.1	50.5	1.5	11.0	0.0	**201.6**
28-Jul-09	1.5	2.3	50.9	38.4	6.7	0.7	4.2	16.1	1.1	0.0	**121.9**
11-Aug-09	0.3	2.0	17.9	20.1	19.6	1.4	0.9	18.5	0.9	0.0	**81.7**
27-Aug-09	0.5	1.9	11.1	28.3	9.9	6.2	5.7	7.7	0.4	0.0	**71.7**
14-Sep-09	0.4	1.9	8.2	20.0	5.5	2.5	1.9	3.4	1.0	0.0	**44.7**
01-Oct-09	0.5	3.2	17.8	45.8	2.0	1.7	1.4	1.1	0.2	0.0	**73.7**
22-Oct-09	0.8	1.3	16.0	54.3	0.0	1.6	0.2	0.0	0.0	0.0	**74.1**
27-Nov-09	3.5	3.2	54.6	31.1	0.2	0.3	0.0	0.0	0.0	0.0	**92.9**
17-Dec-09	4.0	4.7	34.3	8.4	0.1	0.2	0.0	0.0	0.0	0.0	**51.6**

Sampling Date	Rotifer total	Nauplii total	*D. thomasi* adults & copepodids	*L. ashlandi* adults & copepodids	*Epischura*	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*	Other	**Total**
16-Feb-10	13.1	2.8	16.6	2.4	0.0	0.0	0.0	0.0	0.0	0.0	**34.9**
16-Apr-10	39.4	4.1	68.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	**112.1**
09-May-10	27.1	2.2	81.9	0.2	0.7	0.0	0.0	0.0	0.0	0.0	**112.0**
1-Jun-10	1.1	2.9	34.9	0.2	0.6	0.2	0.0	0.0	0.0	0.0	**39.9**
14-Jun-10	1.3	12.4	98.2	0.3	0.6	7.5	0.2	0.0	0.0	0.0	**120.5**
29-Jun-10	0.1	6.2	90.8	0.8	0.7	11.3	2.5	0.1	0.0	0.0	**112.4**
06-Jul-10	0.4	6.1	83.2	3.9	0.5	2.4	6.0	0.0	0.2	0.6	**103.2**
20-Jul-10	0.2	3.6	97.6	2.0	0.2	2.6	32.5	0.5	1.7	0.0	**141.0**
26-Jul-10	0.4	2.7	128.2	2.7	0.8	1.3	84.1	1.6	11.5	0.0	**233.3**
16-Aug-10	0.7	0.7	87.5	5.5	2.2	0.0	0.6	18.4	5.9	0.1	**121.7**
31-Aug-10	0.7	2.1	56.2	7.7	6.0	0.0	0.4	2.5	1.0	0.0	**76.6**
14-Sep-10	0.6	1.9	31.7	7.2	4.0	0.2	1.6	1.2	0.5	0.0	**48.8**
27-Sep-10	0.6	2.8	29.1	12.8	4.6	0.4	6.6	0.4	0.5	0.0	**57.9**
18-Oct-10	0.2	3.5	18.7	19.6	0.7	0.4	2.9	0.3	0.0	0.0	**46.3**
10-May-11	11.7	8.7	47.8	83.4	0.0	0.0	0.7	0.0	0.0	0.0	**152.3**
31-May-11	5.1	4.7	25.5	35.4	0.0	0.5	0.4	0.0	0.0	0.0	**71.6**
15-Jun-11	2.4	2.6	15.3	17.4	0.1	1.4	4.3	0.0	0.0	0.0	**43.5**
20-Jun-11	1.5	2.8	28.1	15.2	0.2	2.0	3.1	0.2	0.0	0.1	**53.1**
14-Jul-11	0.3	3.0	22.6	16.6	1.3	0.1	5.4	1.2	1.0	0.0	**51.5**
20-Jul-11	0.2	2.5	25.3	24.3	2.0	0.1	7.1	6.1	2.5	0.0	**70.1**
9-Aug-11	0.1	3.4	27.8	22.6	3.6	0.0	3.3	9.2	5.1	0.0	**75.2**
29-Aug-11	0.1	5.6	27.7	30.5	5.4	0.2	6.3	3.9	0.5	0.0	**80.1**
22-Sep-11	0.2	1.6	11.1	27.4	2.9	0.7	1.0	2.0	0.1	0.0	**47.0**
6-Oct-11	0.0	0.0	5.4	31.7	0.8	1.5	4.8	0.9	0.5	0.0	**45.6**
3-Nov-11	0.9	2.2	15.9	39.6	0.0	5.3	6.5	4.6	0.0	0.0	**75.1**
16-Nov-11	1.0	1.0	9.8	28.3	0.0	1.0	5.4	0.2	0.0	0.0	**46.7**
29-Apr-12	21.6	2.0	29.6	5.7	0.0	0.1	0.0	0.0	0.0	0.0	**59.2**
23-May-12	6.6	3.5	31.5	6.0	4.2	2.3	0.2	0.0	0.0	0.0	**54.2**
12-Jun-12	5.3	5.4	40.7	13.6	1.6	9.3	0.2	0.1	0.1	0.0	**76.2**
26-Jun-12	3.4	7.5	55.2	45.2	1.9	2.8	2.0	0.1	1.3	0.0	**119.5**
10-Jul-12	0.9	4.6	25.0	24.0	0.1	0.1	3.2	2.0	0.9	0.0	**60.7**
23-Jul-12	0.3	2.8	24.1	38.6	1.1	0.0	11.6	11.5	3.6	0.0	**93.6**
13-Aug-12	0.1	2.3	21.7	55.1	3.7	0.0	13.3	4.6	2.0	0.0	**102.7**
27-Aug-12	0.1	1.3	14.0	42.7	3.5	0.1	5.3	2.5	1.0	0.0	**70.5**
17-Sep-12	0.1	1.6	11.4	32.6	5.8	0.3	3.6	5.7	0.0	0.0	**61.2**
30-Sep-12	0.0	5.9	12.1	39.3	4.3	0.8	5.1	5.8	0.0	0.0	**73.2**
01-Nov-12	0.3	2.0	17.3	28.5	0.2	0.2	0.4	0.6	0.0	0.0	**49.3**
22-Nov-12	0.5	2.0	18.7	31.0	0.0	0.0	0.0	0.1	0.0	0.0	**52.3**

Sampling Date	Rotifer total	Nauplii total	*D. thomasi* adults & copepodids	*L. ashlandi* adults & copepodids	*Epischura*	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*	Other	**Total**
23-Apr-13	8.7	3.4	49.6	26.6	0.0	0.0	0.0	0.0	0.0	0.0	**88.4**
15-May-13	7.5	5.0	45.2	20.5	0.2	0.0	0.0	0.0	0.0	0.0	**78.4**
28-May-13	8.3	5.9	25.5	20.2	1.5	0.3	0.1	0.1	0.0	0.0	**61.7**
19-Jun-13	2.9	2.2	16.6	6.4	0.6	7.9	0.1	0.6	0.0	0.0	**37.3**
03-Jul-13	0.2	1.7	12.9	7.4	7.4	0.4	0.2	2.9	0.2	0.0	**33.3**
15-Jul-13	0.1	2.0	20.2	9.5	7.6	0.2	1.3	9.0	0.0	0.0	**49.9**
30-Jul-13	0.2	2.5	16.5	13.3	9.2	0.2	16.6	2.7	0.3	0.0	**61.4**
15-Aug-13	0.0	4.7	10.4	23.9	8.2	0.0	15.7	7.2	0.9	0.0	**71.1**
26-Aug-13	0.1	1.6	39.6	23.0	6.3	0.0	1.9	11.8	0.1	0.0	**84.5**
12-Sep-13	0.0	2.0	9.2	35.1	6.5	0.5	0.7	5.5	0.1	0.0	**59.6**
23-Sep-13	0.0	0.8	4.6	18.8	3.0	0.8	2.3	4.3	0.0	0.0	**34.6**
16-Oct-13	0.1	1.4	10.7	36.2	0.2	0.6	1.6	1.0	0.0	0.0	**51.9**

OSOYOOS LAKE ZOOPLANKTON DENSITY

Table 7. Osoyoos Lake zooplankton density 2005-2013. Units are numbers per L. Rotifers were not included during the first three years of the study.

Sampling Date	Rotifer total	Nauplii total	*D. thomasi* adults & copepodids	*L. ashlandi* adults & copepodids	*Epischura*	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*	Other
26-Apr-05		9.3	2.3	9.2	0.0	0.0	0.0	0.0	0.0	0.0
06-Jun-05		17.0	7.7	18.7	0.1	3.7	1.3	2.2	0.0	0.0
22-Jun-05		16.3	8.1	21.2	0.2	0.1	0.8	0.1	0.1	0.0
14-Jul-05		21.3	6.8	9.9	0.4	0.0	1.6	0.7	0.0	0.0
04-Aug-05		30.3	9.9	15.2	0.5	0.0	4.2	5.0	0.0	0.0
25-Aug-05		17.0	9.4	22.0	0.6	0.1	0.6	0.2	0.0	0.0
15-Sep-05		7.4	5.1	22.7	0.3	1.0	0.1	0.7	0.0	0.0
05-Oct-05		13.2	5.8	21.3	0.1	3.0	0.5	0.8	0.0	0.0
2-Nov-05		23.0	9.9	19.7	0.0	0.0	0.0	0.1	0.0	0.0

Sampling Date	Rotifer total	Nauplii total	*D. thomasi* adults & copepodids	*L. ashlandi* adults & copepodids	*Epischura*	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*	Other
25-May-06		29.3	16.8	2.3	0.0	0.3	0.0	0.0	0.0	65.0
13-Jun-06		29.0	26.6	4.1	0.1	0.9	0.1	0.1	0.0	30.0
26-Jul-06		30.6	17.5	20.0	0.8	0.0	4.6	3.5	0.1	17.0
17-Aug-06		13.3	18.6	20.7	0.4	0.0	0.0	0.3	0.0	17.0
5-Sep-06		11.3	9.0	18.4	0.3	0.0	0.0	1.1	0.0	35.0
2-Oct-06		21.3	9.6	19.3	0.1	0.9	0.3	0.2	0.0	36.0
24-Oct-06		9.2	6.3	27.7	0.0	0.1	0.2	0.1	0.0	27.0
18-Dec-06		5.1	8.2	18.0	0.0	0.3	0.0	0.0	0.0	16.0
18-Apr-07		16.7	12.5	20.8	0.0	0.0	0.0	0.0	0.0	0.0
15-May-07		32.0	19.1	17.2	0.0	0.0	0.0	0.0	0.0	0.0
21-Jun-07		22.0	22.2	7.5	0.2	2.2	3.5	1.0	0.3	0.0
26-Jun-07		33.3	23.2	10.0	0.3	0.8	5.4	1.4	0.4	0.0
10-Jul-07		20.9	27.7	9.5	0.2	0.0	2.6	3.2	0.1	0.0
25-Jul-07		16.7	13.3	7.6	0.5	0.1	0.0	1.2	0.0	0.0
17-Aug-07		15.7	8.3	9.8	1.0	0.3	0.4	1.9	0.0	0.0
4-Sep-07		10.8	8.1	11.1	0.4	0.8	1.1	1.2	0.0	0.0
12-Sep-07		15.8	6.9	17.2	0.7	3.3	1.9	1.8	0.0	0.0
25-Sep-07		13.7	9.1	22.5	0.4	3.3	2.4	0.6	0.0	0.0
10-Oct-07		7.6	7.6	16.7	0.0	0.7	0.8	0.5	0.0	0.0
5-Nov-07		22.0	7.3	22.2	0.0	0.1	0.0	0.1	0.0	0.0
17-Dec-07		38.7	7.1	15.9	0.0	0.0	0.0	0.0	0.0	0.0
3-Mar-08	0.0	13.4	24.3	13.2	0.0	0.0	0.0	0.0	0.0	0.0
7-Apr-08	19.0	23.3	22.0	20.6	0.0	0.0	0.0	0.0	0.0	0.0
12-May-08	54.7	35.3	19.2	13.5	0.0	0.0	0.0	0.0	0.0	0.0
28-May-08	23.3	51.3	24.9	20.7	0.0	0.1	0.0	0.0	0.0	0.0
11-Jun-08	3.6	35.3	12.9	1.9	0.0	0.5	0.1	0.0	0.0	0.0
24-Jun-08	8.2	76.0	38.5	14.7	0.0	5.9	0.6	0.0	0.0	0.0
8-Jul-08	4.9	41.3	41.6	27.6	0.1	0.2	4.8	1.1	0.1	0.0
22-Jul-08	2.7	13.5	42.9	13.8	0.1	0.4	3.2	2.4	0.2	0.0
28-Jul-08	6.4	11.7	25.3	16.9	0.2	0.0	0.4	2.2	0.1	0.0
12-Aug-08	5.9	7.6	15.5	10.6	0.3	0.0	0.1	1.6	0.0	0.0
27-Aug-08	4.5	24.3	16.6	12.2	0.4	0.1	0.0	1.5	0.0	0.0
7-Sep-08	4.6	13.2	9.4	11.2	0.5	0.0	0.0	1.7	0.0	0.0
22-Sep-08	3.2	16.3	9.2	8.2	0.0	0.4	0.0	1.7	0.0	0.0
17-Oct-08	4.5	15.5	13.4	14.2	0.0	1.3	0.0	0.3	0.0	0.0
18-Nov-08	6.6	25.0	11.0	14.7	0.0	0.0	0.0	0.1	0.0	0.0
4-Dec-08	12.6	43.3	9.9	19.5	0.0	0.0	0.0	0.0	0.0	0.0

Sampling Date	Rotifer total	Nauplii total	*D. thomasi* adults & copepodids	*L. ashlandi* adults & copepodids	*Epischura*	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*	Other
2-Apr-09	60.0	29.6	30.0	27.1	0.0	0.0	0.0	0.0	0.0	0.0
11-May-09	117.3	76.0	30.7	19.9	0.0	0.0	0.0	0.0	0.0	0.0
25-May-09	86.7	78.7	40.2	11.2	0.0	0.1	0.0	0.0	0.0	0.0
8-Jun-09	104.0	165.3	44.7	11.3	0.0	1.0	1.4	0.0	0.0	0.0
29-Jun-09	47.6	76.7	40.1	17.0	0.1	3.2	16.5	0.1	0.1	0.0
13-Jul-09	22.7	39.3	28.3	13.2	0.1	0.1	3.4	0.2	0.2	0.0
28-Jul-09	11.7	12.3	15.2	10.9	0.7	0.3	0.3	3.5	0.0	0.0
11-Aug-09	2.6	11.6	6.9	6.4	1.1	0.9	0.1	3.6	0.0	0.0
27-Aug-09	4.8	9.5	8.9	7.0	0.5	3.8	0.8	1.4	0.0	0.0
14-Sep-09	4.2	10.2	6.0	7.6	0.3	1.7	0.2	0.7	0.0	0.0
1-Oct-09	4.1	15.9	7.6	14.0	0.1	1.0	0.2	0.2	0.0	0.0
22-Oct-09	9.1	7.1	7.4	21.1	0.0	1.0	0.0	0.0	0.0	0.0
27-Nov-09	41.3	19.9	21.6	7.0	0.0	0.3	0.0	0.0	0.0	0.0
17-Dec-09	46.7	30.7	15.8	2.4	0.0	0.1	0.0	0.0	0.0	0.0
16-Feb-10	136.6	15.9	9.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0
16-Apr-10	328.0	24.1	19.7	0.0	0.0	0.0	0.0	0.0	0.0	0.2
9-May-10	198.4	14.0	28.7	0.0	0.1	0.0	0.0	0.0	0.0	0.0
1-Jun-10	7.0	20.5	15.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0
14-Jun-10	3.8	74.8	54.7	0.0	0.0	3.7	0.0	0.0	0.0	0.0
29-Jun-10	1.2	30.5	50.4	0.1	0.0	7.5	0.5	0.0	0.0	0.0
6-Jul-10	3.0	32.7	57.3	0.7	0.0	1.5	1.6	0.0	0.0	0.3
20-Jul-10	1.8	20.5	52.4	0.3	0.0	2.2	4.5	0.1	0.0	0.0
26-Jul-10	4.0	16.7	55.6	0.5	0.0	1.0	6.9	0.3	0.3	0.0
16-Aug-10	7.4	3.8	36.7	0.9	0.1	0.0	0.1	3.5	0.1	0.0
31-Aug-10	8.1	11.1	16.9	1.3	0.3	0.0	0.0	0.4	0.0	0.0
14-Sep-10	6.9	9.1	11.2	1.5	0.2	0.1	0.2	0.2	0.0	0.0
27-Sep-10	7.5	12.3	9.4	3.5	0.2	0.3	0.7	0.1	0.0	0.0
18-Oct-10	2.1	17.0	7.1	5.9	0.0	0.3	0.5	0.1	0.0	0.0
15-Nov-10	5.0	17.7	7.6	13.4	0.0	0.2	0.2	0.0	0.0	0.0

Sampling Date	Rotifer total	Nauplii total	*D. thomasi* adults & copepodids	*L. ashlandi* adults & copepodids	*Epischura*	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*	Other
10-May-11	114.7	49.3	17.0	28.3	0.0	0.0	0.1	0.0	0.0	0.0
31-May-11	53.3	32.7	10.9	10.0	0.0	0.7	0.1	0.0	0.0	0.0
15-Jun-11	27.8	18.2	8.1	5.1	0.0	1.1	0.8	0.0	0.0	0.0
20-Jun-11	16.9	18.9	14.2	5.7	0.0	1.4	0.6	0.0	0.0	0.1
14-Jul-11	3.5	21.0	10.5	7.2	0.1	0.1	0.9	0.3	0.0	0.0
20-Jul-11	2.4	23.0	8.1	8.1	0.1	0.0	0.8	1.3	0.0	0.0
9-Aug-11	1.0	23.0	8.5	6.1	0.1	0.0	0.4	1.7	0.1	0.0
29-Aug-11	1.6	33.3	10.9	7.5	0.3	0.1	0.8	0.8	0.0	0.0
22-Sep-11	2.6	12.0	5.2	8.4	0.1	0.4	0.2	0.4	0.0	0.0
6-Oct-11	0.0	0.0	1.1	6.0	0.0	0.5	0.8	0.2	0.0	0.0
3-Nov-11	16.0	15.2	8.3	10.8	0.0	3.0	1.6	0.8	0.0	0.0
16-Nov-11	18.7	6.9	5.2	7.4	0.0	0.5	1.2	0.0	0.0	0.0
29-Apr-12	179.8	8.5	7.3	0.7	0.0	0.1	0.0	0.0	0.0	0.0
23-May-12	51.0	17.0	10.2	1.8	0.2	1.0	0.0	0.0	0.0	0.0
12-Jun-12	45.3	28.3	16.2	2.9	0.1	4.2	0.0	0.0	0.0	0.0
26-Jun-12	31.0	40.0	26.9	11.6	0.1	1.6	0.1	0.0	0.0	0.0
10-Jul-12	10.3	27.7	11.4	10.3	0.0	0.0	0.4	0.4	0.0	0.0
23-Jul-12	3.1	12.7	9.3	9.1	0.0	0.0	1.0	2.1	0.1	0.0
13-Aug-12	0.8	14.0	8.1	11.7	0.1	0.0	0.7	0.8	0.0	0.0
27-Aug-12	0.9	8.8	5.0	10.4	0.1	0.0	0.3	0.5	0.0	0.0
17-Sep-12	0.6	8.8	3.6	9.5	0.2	0.2	0.3	1.0	0.0	0.0
30-Sep-12	0.4	32.2	5.0	11.8	0.1	0.4	0.4	1.1	0.0	0.0
1-Nov-12	4.2	11.0	6.6	8.0	0.0	0.1	0.0	0.1	0.0	0.0
22-Nov-12	5.3	12.5	5.8	7.6	0.0	0.0	0.0	0.0	0.0	0.0
23-Apr-13	72.0	17.3	12.6	2.9	0.0	0.0	0.0	0.0	0.0	0.0
15-May-13	60.7	25.5	13.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0
28-May-13	64.0	32.0	8.8	4.1	0.1	0.1	0.0	0.0	0.0	0.1
19-Jun-13	32.7	15.2	10.7	2.6	0.0	6.0	0.0	0.1	0.0	0.0
3-Jul-13	2.7	11.9	8.4	3.0	0.5	0.3	0.0	0.6	0.0	0.0
15-Jul-13	1.7	13.6	14.7	3.5	0.4	0.2	0.1	2.0	0.0	0.0
30-Jul-13	2.0	15.6	8.9	5.1	0.5	0.2	1.9	0.6	0.0	0.0
15-Aug-13	0.5	29.3	9.0	11.5	0.6	0.0	1.7	1.6	0.0	0.0
26-Aug-13	1.3	12.7	16.3	9.8	0.6	0.0	0.2	2.8	0.0	0.0
12-Sep-13	0.6	12.7	7.9	14.3	0.5	0.4	0.1	1.2	0.0	0.0
23-Sep-13	0.3	5.3	4.0	9.1	0.2	0.6	0.4	1.0	0.0	0.0
16-Oct-13	0.0	6.6	4.2	12.0	0.0	0.4	0.3	0.2	0.0	0.0

OSOYOOS LAKE *MYSIS RELICTA* BIOMASS

Table 8. Osoyoos Lake 2005-2013 *Mysis relicta* biomass. Units are mg wet weight per m^3.

Sampling Date	juvenile	immature male	immature female	adult male	adult female	adult female - released eggs	gravid female	embryos	**Total**
06-Jun-05	1.76	2.61	1.73	1.03	2.70	2.28	2.70	0.24	**15.04**
14-Jul-05	3.53	6.02	3.90	0.25	15.08	0.34	0.00	0.00	**29.13**
04-Aug-05	1.73	10.21	9.06	0.11	15.70	0.00	0.00	0.00	**36.81**
15-Sep-05	0.00	14.23	12.21	1.51	13.19	0.00	0.00	0.00	**41.13**
05-Oct-05	0.00	18.12	17.89	4.62	13.52	0.00	0.00	0.00	**54.16**
02-Nov-05	0.00	11.74	12.96	3.62	4.23	0.00	0.00	0.00	**32.55**
17-Jan-06	0.00	4.65	3.00	5.66	3.87	0.44	5.54	0.46	**23.63**
29-Mar-06	0.00	3.77	3.37	1.12	0.10	0.82	2.66	0.20	**12.04**
23-Apr-06	0.00	7.37	5.29	0.17	0.00	3.16	3.43	0.20	**19.62**
25-May-06	0.50	6.00	3.60	0.60	1.10	1.30	1.80	1.61	**16.51**
26-Jul-06	1.81	18.75	15.03	0.30	11.30	0.10	0.00	0.00	**47.30**
18-Aug-06	0.20	17.21	13.23	0.10	19.25	0.00	0.00	0.00	**49.99**
27-Sep-06	0.20	12.89	10.58	1.83	10.09	0.00	0.00	0.00	**35.60**
24-Oct-06	0.00	1.94	2.55	0.30	0.00	0.00	0.00	0.00	**4.78**
18-Dec-06	0.00	1.32	1.32	0.71	1.62	0.00	0.00	0.00	**4.96**
07-Mar-07	0.00	4.70	3.50	2.20	0.60	2.90	3.00	0.23	**17.13**
15-May-07	0.00	4.50	2.70	1.20	0.00	0.40	0.90	0.05	**9.75**
21-Jun-07	1.20	8.71	5.42	0.60	3.00	1.70	0.40	0.02	**21.07**
10-Jul-07	4.75	15.37	10.91	0.30	10.66	0.50	0.00	0.00	**42.49**
25-Sep-07	0.00	14.68	13.76	6.26	12.78	0.00	0.00	0.00	**47.47**
05-Nov-07	0.00	5.47	5.27	1.76	2.02	0.00	0.00	0.00	**14.51**
17-Dec-07	0.00	3.11	2.59	5.95	7.69	0.41	0.00	0.03	**19.78**
18-Mar-08	0.00	4.62	2.72	1.21	0.20	1.61	12.95	0.98	**24.29**
07-Apr-08	0.00	6.03	4.92	0.51	0.20	1.22	9.37	1.02	**23.28**
12-May-08	0.03	3.20	3.60	0.60	0.10	0.20	4.81	0.46	**13.00**
08-Jul-08	5.45	8.45	8.48	0.00	7.68	0.70	0.00	0.00	**30.76**
12-Aug-08	0.83	12.77	7.99	0.31	8.11	0.00	0.00	0.00	**30.01**
22-Sep-08	0.03	10.07	9.33	2.46	10.19	0.00	0.00	0.00	**32.09**
18-Nov-08	0.00	6.73	9.26	5.91	5.09	0.00	0.00	0.00	**26.98**
04-Dec-08	0.00	9.10	13.36	13.61	11.02	0.00	0.00	0.00	**47.09**

Sampling Date	juvenile	immature male	immature female	adult male	adult female	adult female - released eggs	gravid female	embryos	**Total**
02-Apr-09	0.00	7.17	5.15	5.97	0.10	1.25	6.37	0.46	**26.48**
15-Apr-09	0.00	3.87	5.03	3.15	0.20	2.55	3.62	0.23	**18.66**
11-May-09	0.00	12.27	7.99	2.83	0.00	2.54	7.57	0.47	**33.68**
08-Jun-09	0.99	11.04	6.28	1.34	1.38	3.34	2.14	0.11	**26.63**
13-Jul-09	8.22	18.33	15.64	0.62	17.06	0.50	0.41	0.02	**60.79**
11-Aug-09	2.26	15.72	9.48	0.10	7.90	0.00	0.00	0.00	**35.46**
14-Sep-09	0.35	12.70	10.20	1.30	9.80	0.00	0.00	0.00	**34.35**
22-Oct-09	0.03	11.05	14.09	5.96	11.72	0.00	0.00	0.00	**42.85**
27-Nov-09	0.00	4.87	8.98	3.82	3.38	0.00	0.00	0.00	**21.04**
17-Dec-09	0.00	3.05	2.24	2.34	1.23	0.00	0.43	0.02	**9.31**
16-Feb-10	0.00	7.36	6.60	5.12	5.04	0.40	7.47	0.54	**32.53**
16-Apr-10	0.00	18.62	14.04	1.31	0.33	6.06	16.17	1.61	**58.14**
11-May-10	0.04	10.68	11.27	0.60	0.20	0.10	4.53	0.33	**27.75**
14-Jun-10	2.18	2.80	3.60	0.20	1.50	1.10	0.30	0.01	**11.69**
16-Aug-10	0.46	16.20	14.64	0.31	9.89	0.00	0.00	0.00	**41.50**
27-Sep-10	0.01	19.25	14.71	3.38	11.20	0.00	0.00	0.00	**48.55**
15-Dec-10	0.00	2.10	2.10	1.70	2.40	0.00	0.00	0.00	**8.30**
10-Mar-11	0.00	0.71	0.61	0.40	0.70	0.10	1.01	0.09	**3.62**
10-May-11	0.00	1.62	0.91	0.11	0.00	0.30	0.31	0.02	**3.27**
31-May-11	0.01	0.30	0.00	0.10	0.00	0.00	0.20	0.01	**0.61**
14-Jun-11	0.23	0.20	0.00	0.10	0.30	0.10	0.00	0.00	**0.93**
20-Jul-11	0.67	1.13	0.73	0.21	0.71	0.00	0.00	0.00	**3.46**
09-Aug-11	0.35	2.20	2.20	0.80	1.91	0.00	0.00	0.00	**7.46**
29-Aug-11	0.06	1.52	1.62	0.20	0.80	0.00	0.00	0.00	**4.20**
22-Sep-11	0.00	3.50	2.50	2.70	2.60	0.00	0.00	0.00	**11.30**
06-Oct-11	0.02	4.74	4.55	4.23	5.63	0.00	0.00	0.00	**19.18**
03-Nov-11	0.00	2.91	3.21	0.70	0.00	0.00	0.00	0.00	**6.83**
29-Nov-11	0.00	5.49	8.00	5.88	6.81	0.00	0.00	0.00	**26.19**
20-Dec-11	0.00	2.11	2.41	6.06	6.02	0.00	0.71	0.06	**17.37**

Sampling Date	juvenile	immature male	immature female	adult male	adult female	adult female - released eggs	gravid female	embryos	**Total**
19-Mar-12	0.00	1.32	0.30	2.46	0.41	1.23	8.36	0.77	**14.85**
12-Jun-12	1.35	2.90	0.10	1.20	2.60	2.60	2.60	0.13	**13.48**
26-Jun-12	4.36	6.50	2.00	0.30	6.80	1.40	2.30	0.12	**23.78**
23-Jul-12	2.70	3.40	3.00	0.70	4.00	0.00	0.00	0.00	**13.80**
20-Aug-12	0.85	13.40	9.10	0.10	16.20	0.00	0.00	0.00	**39.65**
24-Sep-12	0.16	11.10	8.50	3.00	10.30	0.00	0.00	0.00	**33.06**
01-Nov-12	0.00	18.80	21.50	6.00	9.80	0.00	0.00	0.00	**56.10**
26-Jan-13	0.00	6.10	4.40	12.60	5.90	0.30	9.50	0.78	**39.58**
24-Apr-13	0.02	14.56	13.57	2.24	0.60	1.72	17.93	1.15	**51.79**
28-May-13	1.37	10.66	7.39	1.63	4.03	0.00	3.19	0.21	**28.49**
03-Jul-13	2.79	4.95	5.55	0.31	6.49	0.21	0.10	0.01	**20.39**
30-Jul-13	3.05	24.42	22.03	1.01	25.94	0.30	0.00	0.00	**76.76**
12-Sep-13	0.44	16.14	12.67	1.02	13.75	0.00	0.00	0.00	**44.02**
13-Nov-13	0.00	6.70	7.30	3.10	3.90	0.00	0.00	0.00	**21.01**

OSOYOOS LAKE *MYSIS RELICTA* DIETS

Table 9. Osoyoos Lake 2005-2013 *Mysis relicta* diets as average number of prey per *Mysis*.

Sampling Date	Number Mysis processed	*Daphnia*	*Bosmina*	Cyclopoid	Calanoid	nauplii	rotifer	*Diaphanosoma*
25-May-06	12	0.167	0.083	0.000	0.083	0.000	0.000	0.000
26-Jul-06	30	0.400	0.000	0.000	0.000	0.000	0.000	0.000
18-Aug-06	30	0.000	0.000	0.000	0.200	0.000	0.000	0.000
27-Sep-06	30	0.133	0.133	0.000	0.100	0.000	0.000	0.000
24-Oct-06	9	0.000	0.200	0.000	0.000	0.000	0.000	0.000
16-May-07	30	0.067	0.033	0.133	0.233	0.000	0.000	0.000
21-Jun-07	19	0.211	0.053	0.000	0.000	0.000	0.000	0.000
10-Jul-07	30	0.033	0.033	0.067	0.100	0.000	0.000	0.000
17-Aug-07	30	0.233	0.133	0.033	0.000	0.000	0.000	0.000
25-Sep-07	30	0.233	0.033	0.000	0.000	0.000	0.000	0.000
05-Nov-07	30	0.333	0.367	0.000	0.067	0.000	0.000	0.000
17-Dec-07	27	0.000	0.037	0.000	0.185	0.000	0.000	0.000
12-May-08	23	0.000	0.087	0.478	0.043	0.000	0.478	0.000
11-Jun-08	19	0.000	0.211	0.000	0.000	0.000	0.000	0.000
08-Jul-08	14	0.000	0.357	0.429	0.000	0.000	0.000	0.000
12-Aug-08	30	0.033	0.067	0.000	0.067	0.000	0.000	0.000
22-Sep-08	31	0.000	0.000	0.065	0.000	0.000	0.000	0.000
18-Nov-08	30	0.000	0.000	0.133	0.033	0.000	0.000	0.000
11-May-09	78	0.000	0.000	0.526	0.359	0.000	0.295	0.000
08-Jun-09	104	0.010	0.010	0.173	0.067	0.000	0.413	0.000
13-Jul-09	147	0.116	0.027	0.075	0.075	0.000	0.129	0.000
11-Aug-09	116	0.190	0.078	0.121	0.026	0.009	0.060	0.000
14-Sep-09	104	0.510	0.587	0.154	0.087	0.010	0.019	0.000
22-Oct-09	228	0.000	0.123	0.070	0.004	0.000	0.026	0.000
27-Nov-09	84	0.012	0.250	0.107	0.000	0.000	0.012	0.000

Sampling Date	Number Mysis processed	*Daphnia*	*Bosmina*	Cyclopoid	Calanoid	nauplii	rotifer	*Diaphanosoma*
14-Jun-10	75	0.000	0.187	0.547	0.000	0.000	0.027	0.000
17-Aug-10	150	0.073	0.067	0.333	0.000	0.000	0.047	0.040
28-Sep-10	124	0.177	0.032	0.282	0.024	0.000	0.024	0.032
18-Oct-10	94	0.255	0.106	0.330	0.000	0.000	0.000	0.000
16-Jun-11	16	0.000	0.188	0.063	0.000	0.000	0.250	0.000
20-Jul-11	56	0.018	0.000	0.125	0.036	0.000	0.000	0.000
22-Aug-11	83	0.096	0.036	0.181	0.012	0.000	0.000	0.000
06-Oct-11	106	0.000	0.340	0.066	0.009	0.000	0.028	0.000
23-May-12	33	0.000	0.030	0.303	0.000	0.000	1.424	0.000
26-Jun-12	100	0.010	0.060	0.130	0.000	0.000	0.090	0.000
10-Jul-12	100	0.020	0.080	0.310	0.000	0.000	0.060	0.000
20-Aug-12	100	0.280	0.060	0.130	0.000	0.000	0.000	0.000
24-Sep-12	100	0.220	0.210	0.230	0.020	0.000	0.060	0.000
01-Nov-12	100	0.060	0.120	0.400	0.080	0.000	0.040	0.000
28-May-13	100	0.000	0.010	0.220	0.070	0.000	0.790	0.000
03-Jul-13	100	0.030	0.130	0.130	0.010	0.000	0.130	0.000
30-Jul-13	100	0.200	0.140	0.280	0.010	0.000	0.010	0.000
15-Aug-13	100	0.230	0.000	0.070	0.000	0.000	0.000	0.000
12-Sep-13	85	0.059	0.059	0.094	0.000	0.000	0.012	0.000
16-Oct-13	81	0.173	0.284	0.049	0.012	0.000	0.012	0.000

OSOYOOS LAKE FISH LENGTH, WEIGHT, and DENSITY

Table 10. Year 2005-2013 Osoyoos Lake species-specific (sockeye, whitefish) and age-specific [i.e. (i) nerkids <15 cm known from the trawl samples to be almost entirely age-0 sockeye, (ii) age-1 sockeye or kokanee known to be age-1 from scale data, (iii) larger nerkids length 15-33 cm and (iv) fish larger than 33 cm which we assume to be a mixture of lake whitefish and returning adult sockeye], densities, lengths and weights. The numbers in the box include lake-whitefish, adult salmon spawners, and rare occurrences of very large kokanee, very large pike minnow, and large rainbow trout. The single **red** number is the late fall estimate of whitefish densities. The numbers in **green** are 2013, 2012, and 2010 stocking densities and mean weights of stocked sockeye salmon fry. During 2005-09, age-1 juvenile sockeye holdovers (i.e. juvenile sockeye that remained in the lake for a 2nd year) were absent or uncommon and were not separated from the age-0 nerkids. Although mixtures of sockeye and kokanee could be present in samples of all size classes of *O. nerka* comprising our samples, counts of adult sockeye and kokanee in terminal spawning areas suggest that sockeye likely comprise greater than 90% of all sub-adult *O. nerka* samples from Osoyoos Lake. Evidence that annual variations in juvenile sockeye numbers vary in direct proportion to annual variations in adult sockeye returns (see Hyatt and Rankin 1999 and Hyatt, unpublished data) also strongly suggest that kokanee contribute little by way of numbers to the “nerkid” aggregate rearing in Osoyoos Lake during the years of our investigation.

Year 2005 Osoyoos Lake fish summary

	16-May-05	**15-Jul-05**	**04-Aug-05**	**13-Sep-05**	**28-Nov-05**	**18-Jan-05**
	Density per ha					
Nerkids <15cm (age 0 sockeye	4414	nd	3299	5623	1934	1864
Nerkids between 15-33 cm	44	nd	14	37	8	12
Other fish >33cm	142	nd	36	5	2	2
Total fish (± 95% CI)	4600 (663)		3349 (742)	5665 (1804)	1945 (237)	1878 (344)
	Length (cm)					
Nerkids <15cm (age 0 sockeye	3.9	5.0	5.8	6.4	7.0	6.9
Nerkids between 15-33 cm	nd	20.2	20.4	18.7	nd	15.0
Other fish >33cm	nd	nd	nd	nd	nd	nd
	Weight (g)					
Nerkids <15cm (age 0 sockeye	0.4	1.4	2.6	3.0	3.5	3.4
Nerkids between 15-33 cm	nd	94.3	102.4	77.5	nd	33.4
Other fish >33cm	nd	nd	nd	nd	nd	nd

Year 2006 Osoyoos Lake fish summary

	17-May-06	26-Jul-06	04-Oct-06	22-Nov-06	05-Dec-06	14-Mar-07
	Density per ha					
Nerkids <15cm (most age-0 sockeye)	2244		2212	2188	1984	1476
Nerkids between 15-33 cm	134		261	273	132	78
Other fish >33cm	24		46	10	19	11
Total fish (± 95% CI)	2402 (599)		2519 (243)	2471 (322)	2134 (163)	1565 (202)
	Length (cm)					
Nerkids <15cm (most age-0 sockeye)	3.4	5.5	6.5	nd	6.9	7.6
Nerkids between 15-33 cm	nd	15	nd	nd	ND	nd
Other fish >33cm						
	Weight (g)					
Nerkids <15cm (most age-0 sockeye)	0.3	1.9	3.2	nd	3.4	4.3
Nerkids between 15-33 cm	nn	45.0	nd	nd	nd	nd
Other fish >33cm						

Year 2007 Osoyoos Lake fish summary

	05-Jun-07	24-Jul-07	16-Aug-07	03-Oct-07	15-Nov-07	15-Jan-08
	Density per ha					
Nerkids <15cm (most age-0 sockeye)	nd	3620	1782	2269	2182	2143
Nerkids between 15-33 cm	nd	280	117	95	49	64
Other fish >33cm	nd	43	22	15	3	7
Total fish (± 95% CI)		3944 (167)	1921 (40)	2412 (62)	2234 (54)	2114 (53)
	Length (cm)					
Nerkids <15cm (most age-0 sockeye)	3.6	5.6	6.0	6.8	6.8	7.1
Nerkids between 15-33 cm	nd	18.6	17.1	19.6	18.8	nd
Other fish >33cm	nd	nd	nd	nd	nd	nd
	Weight (g)					
Nerkids <15cm (most age-0 sockeye)	0.4	2.0	2.2	3.6	3.3	2.6
Nerkids between 15-33 cm	nd	92.4	66.2	89.6	75.6	nd
Other fish >33cm	nd	nd	nd	nd	nd	nd

Year 2008 Osoyoos Lake fish summary

Fish Sampled	**20-May-08**	**04-Jul-08**	**12-Aug-08**	**05-Sep-08**	**29-Sep-08**	**05-Nov-08**	**04-Apr-09**
	Density per ha						
Nerkids <15cm (most age-0 sockeye)	705	1075	1481	1199	1042	832	nd
Nerkids between 15-33 cm	14	131	247	199	186	88	nd
Other fish >33cm	2	20	62	60	43	6	nd
Total fish (± 95% CI)	720 (112)	1226 (235)	1790 (220)	1459 (184)	1271 (115)	926 (51)	nd
	Length (cm)						
Nerkids <15cm (most age-0 sockeye)	3.4	5	6	6.5	7.2	7.7	8.3
Nerkids between 15-33 cm	nd	nd	nd	nd	nd	18.3	19.4
Other fish >33cm	nd	nd	nd	nd	nd	nd	nd
	Weight (g)						
Nerkids <15cm (most age-0 sockeye)	0.4	1.3	2.1	2.8	4.6	5.6	6.6
Nerkids between 15-33 cm	nd	nd	nd	nd	nd	72.3	91.6
Other fish >33cm	nd	nd	nd	nd	nd	nd	nd

Year 2009 Osoyoos Lake fish summary

Fish Sampled	**19-May-09**	**17-Jun-09**	**22-Jul-09**	**24-Aug-09**	**28-Sep-09**	**23-Nov-09**	**10-Feb-09**
	Density per ha						
Nerkids <15cm (most age-0 sockeye)	10686	10025	9862	7945	6785	7569	8148
Nerkids between 15-33 cm	219	371	357	417	569	191	123
Other fish >33cm	31	93	56	84	142	14	6
Total fish (± 95% CI)	10935 (5333)	10489 (4327)	10275 (913)	8445 (1213)	7496 (388)	7774 (732)	8278 (717)
	Length (cm)						
Nerkids <15cm (most age-0 sockeye)	3.3	4	5.7	6.1	6.6	7	7.2
Nerkids between 15-33 cm	nd	19.1	11.8	24.1	15.7	18.3	nd
Other fish >33cm	nd	nd	nd	nd	nd	nd	nd
	Weight (g)						
Nerkids <15cm (most age-0 sockeye)	0.3	0.7	2	2.4	3.1	3.4	3.3
Nerkids between 15-33 cm	nd	91.5	21.9	nd	43.1	66.1	nd
Other fish >33cm	nd	nd	nd	nd	nd	nd	nd

Year 2010 Osoyoos Lake fish summary

	31-May-10	02-Jun-10	23-Jun-10	12-Jul-10	09-Aug-10	06-Sep-10	02-Oct-10	13-Nov-10	11-Mar-11
Density per ha									
Wild nerkids <15cm (age-0 sockeye)	358		988	1466	1346	1085	622	761	669
Stocked sockeye <15 cm		463	184	73	288	101	163	18	88
Age 1 sockeye or kokanee	155		268	363	325	305	284	155	31
Nerkids between 15-33 cm	41		41	152	216	185	104	69	31
Other fish >33cm	11		3	22	82	73	18	4	1
Total fish (± 95% CI)	566 (268)		1483 (359)	2077 (309)	2259 (347)	1751 (133)	1194 (196)	1007 (117)	798 (80)
Length (cm)									
Wild nerkids <15cm (age-0 sockeye)	3.3		4.3	5.2	6.2	6.1	6.8	7.3	8.3
Stocked sockeye <15 cm		nd	5.8	6.6	7.5	7.6	7.7	8.6	9.3
Age 1 sockeye or kokanee	7.2		8.7	10.3	10.2	10.5	10.9	11.9	11.4
Nerkids between 15-33 cm	16.5		16	20.1	18.2	24.4	18.1	25.8	nd
Other fish >33cm	nd		nd	nd	nd	nd	nd	nd	nd
Weight (g)									
Wild nerkids <15cm (age-0 sockeye)	0.2		0.8	1.5	2.7	2.4	3.3	4.1	6
Stocked sockeye <15 cm		1.1	2.2	3.3	4.6	4.7	4.8	6.9	8.1
Age 1 sockeye or kokanee	3.9		7.8	13.5	11.9	12.8	14.5	18.9	15.1
Nerkids between 15-33 cm	50.1		44.2	102	92.6	181.8	69.2	187.3	nd
Other fish >33cm	nd		nd	nd	nd	nd	nd	nd	nd

Year 2011 Osoyoos Lake fish summary

	29-Jun-11	02-Aug-11	07-Sep-11	16-Oct-11	28-Nov-11	19-Mar-12
	Density per ha					
Nerkids <15cm (age-0 sockeye)	5607	6147	3650	4508	4976	4376
Age 1 sockeye or kokanee	642	933	356	163	35	0
Nerkids between 15-33 cm	102	181	184	18	107	73
Other fish >33cm	13	81	42	nd	5	3
Total fish (± 95% CI)	6365 (1700)	7342 (605)	4232 (492)	4688 (308)	5123 (576)	4451 (456)
	Length (cm)					
Nerkids <15cm (age-0 sockeye)	4.7	6	6.4	6.9	7.2	7.8
Age 1 sockeye or kokanee	11.3	12.9	15.7	14	13.5	nd
Nerkids between 15-33 cm	17.9	17.8	19.3	nd	17.4	15.9
Other fish >33cm	nd	nd	nd	nd	nd	nd
	Weight (g)					
Nerkids <15cm (age-0 sockeye)	1.1	2.2	2.8	3.5	3.7	4.9
Age 1 sockeye or kokanee	17.4	24.7	43.8	31.7	27	nd
Nerkids between 15-33 cm	56.5	67.5	96.4	nd	59.9	40.9
Other fish >33cm	nd	nd	nd	nd	nd	nd

Year 2012 Osoyoos Lake fish summary

	29-May-12	14-Jun-12	24-Jul-12	11-Sep-12	11-Oct-12	17-Nov-12	15-Feb-13
	Density per ha						
Nerkids <15cm (age 0 sockeye)		3980	4244	4285	3074	2372	2476
Stocked sockeye <15 cm	898	345	195	352	315	151	317
Age 1 sockeye or kokanee		315	170	260	224	107	67
Nerkids between 15-33 cm		52	99	198	108	41	39
Other fish >33cm		13	30	55	25	2	
Total fish (± 95% CI)		4706 (926)	4738 (537)	5149 (390)	3746 (350)	2673 (205)	2901 (180)
	Length (cm)						
Nerkids <15cm (age 0 sockeye)		4	4.8	6.1	6.6	7.1	7.6
Stocked sockeye <15 cm	nd	4.6	5.7	7.1	7.5	8.2	8.1
Age 1 sockeye or kokanee		9.7	10.9	12.3	13.2	11	nd
Nerkids between 15-33 cm		20.1	nd	nd	nd	nd	nd
Other fish >33cm		nd	nd	nd	nd	nd	nd
	Weight (g)						
Nerkids <15cm (age 0 sockeye)		0.6	1.1	2.3	3.1	3.7	4.1
Stocked sockeye <15 cm	0.8	0.9	2	3.7	4.7	6.1	5
Age 1 sockeye or kokanee		10.2	15.8	21.4	24.9	13.4	nd
Nerkids between 15-33 cm		96.3	nd	nd	nd	nd	nd
Other fish >33cm		nd	nd	nd	nd	nd	nd

Year 2013 Osoyoos Lake fish summary

	05-Jun-13	06-Jun-13	09-Jul-13	03-Aug-13	05-Sep-13	10-Oct-13	06-Nov-13	18-Mar-13
	Density per ha							
Nerkids <15cm (age 0 sockeye)		9176	6057	6480	5254	4080	3579	4023
Stocked sockeye <15 cm	895		100	133	114	66	55	82
Age 1 sockeye or kokanee		69	214	618	1099	999	1020	1512
Nerkids between 15-33 cm		50	91	181	297	291	222	123
Other fish >33cm		9	14	31	51	23	7	0
Total fish		9395	6476	7443	6816	5459	4883	5742
(± 95% CI)		(1870)	(1200)	(506)	(422)	(4883)	(312)	(638)
	Length (cm)							
Nerkids <15cm (age 0 sockeye)		3.7	4.5	5.1	5.5	6	6.5	7.4
Stocked sockeye <15 cm			5.2	5.9	6.6	6.5	7.4	7.6
Age 1 sockeye or kokanee		9.8	10.9	13.4	11.3	nd	15.2	10.7
Nerkids between 15-33 cm		18.9	18.2	nd	49.4	nd	nd	nd
Other fish >33cm		nd	nd	nd	nd	nd	nd	nd
	Weight (g)							
Nerkids <15cm (age 0 sockeye)		0.4	1	1.4	1.7	2.4	2.9	4.1
Stocked sockeye <15 cm	0.98		1.6	2.2	3.4	3	4.3	4.6
Age 1 sockeye or kokanee		11	17	31.7	17.1	nd	43.7	12
Nerkids between 15-33 cm		80.5	75	nd	1273	nd	nd	nd
Other fish >33cm		nd	nd	nd	nd	nd	nd	nd

OSOYOOS LAKE FISH STOMACHS

Table 11. Year 2006-2013 Osoyoos Lake fish stomach summary as average numbers of each prey type found in stomachs collected through the summer-fall from age-0 wild sockeye, age-0 hatchery sockeye stocked in 2010, 2012, 2013, age-1 smolts or kokanee, age-2 smolts of kokanee.

2006 Osoyoos Lake fish diets (average number prey per fish)

Sampling Date	**Fish Group**	**Number stomachs processed**	*D. thomasi* copepodids & adults	*L. ashlandi* copepodids & adults	*E. nevadensis* copepodid & adults	*Bosmina*	*Daphnia*	*Leptodora*	*Polyphemus*	*Diaphanosoma*	*Mysis*	Chironomid Larva
25-May-06	Age 0+ sockeye	**27**	24.7	0.0	0.1	1.0	0.1	0.0	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**0**										
26-Jul-06	Age 0+ sockeye	**51**	69.3	0.1	13.9	0.0	62.0	0.1	0.0	0.1	0.0	0.0
	Nerkids > 15 cm	**0**										
04-Oct-06	Age 0+ sockeye	**64**	22.5	0.0	72.4	0.1	3.6	0.0	0.0	0.0	0.4	0.0
	Nerkids > 15 cm	**2**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0
06-Dec-06	Age 0+ sockeye	**43**	58.4	0.8	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**5**	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0

2007 Osoyoos Lake fish diets (average number prey per fish)

Sampling Date	Fish Group	**Number stomachs processed**	*D. thomasi* copepodids & adults	*L. ashlandi* copepodids & adults	*E. nevadensis* copepodid & adults	*Bosmina*	*Daphnia*	*Leptodora*	*Polyphemus*	*Diaphanosoma*	*Mysis*	Chironomid Larva	*Sida*	Mayfly	Adult Fly	fly larva
5-Jun-07	Age 0+ sockeye	**51**	54.0	0.0	9.5	1.6	13.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**0**														
24-Jul-07	Age 0+ sockeye	**21**	39.1	0.0	17.7	0.0	4.7	3.6	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0
	Nerkids > 15 cm	**8**	9.5	0.0	0.0	0.0	5.3	17.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
16-Aug-07	Age 0+ sockeye	**40**	72.5	0.0	24.3	0.0	13.1	1.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0
	Nerkids > 15 cm	**2**	91.5	0.0	55.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3-Oct-07	Age 0+ sockeye	**34**	59.4	0.0	34.1	0.6	42.2	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**6**	81.7	0.0	5.3	0.0	147.7	0.0	0.0	0.0	1.0	5.0	0.0	0.2	0.0	0.0
15-Nov-07	Age 0+ sockeye	**41**	52.1	0.0	2.1	0.0	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**4**	170.8	0.0	0.0	0.0	2.0	0.0	0.0	0.0	9.5	0.0	0.0	0.0	0.0	0.0
15-Jan-07	Age 0+ sockeye	**29**	51.1	0.0	16.0	0.1	0.0	0.1	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**0**														

2008 Osoyoos Lake fish diets (average number prey per fish)

Sampling Date	**Fish Group**	**Number stomachs processed**	*D. thomasi* copepodids & adults	*L. ashlandi* copepodids & adults	*E. nevadensis* copepodid & adults	*Bosmina*	*Daphnia*	*Leptodora*	*Polyphemus*	*Diaphanosoma*	*Mysis*	Chironomid Larva	*Sida*	Mayfly	Adult Fly	fly larva
15-May-08	Age 0+ sockeye	**50**	12.3	34.1	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	Nerkids > 15 cm	**0**														
04-Jul-08	Age 0+ sockeye	**39**	1.5	0.0	0.3	0.1	48.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**0**														
12-Aug-08	Age 0+ sockeye	**37**	16.9	1.0	25.6	0.0	1.9	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**0**														
11-Sep-08	Age 0+ sockeye	**17**	0.4	0.0	43.6	0.0	0.5	0.0	0.0	11.9	0.0	0.0	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**0**														
29-Sep-08	Age 0+ sockeye	**39**	12.5	0.0	29.7	0.0	0.1	0.1	0.1	1.4	0.1	0.0	0.0	0.0	0.9	0.6
	Nerkids > 15 cm	**0**														
05-Nov-08	Age 0+ sockeye	**31**	95.5	9.2	14.8	0.0	0.0	0.0	0.0	0.1	1.3	0.0	0.0	0.0	0.1	0.0
	Nerkids > 15 cm	**6**	59.3	0.0	5.8	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0

2009 Osoyoos Lake fish diets (average number prey per fish)

Sampling Date	**Fish Group**	**Number stomachs processed**	*D. thomasi* copepodids & adults	*L. ashlandi* copepodids & adults	*E. nevadensis* copepodid & adults	*Bosmina*	*Daphnia*	*Leptodora*	*Polyphemus*	*Diaphanosoma*	*Mysis*	Chironomid Larva	*Sida*	Mayfly	Adult Fly	fly larva
11-May-09	Age 0+ sockeye	**31**	43.1	2.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.1
	Nerkids > 15 cm	**0**														
17-Jun-09	Age 0+ sockeye	**31**	18.6	1.0	0.7	0.2	28.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**2**	0.5	0.0	0.5	0.0	18.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
22-Jul-09	Age 0+ sockeye	**30**	10.9	0.1	0.8	0.1	33.9	0.8	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**0**														
24-Aug-09	Age 0+ sockeye	**30**	20.4	0.3	2.4	2.4	0.3	0.1	0.0	0.7	0.1	0.0	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**0**														
28-Sep-09	Age 0+ sockeye	**28**	61.2	4.5	83.6	0.4	6.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**1**	1.0	2.0	1.0	0.0	122.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23-Nov-09	Age 0+ sockeye	**45**	58.8	0.6	1.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0

2010 Osoyoos Lake fish diets (average number prey per fish)

Sampling Date	Fish Group	**Number stomachs processed**	*D. thomasi* copepodids & adults	*L. ashlandi* copepodids & adults	*E. nevadensis* copepodid & adults	*Bosmina*	*Daphnia*	*Leptodora*	*Polyphemus*	*Diaphanosoma*	*Mysis*	Chironomid Larva	*Sida*	Mayfly	Adult Fly	fly larva	fly pupa
17-May-10	Age 0+ sockeye	**17**	109.3	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.2
	Nerkids 4-9 cm	**22**	206.4	0.0	12.9	0.9	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0.0	0.5	0.8	11.9
	Nerkids > 15 cm	**3**	208.7	0.0	85.3	0.3	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	3.0	6.0	2.0
21-Jun-10	Age 0+ sockeye	**52**	138.2	9.9	55.6	26.1	0.5	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.4	0.3
	Nerkids 4-9 cm	**14**	271.6	1.7	72.0	94.5	0.5	0.0	0.0	2.1	0.1	0.0	0.0	0.0	0.6	0.0	2.5
	Nerkids > 15 cm	**2**	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0
09-Aug-10	Age 0+ sockeye	**37**	2.5	0.0	0.4	0.1	63.2	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Nerkids 4-9 cm	**14**	3.4	0.0	3.1	0.0	113.0	9.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	Nerkids > 15 cm	**1**	0.0	0.0	0.0	0.0	94.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
02-Oct-10	Age 0+ sockeye	**41**	59.4	0.0	36.8	0.0	7.2	0.4	0.0	0.0	1.0	0.1	0.0	0.0	1.6	1.8	0.3
	Nerkids 4-9 cm	**2**	33.0	0.0	19.0	0.0	2.0	0.0	0.0	0.0	11.0	0.0	0.0	0.0	0.0	9.5	0.0
	Nerkids > 15 cm	**1**	249.0	0.0	53.0	0.0	373.0	94.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0

2011 Osoyoos Lake fish diets (average number prey per fish)

Sampling Date	**Fish Group**	**Number stomachs processed**	*D. thomasi* copepodids & adults	*L. ashlandi* copepodids & adults	*E. nevadensis* copepodid & adults	*Bosmina*	*Daphnia*	*Leptodora*	*Polyphemus*	*Diaphanosoma*	*Mysis*	Chironomid Larva	*Sida*	Mayfly	Adult Fly	fly larva	fly pupa
29-Jun-11	Age 0+ sockeye	**30**	5.6	0.0	0.5	0.1	168.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
	Nerkids 4-9 cm	**9**	32.7	0.0	0.4	0.8	255.8	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
	Nerkids > 15 cm	**5**	59.6	0.0	0.4	0.4	590.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
02-Aug-11	Age 0+ sockeye	**32**	42.7	0.0	8.8	0.1	41.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
	Nerkids 4-9 cm	**1**															
	Nerkids > 15 cm	**0**															
07-Sep-11	Age 0+ sockeye	**30**	44.8	0.0	20.3	0.0	51.4	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
	Nerkids 4-9 cm	**0**															
	Nerkids > 15 cm	**3**	90.3	0.0	65.7	0.0	51.3	2.3	0.0	0.0	4.0	0.3	0.0	0.0	0.0	0.0	0.0
06-Oct-11	Age 0+ sockeye	**30**	243.9	0.0	7.2	5.6	19.8	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.2	0.0	0.0
	Nerkids 4-9 cm	**0**															
	Nerkids > 15 cm	**1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0

2012 Osoyoos Lake fish diets (average number prey per fish)

Sampling Date	Fish Group	**Number stomachs processed**	*D. thomasi* copepodids & adults	*L. ashlandi* copepodids & adults	*E. nevadensis* copepodid & adults	*Bosmina*	*Daphnia*	*Leptodora*	*Polyphemus*	*Diaphanosoma*	*Mysis*	Chironomid Larva	*Sida*	Mayfly	Adult Fly	fly larva	fly pupa
14-Jun-12	Age 0+ sockeye	**21**	9.0	7.5	4.2	0.1	36.2	2.9	0.0	11.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Nerkids 4-9 cm	**2**	6.5	9.0	1.0	0.0	98.0	0.0	0.0	59.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24-Jul-12	Age 0+ sockeye	**30**	25.7	13.3	6.9	0.3	5.9	0.0	0.0	48.9	0.0	4.4	0.0	0.9	0.0	0.0	0.0
	Nerkids 4-9 cm	**2**	39.0	33.0	6.0	0.0	31.0	5.0	0.0	440.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0
11-Sep-12	Age 0+ sockeye	**29**	4.0	2.8	22.5	0.0	4.5	0.0	0.0	1.9	0.1	0.0	0.0	0.1	0.0	0.0	0.0
	Nerkids 4-9 cm	**4**	0.5	4.5	4.0	0.3	3.3	0.0	0.0	2.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
17-Nov-12	Age 0+ sockeye	**30**	3.9	17.2	0.2	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Nerkids 4-9 cm	**3**	3.0	6.3	0.0	0.0	0.0	0.0	0.0	0.3	1.0	0.0	0.0	0.0	0.0	0.0	0.0

2013 Osoyoos Lake fish diets (average number prey per fish)

Sampling Date	**Fish Group**	**Number stomachs processed**	*D. thomasi* copepodids & adults	*L. ashlandi* copepodids & adults	*E. nevadensis* copepodid & adults	*Bosmina*	*Daphnia*	*Leptodora*	*Polyphemus*	*Diaphanosoma*	*Mysis*	Chironomid Larva	*Sida*	Mayfly	Adult Fly	fly larva	fly pupa	larval fish
04-Jun-13	Wild age-0 sockeye	**30**	23.0	5.0	10.0	0.0	5.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hatchery age-0 sockeye	**2**	26.0	18.0	35.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
	Age 1 nerkids	**18**	94.1	59.0	120.1	0.0	118.5	0.0	0.0	0.2	0.1	0.1	0.0	0.0	7.4	0.0	0.0	0.0
	Age 2 nerkids	**4**	46.8	324.3	9.5	0.0	7.0	0.0	0.0	0.0	0.3	2.3	0.0	0.0	0.3	0.0	0.0	1.0
09-Jul-13	Wild age-0 sockeye	**30**	6.0	2.0	25.0	3.0	0.0	0.0	0.0	21.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hatchery age-0 sockeye	**8**	6.0	2.0	18.0	3.0	0.0	0.0	0.0	26.0	0.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0
	Age 1 nerkids	**3**	2.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	6.7	0.0	0.0	0.0
	Age 2 nerkids	**1**	2.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
03-Aug-13	Wild age-0 sockeye	**30**	44.0	4.0	17.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hatchery age-0 sockeye	**6**	23.0	26.0	24.0	6.0	0.0	0.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Age 1 nerkids	**1**	14.0	18.0	102.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Age 2 nerkids	**0**																
05-Sep-13	Wild age-0 sockeye	**30**	7.0	6.0	8.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hatchery age-0 sockeye	**7**	2.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Age 1 nerkids	**1**	8.0	6.0	26.0	0.0	0.0	0.0	0.0	152.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
	Age 2 nerkids	**0**																

Sampling Date	**Fish Group**	**Number stomachs processed**	*D. thomasi* copepodids & adults	*L. ashlandi* copepodids & adults	*E. nevadensis* copepodid & adults	*Bosmina*	*Daphnia*	*Leptodora*	*Polyphemus*	*Diaphanosoma*	*Mysis*	Chironomid Larva	*Sida*	Mayfly	Adult Fly	fly larva	fly pupa	larval fish
10-Oct-13	Wild age-0 sockeye	**30**	96.0	296.0	46.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hatchery age-0 sockeye	**7**	72.1	80.7	23.6	2.1	1.4	0.0	0.0	3.6	0.1	0.0	0.0	0.0	0.4	0.0	0.0	0.0
	Age 1 nerkids	**0**																
	Age 2 nerkids	**0**																
06-Nov-13	Wild age-0 sockeye	**30**	54.7	232.0	38.7	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Hatchery age-0 sockeye	**6**	47.5	116.7	15.8	0.8	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Age 1 nerkids	**1**	36.7	268.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Age 2 nerkids	**0**																

REFERENCES

Allen, G., Yan, N.D., and Geiling, W.T. 1994. ZEBRA2, zooplankton enumeration and biomass routines for APIOS: a semi-automated sample processing system for zooplankton ecologists. Ontario Ministry Environment Report, Dorset, Ontario.

Allen, R.L., and Meekin, T.K. 1980. Columbia River sockeye salmon study, 1971-1974. Wash. Dep. Fish. Prog. Rep. No. 120. 75 p.

Bran and Luebbe Inc. 1987. Nitrite/Nitrate in waste water, Technicon TrAAcs 800, Industrial Methods No. 824-87T July 1987.

Brett, J.R. 1964. Growth rate and body composition of fingerling sockeye salmon, *Oncorhynchus nerka*, in relation to temperature and ration size. J. Fish. Res. Bd. Can. 26: 2363-2394.

Brett, J.R. 1952. Temperature tolerance in young pacific salmon, genus *Oncorhynchus*. J. Fish. Res. Bd. Can. 37: 1565-1572.

Brett, J.R., and Blackburn, J.M.1981. Oxygen requirements for growth of young coho (*Oncorhynchus kisutch*) and sockeye (*O. nerka*) salmon at 15° C. Can. J. Fish. Aquat. Sci. 38: 399-404.

Brett, J.R., Shelbourn, J.E., and Shoop, C. 1969. Growth rate and body composition of fingerling sockeye salmon *Oncorhynchus nerka*, in relation to temperature and ration size. J. Fish. Res. Bd. Can. 26: 2363-2394.

Campbell, L., and Chow-Fraser, P. 1995. Estimating effects of chemical preservatives and freezing on the length and dry weight of *Daphnia* and *Diaptomus* in an oligotrophic lake. Arch. f. Hydrobiol. 134: 255-269.

Chapman, D., Pevan, C., Giorgi, A., Hillman, T., Utter, F., Stevenson, J., and Miller, M. 1995. Status of Sockeye Salmon in the Mid-Columbia Region. Don Chapman Consultants Inc., Boise, ID. 245 p. + 129 figs., 26 tables.

Cottingham, K.L. 1999. Nutrients and zooplankton as multiple stressors on phytoplankton communities: evidence from size structure. Limnol.Oceanog. 44: 810-827.

Cyr, H. 1998. Cladoceran- and copepod-dominated zooplankton communities graze at similar rates in low-productivity lakes. Can. J. Fish. Aquat. Sci. 55: 414-422.

Davis, J.C. 1975. Waterborne dissolved oxygen requirements and criteria with particular emphasis on the Canadian environment. National Research Council of Canada. NRC Associate Committee Scientific Criteria for Environmental Quality. No. 13.

Downing, J.A., and Rigler, F.H. 1984. A Manual on Methods for the Assessment of Secondary Productivity in Fresh Waters. Second Edition. Blackwell Scientific Publications. Oxford.

Dussart, B.H., and Fernando, C.H. 1990. A review of the taxonomy of five Ontario genera of freshwater cyclopoid Copepoda (Crustacea). Can. J. Zool. 68: 2594-2604.

Eaton, A., Clesceri, L.S., and Greenberg, A.E. *(Editors*).1995. Standard Methods for the Examination of Water and Wastewater, Section 4500PE. APHA-AWWA-WPCF. 20th edition.

Eaton, A., Clesceri, L.S., and Greenberg, A.E. *(Editors*).1998. Standard Methods for the Examination of Water and Wastewater, Section 4500NC. APHA-AWWA-WPCF. 20th edition.

Edmondson, W.T. 1959. Fresh-water Biology. J. Wiley & Sons, Chichester.

Enzenhofer, H.J., and Hume, J.M.B.1989. Simple closing midwater trawl for small boats. N. Am. J. Fish. Manage. 9:372-377.

Fryer, J.K. 1995. Columbia Basin sockeye salmon: Causes of their past decline, factors contributing to their present low abundance, and future outlook. Ph.D. Thesis. Univ. Washington, Seattle.

Girard, R., and Reid, R.A. 1990. Dorset Research Centre Study Lakes: Sampling Methodology (1986 - 1989) and Lake Morphometry. Ont. Min. Environ. Report, 33 p. + appendices

Gjernes, T.W., Hyatt, K.D., and Rankin, D.P. 1986. Development of specifications for the use of an uncalibrated echo sounder to estimate populations of small limnetic fish. Can.Tech. Rep. Fish. Aquat. Sci. 1509: 35 p.

Hewett, S.W., and Johnson, B.L. 1992. Fish Bioenergetics Model 2. University of Wisconsin, Sea Grant Institute, Madison.

Hulbert, S. 1984. Pseudoreplication and the design of ecological field experiments. Ecol. Monogr. 54**:**187-211

Hyatt, K.D., and Rankin, D.P. 1999. A Habitat Based Evaluation of Okanagan Sockeye Salmon Escapement Objectives. Can. Stock Assessment Secretariat Res. Doc. 99/191. 59 p. Available at: http://www.dfo-mpo.gc.ca/Library/244185.pdf

Hyatt, K.D., and Stockner, J.G. 1985. Responses of sockeye salmon (*Oncorhyncus nerka*) to fertilization of British Columbia lakes. Can. J. Fish. Aquat. Sci. 42: 320-331.

Hyatt, K.D., Alexander, C.A.D., and Stockwell, M.M. 2015. A decision support system for improving “fish friendly” flow compliance in the regulated Okanagan lake and river system of British Columbia. Can. Water Resour. J. 40(1): 87-110.

Hyatt, K.D., Rankin, D.P., and Hanslit, B. 2000. Acoustic and trawl based estimates of juvenile sockeye salmon (*Oncorhynchus nerka*) production from 1976-1999 brood year adults returning to Smith Inlet and Long Lake, British Columbia. Pacific Stock Assessment Review Committee Working Paper S00-21.

Hyatt, K.D., Stockwell, M.M., and Rankin, D.P. 2003. Impact and adaptation responses of Okanagan River sockeye salmon (*Oncorhynchus nerka*) to climate variation and change effects during freshwater migration: Stock restoration and fisheries management implications. Can. Water Resour. J. 28: 689-711.

Hyatt, K.D., McQueen, D.J., Rankin, D.P., Stockwell, M.M., Wright, H., Lawrence, S., Stevens, A., Mattieu, C., and Weins, L. 2015. Methods and summary data for limnology and food web structure in Skaha Lake, B. C. (2005-2013). Can. Data Rep. Fish. Aquat. Sci. 1259: vi +76 p.

Hyatt, K.D., Mathias, K., Rankin, D.P., McQueen, D., Mercer, B., and Milligan, P. 2005. Evaluation of hatchery versus wild sockeye salmon fry growth and survival in two British Columbia lakes. N. Am. J. Fish. Mgt. 25: 745-762.

Hyatt, K.D., Rutherford, D.G., Gjernes, T., Rankin, D.P., and Cone, T. 1984. Lake Enrichment Program: Juvenile sockeye unit survey guidelines. Can. Manuscr. Rep. Fish. Aquat. Sci.1796: 84 p.

Jensen, E.V., and Epp, P.F. 2002. Water quality trends in the Okanagan, Skaha, and Osoyoos lakes in response to nutrient reduction and hydrologic variation. BC Ministry of Environment, Penticton, BC. 36 p.

Korinek, V. 1981. *Diaphanosoma birgei* n.sp. (Crustacea, Cladocera). A new species from North America and its widely distributed subspecies *Diaphanosoma birgei* spp. *lacustris* n. spp. Can. J. Zool. 59: 1115-1121.

Lawrence, S., Wright, H., Hyatt, K.D., McQueen, D.J., and Rankin, D.P. 2007. Sockeye salmon restoration in Skaha and Osoyoos lakes: Summary of biomonitoring sampling protocol for water chemistry, phytoplankton, zooplankton and juvenile fish. Available from Okanagan Nation Alliance, #101 3535 Old Okanagan Highway, Westbank, B.C. V4T 3L7.

Levy, D.A. 1991. Shifts in fish distribution in response to an internal seiche in a stratified lake. Limnol. Oceanogr. 36**:** 187-192.

Levy, D.A. 1990. Sensory mechanism and selective advantage for diel vertical migration in juvenile sockeye salmon, *Oncorhynchus nerka*. Can. J. Fish. Aquat. Sci. 47: 1796-1802.

Lieder, U. 1983. Revision of the genus *Bosmina* Baird,1845 (Crustacea, Cladocera). -Int. Revue. ges. Hydrobiol 68: 121-139.

MacLennan, D.N., and Simmonds, E.J. Fisheries Acoustics. Fish and Fisheries Series 5: ix + 325p. Chapman and Hall, London.

McQueen, D.J., Hyatt, K.D., Rankin, D.P., and Ramcharan, C.J. 2007. Changes in algal species composition affected juvenile sockeye salmon production at Woss Lake, British Columbia: a lake fertilization and food web analysis. N. Am. J Fish. Manage.27**:** 369-389.

Millar, R.B., and Anderson, M.J. 2004. Remedies for pseudoreplication. Fish. Res. 70:397-407.

Northcote, T.G., Halsey, T.G., and MacDonald, S.J. 1972. Fisheries and indicators of water quality in Okanagan Basin lakes, British Columbia. Preliminary report No. 22. Canada British Columbia – Okanagan Basin Agreement. British Columbia Fish and Wildlife Branch, Victoria, BC. 78 p.

Okanagan Nation Alliance. 2001. Evaluation of an experimental re-introduction of sockeye salmon into Skaha Lake year 1 of 3. Prepared for the Okanagan Nation Fisheries Commission. Available from the Okanagan Nation Alliance, #101 3535 Old Okanagan Highway, Westbank, B.C. V4T 3L7.

Okanagan Nation Alliance. 2002. Evaluation of an experimental re-introduction of sockeye salmon into Skaha Lake year 2 of 3. Prepared for the Okanagan Nation Fisheries Commission. Available from the Okanagan Nation Alliance, #101 3535 Old Okanagan Highway, Westbank, B.C. V4T 3L7.

Okanagan Nation Alliance. 2003. Evaluation of an experimental re-introduction of sockeye salmon into Skaha Lake year 3 of 3. Prepared for the Okanagan Nation Fisheries Commission. Available from the Okanagan Nation Alliance, #101 3535 Old Okanagan Highway, Westbank, B.C. V4T 3L7.

Peters, C.N., Bernard, D.P., and Marmorek, D.R. 1998. Should sockeye be reintroduced to Okanagan Lake? An exploration of potential benefits, impacts and uncertainties. Prepared for the Okanagan Nation Fisheries Commission. Available from the Okanagan Nation Alliance, #101 3535 Old Okanagan Highway, Westbank, B.C. V4T 3L7.

Rae, R. 2005. The State of Fish and Fish Habitat in the Okanagan and Similkameen Basins. Prepared for the Canadian Okanagan Basin Technical Working group (COBTWG), Westbank, B.C. 110 p. Available at: http://www.obwb.ca/fileadmin/docs/state_of_fish_habitat_obwb.pdf

Rensel, J. 1998. Water quality of Lake Osoyoos during 1997, fourth annual report. Rensel Associates, Arlington, WA.

Rensel, J. 1997. Third Annual Report: Water quality and sockeye salmon enhancement in Lake Osoyoos during 1996. Rensel Associates, Arlington, WA.

Rensel, J. 1996. Second Annual Report: Water quality and sockeye salmon enhancement in Lake Osoyoos during 1995. Rensel Associates, Arlington, WA.

Rensel, J. 1995. First Annual Report: Water quality and sockeye salmon enhancement in Lake Osoyoos during 1994. Rensel Associates, Arlington, WA.

Shields, P.A., and Carlson, S.R. 1996. Effects of formalin and alcohol preservation on lengths and weights of juvenile sockeye salmon. Alaska Department of Fish and Game. Alaska Fish. Res. Bull. 2:81-93

Stockwell, M.M., and Hyatt, K.D. 2003. A summary of Okanagan Sockeye salmon (*Oncorhynchus nerka*) escapement survey observations by date and river segment from 1947 to 2001. Can. Data. Rep. Fish. Aquat. Sci. 1106: 34 p. + Data CD ROM.

Stockwell, M.M., Hyatt, K.D., and Rankin, D.P. 2001. A compendium of historic physical variable observations including air temperature, water temperature, river inflow, and dissolved oxygen conditions in selected portions of the Okanagan Basin in Canada and the United States. Can. Data Rep.Fish. Aquat. Sci.1078: 8 p. + Data CD ROM.

Stutzman, P. 1995. Food quality of gelatinous colonial chlorophytes to the freshwater zooplankters *Daphnia pulicaria*, *Diaptomus oregonensis*. Freshwater Biol. 34: 149-153.

Yan, N.D., and Mackie, G.L. 1987. Improved estimation of the dry weight of *Holopedium gibberum* (Crustacea, Cladocera) using clutch size, a body fat index, and lake water total phosphorus concentration. Can. J. Fish. Aquat. Sci. 44: 382-389.

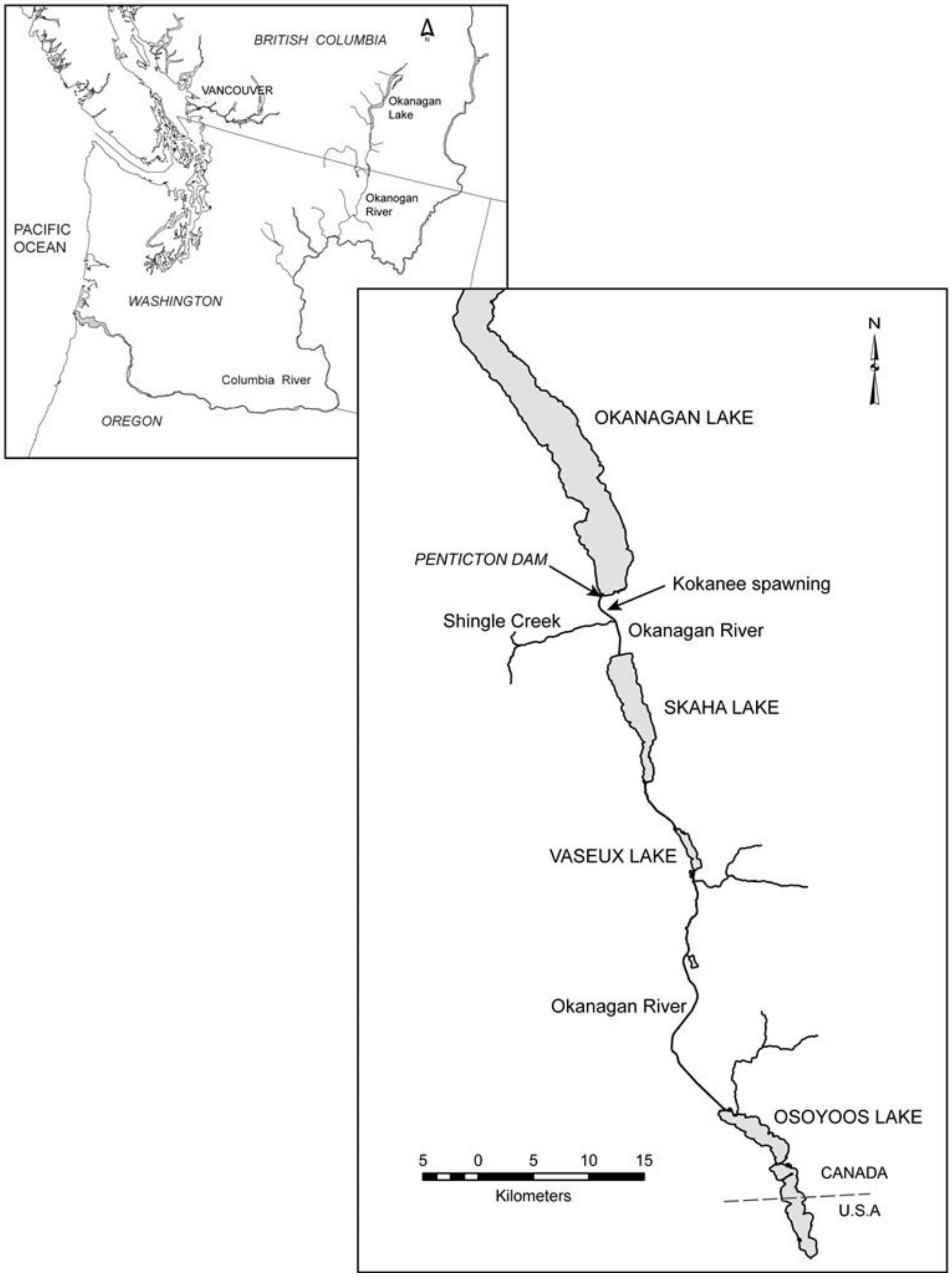

Figure 1. Location of the Okanagan River, Skaha and Osoyoos Lakes.

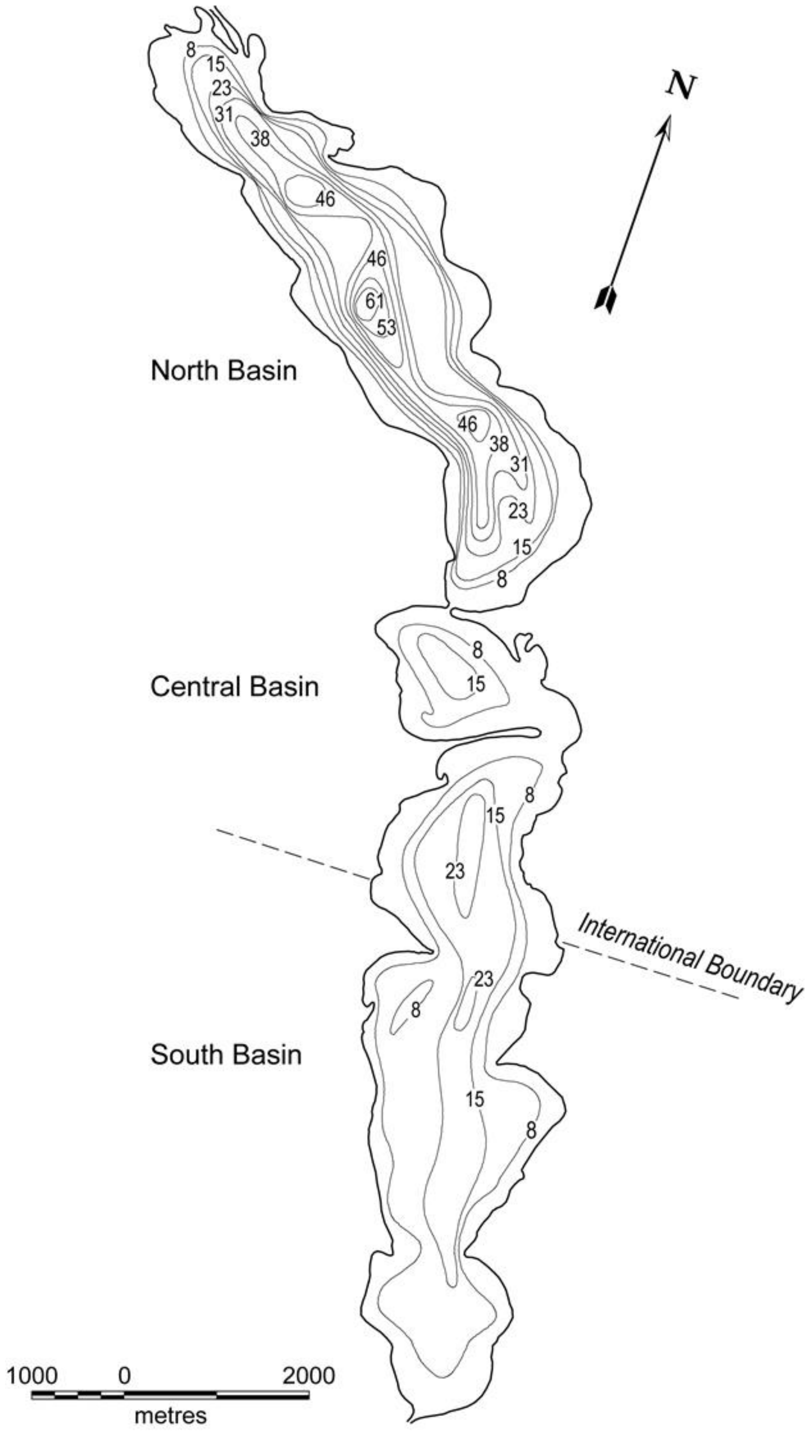

Figure 2. Osoyoos Lake bathymetric contours. Depth is in metres. Adapted from map by Province of B. C.,Fisheries Branch, Inventory Operations, October 1971. Vector file from http://www.bcfisheries.gov.bc.ca/fishinv/basemaps-maps.html (downloaded 9-Jan-06).

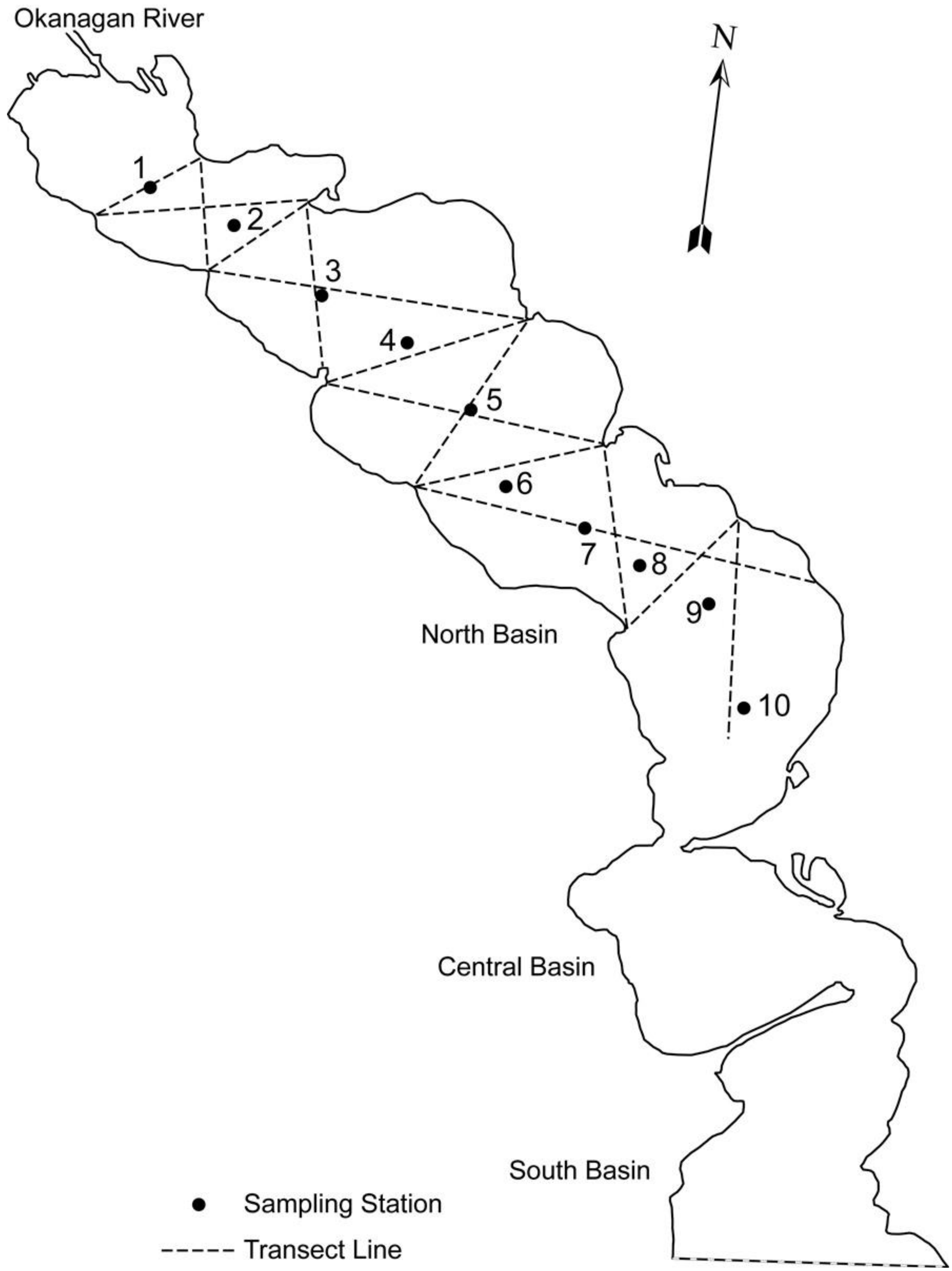

Figure 3. Osoyoos Lake North Basin, showing hydro-acoustics survey transects and water chemistry sampling stations