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

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

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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 Wiens, 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: vii + 76 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. One such project involved an experimental reintroduction of sockeye salmon into Skaha Lake after roughly a century of virtually total exclusion of anadromous salmon from the lake by low-head dams built for irrigation and flood control. The Okanagan Nation Alliance (ONA), in partnership with Chelan and Grant County Public Utilities in Washington State, are the lead proponents for the sockeye reintroduction project. Fisheries and Oceans Canada (DFO), with responsibilities for management of anadromous salmon, and BC Forests, Lands and Natural Resource Operations (BC-FLNRO), with responsibility for management of resident freshwater fish, provide technical advice and regulatory oversight to the project through the three-party (DFO, BC-FLNRO, ONA) Canadian Okanagan Basin Technical Working Group (COBTWG). Here we provide a detailed site-description and report on field survey and sample processing methods used on Skaha Lake to assess annual to seasonal changes in: (1) limnological conditions (temperature, oxygen, water transparency, nutrient concentrations, plankton abundance and production etc.), (2) abundance and biological traits of juvenile sockeye and kokanee salmon, and (3) abundance and biological traits of other limnetic fish species. Monthly or sub-monthly survey work was especially intensive during the years 2005-2013. The first objective of this nine year program was to compare rates of growth and rates of egg-to-smolt survival from hatchery-reared sockeye, stocked into Skaha Lake, with similar rates from the wild Osoyoos Lake population, which contributed the eggs used in the hatchery program. A second objective was to investigate the possibility that stocked age-0 sockeye might in some way, have negative impacts on resident kokanee in Skaha Lake. The report that follows provides a formal summary of the fisheries and limnology methods and data gathered at Skaha Lake in association with experimental introductions of sockeye salmon fry during years 2005-2013. A companion report (Hyatt et al. 2015) provides a similar summary of observations from Osoyoos Lake.

RÉSUMÉ

Hyatt, K.D., McQueen, D.J., Rankin, D.P., Stockwell, M.M., Wright, H., Lawrence, S. Stevens, A., Mathieu, C., et Wiens, L. 2015. Méthodes et données sommaires relatives à la limnologie et à la structure du réseau trophique du lac Skaha, en Colombie-Britannique (2005-2013). Can. Data Rep. Fish. Aquat. Sci. 1259: vii + 76 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. L'un de ces projets consistait à réintroduire de façon expérimentale des saumons rouges dans le lac Skaha après environ un siècle d'exclusion pratiquement totale des saumons anadromes du lac en raison des barrages de basse-chute construits pour l'irrigation et le contrôle du débit. L'Okanagan Nation Alliance, en partenariat avec les services publics des comtés de Chelan et de Grant dans l'État de Washington, dirige le projet de réintroduction du saumon rouge. Pêches et Océans Canada, étant responsable de la gestion des saumons anadromes, et le ministère des Forêts, des Terres et de l'Exploitation des ressources naturelles de la C.-B. (C.-B. – FTERN), étant responsable de la gestion des poissons d'eau douce résidents, fournissent des conseils techniques et assurent une supervision réglementaire dans le cadre du projet par l'entremise du Groupe de travail technique canadien du bassin de l'Okanagan qui regroupe trois partenaires (MPO, C.-B. – FTERN, ONA). 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 Skaha afin d'évaluer : 1) les conditions limnologiques (température, oxygène, transparence de l'eau, concentration de nutriments, abondance et production du plancton, etc.); 2) l'abondance et les caractéristiques biologiques des saumons rouges et des saumons kokani juvéniles; 3) l'abondance et les caractéristiques biologiques d'autres espèces de poissons limnétiques. De nombreux relevés mensuels ou infra-mensuels ont été réalisés entre 2005 et 2013. L'objectif premier de ce programme de neuf ans était de comparer le taux de croissance et le taux de survie œuf-saumoneau chez les saumons rouges élevés en écloserie et introduits dans le lac Skaha avec des taux similaires de la population sauvage du lac Osoyoos, d'où proviennent les œufs utilisés dans le cadre du programme de l'écloserie. Le deuxième objectif était d'enquêter sur la possibilité que les saumons rouges d'âge 0 introduits dans le lac aient un quelconque impact négatif les saumons kokani du lac Skaha. Le rapport qui suit contient un résumé officiel des méthodes de pêche, de limnologie et de collecte de données dans le lac Skaha, utilisées dans le cadre des introductions expérimentales d'alevins de saumon rouge entre 2005 et 2013. Un rapport complémentaire (Hyatt *et al.* 2015) fournit un résumé semblable des observations tirées du lac Osoyoos.

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INTRODUCTION

For thousands of years, anadromous sockeye salmon (*Oncorhynchus nerka*) migrated up the Columbia River into Osoyoos Lake and from there moved up the Okanagan River into Skaha Lake and beyond into Lake Okanagan (Hewes 1998, Kennedy and Bouchard 1998, Ernst 2000, Long 2005). However, during the 19th and 20th centuries, human intervention significantly restructured both access by salmon to these waters and the pelagic food webs of valley bottom lakes in the Okanagan (Okanagan, Skaha and Osoyoos lakes). In the mid-19th century, agriculture, water engineering, overfishing, and logging ensured that anadromous sockeye salmon were extirpated from all but Osoyoos Lake. In the late-19th century, lake-whitefish (*Coregonus clupeaformis*) were stocked into Lake Okanagan and moved downstream into Skaha Lake (McHugh 1936). In the mid-1960s, *M. relicta* were stocked into Okanagan Lake (Northcote 1991) and they too, moved downstream and invaded Skaha Lake.

In response to the habitat degradation and loss of the food and ceremonial opportunities once provided by an abundant supply of several species of salmon (Chinook, Sockeye, and kokanee), the Okanagan Nation Alliance, the Confederated Colville Tribes, Chelan Public Utility and Grant Public Utility of Washington State, embarked on a program designed to satisfy mutual objectives 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 three party (Fisheries and Oceans Canada, BC-Forests Lands and Natural Resource Operations and the Okanagan Nation Alliance) Canadian Okanagan Basin Technical Working Group [COBTWG] determined that sockeye salmon would be stocked, on an experimental basis, into Skaha Lake (Peters et al. 1998).

In October 2003 (brood year 2003), the Okanagan Nation Alliance fisheries personnel collected brood-stock from the Okanagan River just north of Osoyoos Lake. The eggs and fry were raised in a DFO managed hatchery, and in May 2004, 352,500 sockeye fry were released into Skaha Lake (Wright et al. 2006, Lawrence et al. 2005). During the summer of 2004, it was determined that substantial numbers of sockeye fry survived and then left Skaha Lake as smolts in spring 2005. Also during the first year of the Skaha sockeye project, a formal monitoring plan was developed (Lawrence 2005). The assessment goal of the Skaha sockeye project was to determine whether the growth and survival advantage conferred by hatchery incubation of sockeye eggs and fry, followed by residence in Skaha Lake, was large enough to justify the continued removal of wild adults from the Okanagan River to serve as hatchery brood stock. Detailed field and laboratory methods associated with the monitoring program were documented in preliminary form by Lawrence et al. (2005, 2007). Over the ensuing nine years (in-lake years 2005-13) the reintroduction project plan mandated that sockeye fry stocking densities should vary, but that the field survey and laboratory sample processing methods applied at both Osoyoos (wild-fry “control” observations) and Skaha lakes (hatchery-fry “test” observations) should remain stable. This protocol was followed exactly during 2005, 2006, 2007, 2008, 2009 and 2011, but special circumstances resulted in changes to the plan during in-lake years 2010, 2012 and 2013. Stocking densities are summarized in the following table.

Lake	Brood year	In-lake year	Number of fry (per ha) released into Skaha or Osoyoos Lake
Skaha	2004	2005	1,205,500 (603)
Skaha	2005	2006	1,384,000 (692)
Skaha	2006	2007	1,479,000 (740)
Skaha	2007	2008	885,500 (443)
Skaha	2008	2009	1,614,300 (807)
Skaha*	2009	2010	448,300 (224)
Osoyoos*	2009	2010	432,400 (463)
Skaha	2010	2011	900,000 (462)
Osoyoos**	2011	2012	837,800 (898)
Osoyoos**	2012	2013	837,800 (898)

During in-lake years 2005-09 and 2011, all hatchery-reared fry were released into Skaha Lake where methods for limnology and fish populations were replicated with little variation.

***** During in-lake 2010, a special experiment was conducted in both Skaha and Osoyoos lakes. Because both hatchery and wild-origin fry originated from wild spawners, investigators wished to determine whether observed survival of hatchery-origin fry placed into Skaha Lake differed from that of wild-origin fry in Osoyoos Lake due to “lake-effects” or “hatchery-effects”. Consequently, 50% of hatchery-origin fish were stocked into Osoyoos Lake and 50% into Skaha Lake. The goal was to determine whether hatchery-origin fry grew and survived as well as their wild-origin siblings when both occupied Osoyoos Lake (i.e. a “common garden” experiment).

****** During in-lake 2012 and 2013 (BY2011 and 2012) flow rates in the Okanagan River were exceptionally high and wild adult sockeye salmon were able to bypass flood-gates normally serving as barriers at two dams and spawn in Penticton Channel upstream of Skaha Lake. Because investigators wished to determine the abundance of wild-origin fry recruiting to Skaha Lake from these spawners, no hatchery-origin fry were introduced to Skaha Lake in 2012 or 2013. In the latter years, hatchery-origin fry were introduced into only Osoyoos Lake to replicate the “common garden” experiment noted above.

One of the initial concerns associated with the stocking program was that the addition of age-0 sockeye might intensify competition between stocked age-0 sockeye and resident age-0 kokanee, older age 1-3+ kokanee and *Mysis relicta*.Preferred prey species for juvenile sockeye salmon include large-bodied zooplankton such as *Daphnia* and *Epischura* (Eggers 1977, 1978, 1982, Jaenicke et al. 1987, Higgs et al. 1995, Shortreed and Morton 2000) or medium sized species such as *Bosmina*, *Diaphanosoma*, *Holopedium*, and *Alona* (Hyatt et al. 2005, McQueen et al. 2007). Juvenile sockeye living in Pacific coastal lakes have also been reported to consume *Neomysis mercedis*, especially during the fall (Hyatt et al. 2005). Kokanee diets are qualitatively identical to the diets of similarly sized sockeye (O’Neill, 1986; O’Neill & Hyatt, 1987; Ashley et al. 1997, 1999). Juvenile and adult kokanee consume copepods and cladocerans including *Daphnia, Bosmina, Holopedium*, *Leptodiaptomus* and cyclopoids (Ferguson 1949, Taki et al. 1999, Stockwell and Johnson 1997). In addition, Kootenay Lake sockeye consume *Mysis relicta* (Thompson 1999).

M. relicta diets include many of the prey types listed for age-0 sockeye and age-0 kokanee, and their rates of predation are high enough that they have been associated with the reduction or elimination of several cladoceran species (Lasenby & Langford 1973, Grossnickle 1978, Goldman et al. 1979, Morgan et al. 1978, Threlkeld et al. 1980, Rieman and Falter 1981, Furst et al. 1984, 1986, Nero and Sprules 1986). Some authors have concluded that *M. relicta* have out-competed the fish species for which they were originally introduced as a forage item (Morgan et al. 1978, Nero and Sprules 1986, Furst et al. 1986, Rieman and Falter 1981), but others have found lower impacts ranging from <1% of the prey population consumed per day in Lake Michigan (Lehmann et al. 1990), to about 1% per day in Kalamalka and Okanagan lakes (Whall and Lasenby 1998), and 2-4 % per day in Kootenay Lake (Smokorowski 1998, but see Thompson 1999).

Experiments involving comparisons of the relative impacts on pelagic zooplankton populations by juvenile sockeye, juvenile kokanee, and mysids have all concluded that mysids are superior competitors. Cooper (1988) and Cooper et al. (1992) suggested that *N. mercedis* in Muriel and Kennedy Lake on Vancouver Island could consume up to 10 times more zooplankton per day than juvenile sockeye. Hyatt et al. (2005) found that on average, Muriel Lake *N. mercedis* consumed about 8 times more zooplankton than juvenile sockeye. Chipps and Bennett (2000) found that mean seasonal consumption by Lake Pend Oreille (Idaho) *M. relicta* was about four times greater than consumption by all kokanee age classes together.

At Skaha Lake, our task was to determine whether annual introductions of various densities of age-0 sockeye salmon would have negative impacts on growth or survival of Skaha Lake resident kokanee. We were also required to account for the confounding influence of *M. relicta.* The data summarized in this report represent the first step in our analysis to resolve these issues.

SKAHA LAKE SITE DESCRIPTION

PHYSICAL DESCRIPTION

Skaha Lake (Figures 1 and 2), measures 12 km in length, has a surface area of 1946 ha, volume of 0.56 km^3, maximum depth of 57 m, mean depth of 26 m. Earlier reports (Pinsent and Stockner 1974) suggested that water residence time averaged 1.2 years, but during high flow years (2011-13) we have observed annual turnover times as high as once every 4-6 months.

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 Skaha Lake during 1970-99, average spring epilimnetic total phosphorus fell from about 25 µg L^{-1} in the 1980s to <10 µg L^{-1} in the 1990s. Average spring epilimnetic total nitrogen fell from about 0.32 mg L^{-1} in the 1980s to <0.25 mg L^{-1} in the 1990s. Average spring and fall chlorophyll a concentrations varied from 2-20 µg L^{-1} through 1978-1994, but fell to 1-5 µg L^{-1} during the late 1990s. Spring and fall Secchi depths showed the same trends averaging 4 m during the early years and increasing to 6-8 m in the late 1990s. All of these changes have ensured well oxygenated, hypolimnetic waters and excellent conditions for rearing by juvenile sockeye salmon, kokanee, and lake whitefish. During our intensive study period (2005-2013), there has been little change in water chemistry concentrations.

SKAHA LAKE FISH HISTORY

Limited time series for Skaha Lake pelagic fish populations are available from seven data sources. (1) Clemens et al. (1939) used gill nets to survey several Okanagan Valley lakes and provided very limited catch data for eastern (lake) whitefish from Dog (Skaha) Lake. (2) Ferguson (1949) used gill nets, beach seines, and dynamite to survey Skaha Lake fish populations and record species present, lengths, weights and diets. (3) Northcote et al. (1972) (data cited in Pinsent 1974) used gillnets and beach seines to record fish species present, lengths and weights. They also reported kokanee in-lake and stream spawner densities. (4), Parkinson (1986) used echo-sounding and mid-water trawls to estimate juvenile kokanee densities, lengths, and weights. (5) In some years during 1983-2003, Hyatt and Rankin (unpublished data, Canadian Department of Fisheries and Oceans) used acoustics-and-trawl based surveys to estimate juvenile kokanee densities, lengths, and weights. (6) During 2001-03, the Okanagan First Nation (ONA 2001, 2002, 2003), used gillnets, electrofishing and beach seines to estimate species present, lengths and weights. Rae (2005) reviewed earlier information and summarized some of these ONA data. (7) During 2001-present, British Columbia Ministry of Environment kokanee surveys (Webster 2007) recorded spawner abundance, and spawner lengths and weights.

Ferguson (1949) reported the presence of 13 species of fish. Two were obligate pelagic planktivores (kokanee and lake whitefish). The others included (rainbow trout – *Oncorhynchus mykiss*, largescale sucker – *Catostomus macrocheilus*, longnose sucker – *Catostomus catostomus*, burbot – *Lota lota*, prickly sculpin – *Cottus asper*, carp – *Cyprinus carpio*, redside shiner – *Richardsonius balteatus*, northern pikeminnow – *Ptychocheilus oregonensis*, peamouth chub – *Mylocheilus caurinus*, chiselmouth – *Acrocheilus alutaceus*, and mountain whitefish – *Prosopium williamsoni*). Northcote et al. (1972) reported the same species plus black crappie – *Pomoxis nigromaculatus* and pygmy whitefish – *Prosopium coulteri.* The 2001-02 Okanagan First Nation (ONA 2001, 2002, 2003) surveys reported the same 15 species plus four additions (black bullhead – *Ictalurus mealus*, lake chub – *Couesius plumbeus*, pumpkinseed – *Lepomis gibbosus,* and smallmouth bass – *Micropterus dolomieui*).

OKANAGAN SOCKEYE SALMON

The Okanagan River drains south through a series of six lakes (Ellison, Wood, Kalamalka, Okanagan, Skaha, and Vaseux) into Osoyoos Lake which straddles the Canada USA border, and ultimately drains into the Columbia River (Figure 1). Adult sockeye bound for the Okanagan begin their upstream migration during May-June, negotiate 10 fish-ways placed at dams in the Columbia and Okanagan rivers and arrive at Osoyoos Lake during July through early September (Allen and Meekin 1980, Chapman et al. 1995, Hyatt and Rankin 1999). They hold in the lake until late September and then migrate north into the Okanagan River where they spawn during October-November (Stockwell and Hyatt 2003, Hyatt et al. 2003). The eggs over-winter in the river, hatch in April-May, and newly hatched age-0 juveniles move down stream to Osoyoos Lake where they rear for one summer, over-winter and finally leave as 1+ smolts in April-May of the next year.

Columbia River sockeye were once present in at least three Okanagan Valley lakes (Osoyoos, Skaha and Okanagan) (Hewes 1998, Kennedy and Bouchard 1998, Ernst 2000, Long 2005). Only the Osoyoos Lake stock has survived. Since brood year 2003, eggs from the Osoyoos stock have been obtained from wild adults just prior to spawning, transported to a hatchery, reared and released into Skaha Lake as age-0 juveniles.

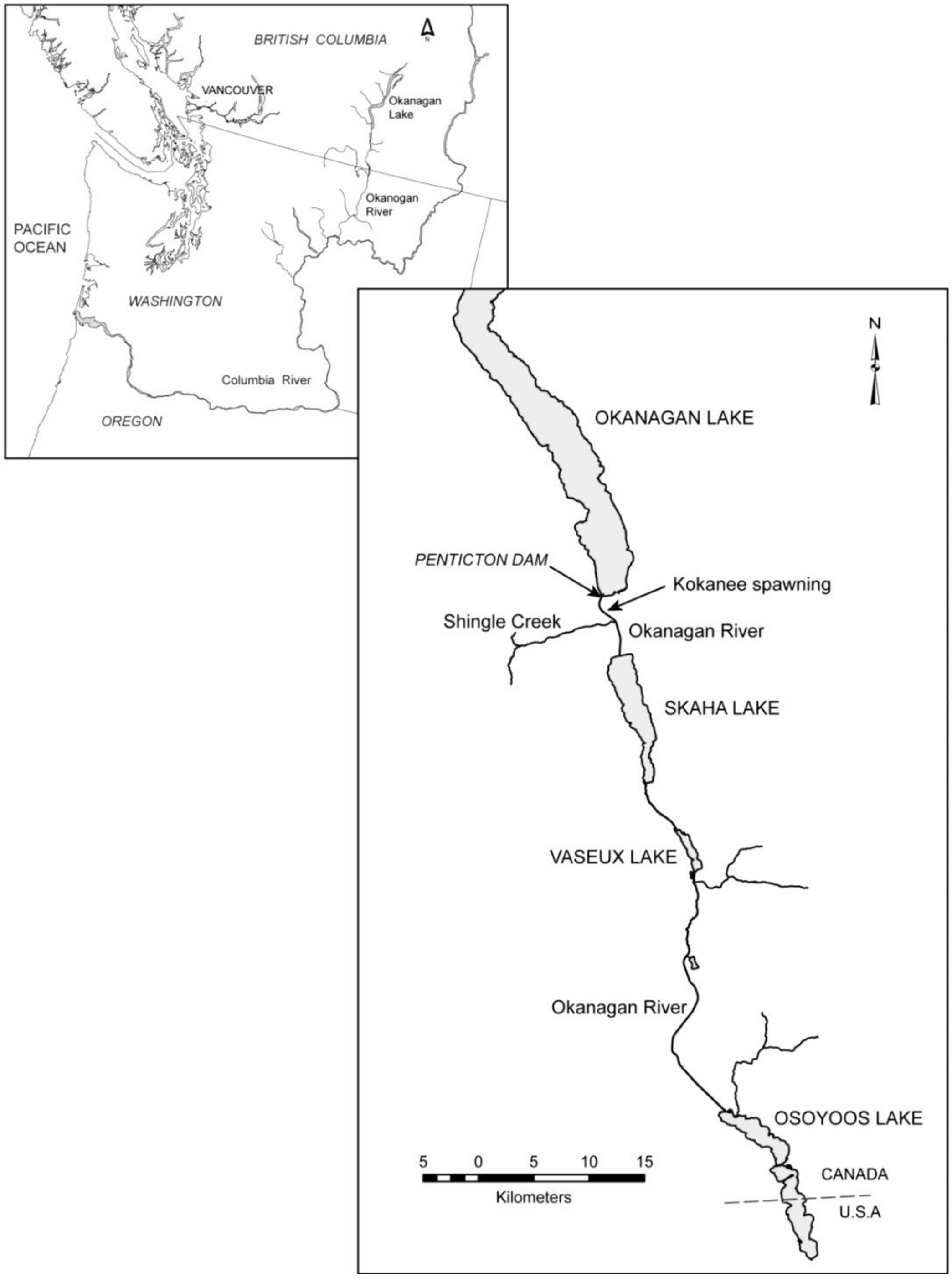

Figure 1. Location of the Okanagan River, Skaha, and Osoyoos lakes.

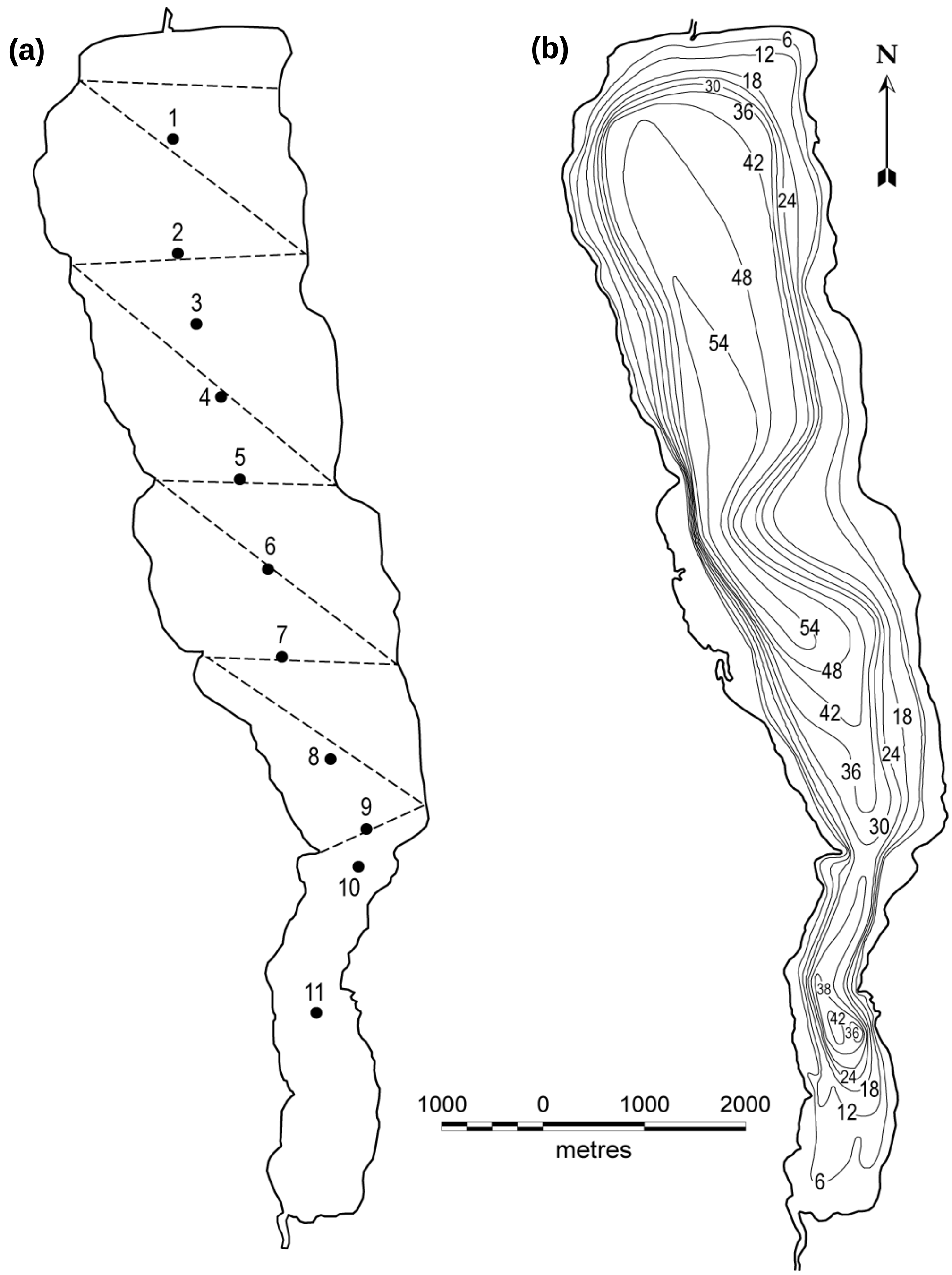

Figure 2. Skaha Lake (a) acoustic and trawl transect lines, and sampling stations (water, phytoplankton, and zooplankton) and (b) bathymetric contours (in metres). Sampling stations are numbered ● and acoustic survey transects are shown as dashed lines. Bathemetry adapted from map by Province of B.C. Fisheries Branch, Inventory Operations, July 1966.Vector file downloaded (09-Jan-2006) from http://www.bcfisheries.gov.bc.ca/fishinv/basemaps-maps.html .

METHODS

WATER CHEMISTRY

Skaha Lake water chemistry was sampled at two stations located at Gilles and Skaha South Basin (Stations 3 and 11, Figure 2). 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). Skaha 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), Eaton et al. (1995, 1998).

PHYTOPLANKTON

All samples were collected at the two water chemistry sites (stations 3 and 11, Figure 2). All phytoplankton samples were treated with Lugol's solution and stored in the dark. At the laboratory, the Skaha 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 by zooplankton (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).

ZOOPLANKTON

In Skaha Lake, zooplankton were sampled at stations 2, 4, 6, 8, 11 (Figure 2) with 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 with carbon dioxide saturated water and then preserved in 5.5% buffered and sugared formalin. 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.

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. Nauplii were identified only to the sub-ordinal level (i.e. *Diacyclops thomasi* or *Leptodiaptomus ashlandi*). 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). If preserved animals were used to develop these regressions, a 39 % correction for weight loss in formalin was applied (Giguère et al. 1989).

MYSIS RELICTA

In Skaha Lake, *M. relicta* were sampled every 3-6 weeks (depending on the time of year) at stations 1-9 and 11 (Figure 2) 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 flow-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 to be used for production analysis.

Mysid diets were assessed by direct inspection of gut contents of juveniles (2-10 mm length) and adults (11-22 mm) from each sample. During 2006-08, 30 specimens were examined on each sampling date. During 2009-13, at least 100 specimens were examined 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.

During 2013, we ran a special experiment to quantify seasonal changes in *Mysis* vertical profiles. Our estimates of Mysis density per m^3 are based on metered, vertical hauls, between 0-30 m with a 300 µm mesh net. These data were gathered to estimate (1) *Mysis* biomass and density, (2) *Mysis* consumption rates per m^3, (3) daily proportions of prey biomass and production removed by *Mysis*, (4) the rates at which *Mysis* are consumed by fish and (5) daily proportions of the *Mysis* population removed by fish.

In the first three cases, both zooplankton and *Mysis* densities were estimated over 0-30 m and our calculations of consumption rate per m^3 d^{-1} were based on densities between 0-30 m. We chose 0-30 m haul depths because some of our 11 stations are only slightly deeper than 30 m and the mean depths for Skaha Lake is 26 m. The relative volume of lake water deeper than 30 m in Skaha is 7%. When calculating consumption rates, we used Schindler trap samples to assess species-specific zooplankton depth distributions and where necessary, we accounted for the actual depths occupied by both *Mysis* and their prey as they vertically migrated over the diel interval in the water column.

In the fourth and fifth cases noted above, *Mysis* densities were estimated over 30 m and fish densities were estimated per ha of lake surface area. We then adapted a bioenergetics model (Kitchell et al. 1977) to estimate rates of consumption by juvenile sockeye and kokanee. These daily rates were then translated to rates per m^3 d^{-1} and they were compared to the rates of *Mysis* production and biomass from samples taken between 0-30 m. Since the fish migrate through the water column as they feed at night, our calculations would only be valid if we assume that *Mysis* densities below 30 m are similar to *Mysis* densities measured with 0-30 m hauls.

The goal of the 2013 *Mysis* vertical haul experiment was to test this assumption. We used a vertical haul net (300 µm mesh size) to quantify Skaha Lake *Mysis* densities (m^{-3}) at two deep stations, at night, at 5 meter depth intervals (0-5, 5-10, 10-15, 15-20, 20-25, 25-30, 30-35, 35-40, 40-45, 45-50m) on 6 dates (29 May, 2 July, 29 July, 134 Aug, 11 Sept, 15 Oct). The results are summarized in Tables 1 and 2.

Table 1. Average number of *Mysis* per cubic meter captured per m above 30m water depth and below 30m water depth.

	29-May-13	2-Jul-13	29-Jul-13	14-Aug-13	11-Sep-13	15-Oct-13	Average
Average density per m from 0-30m	18	10	6	5	3	6	8
Average density per m from 0-50 m	5	3	4	5	5	8	5

Based on averages (Table 1) it appears that densities above 30 m water depth were higher than densities below 30 m. However, the data were variable. In the spring, average densities above 30 m were higher but as the year progressed, densities below 30 m became greater. In addition, there was substantial variability between the 5 m depth intervals, within dates (Table 2). For example on 29 May 2013, there were very high densities at shallow depths, lower densities between 10-30 m, a higher density at 30-35 m and reduced densities below 35 m. So the averages shown in Table 1 are based on quite variable densities between 0-30 m and also between 30-50 m. We therefore used repeated measures of variance to test the hypothesis that the density differences between 0-30 m and 30-50 m were consistent.

Table 2. Average number of *Mysis* per cubic meter captured in each 5 m intervals between 0 and 50 m water depth.

Interval	29-May-13	2-Jul-13	29-Jul-13	14-Aug-13	11-Sep-13	15-Oct-13
0-5	19	2	1	2	0	2
5-10	68	10	0	0	0	0
10-15	8	27	15	7	1	8
15-20	5	9	10	2	7	17
20-25	3	7	10	6	8	4
25-30	4	5	2	12	2	5
30-35	14	4	14	5	0	0
35-40	0	4	0	8	2	13
40-45	8	4	0	2	1	11
45-50	0	1	2	2	17	8

We found (Table 3), that the variability within dates was larger than the density differences in the 0-30 m and 30-50 m sample depths. From this, we conclude that the methods we have used to estimate the impacts of fish on the *Mysis* population are valid and that the data provided in the annual reports require no further adjustment.

Table 3. Repeated measures analysis showing that water depth had no significant effect on densities of *Mysis* sampled from spring to fall during 2013.

Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Intercept	2433.600	1	2433.600	52.856	.000
depth	129.600	1	129.600	2.815	.132
Error	368.333	8	46.042		

SOCKEYE AND KOKANEE METHODS

Broodstock for hatchery-origin, juvenile sockeye was collected during October in a given year from the Okanagan River north of Osoyoos Lake. Depending on the year, egg take ranged from 1-2 million. After sorting, the eggs were sent to the hatchery (Shuswap Hatchery, Lumby, BC. Szczepan Wolski manager) where they were incubated, thermally marked, reared to fry and screened for disease. During late May – early June, hatchery fry were released into Skaha Lake.

In Lake Sampling

Skaha Lake salmon fry were sampled 5-7 times (depending on the year) between June and March the following year. In Skaha Lake, the fry comprised a mix of resident kokanee and either hatchery-origin (2005-11) or wild-origin (2012-13) sockeye. Bio-samples of fish 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 confirmed by hydro-acoustics to contain targets of interest, and surveys were based on 5-15 trawls per sampling session. On each night, the target-catch by trawl was 300+ fish comprising juvenile sockeye and various age classes of kokanee. After each trawl set, fish were immediately removed from the net and held on ice. At the laboratory, all fish were assigned a unique fish identification number (FIN) and were processed for lengths (mm) and weights (0.1 g). During years when age-0 hatchery fry were known to be in the lake (2005-11), otoliths were removed from all fish falling below a seasonally adjusted, size threshold expected to include all hatchery fry (<5cm in June, <6cm in July and August, <6.5 cm in September, <7.5 cm in October, <8 cm in November and winter) and placed in dry vials. During years when wild-origin fry were known to be in the lake (2012-13), parts of the tail and operculum were removed from all fish < than the seasonal size limits noted above. A portion of each tissue sample was applied to DNA collection cards supplied by DFO while the remainder of each tissue sample was placed in separate vials with 95% ethanol for shipment to the Pacific Biological Station for genetic fingerprinting. Stomach contents were removed from approximately 30 age-0 sockeye and 30 age-0 kokanee on each survey date. For all fish larger than 8 cm, all 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.

Laboratory Processing

Otoliths from all putative hatchery fish (2005-11) were processed to verify that each individual bore a thermal mark from the hatchery and these were assumed to be sockeye fry. All other age-0 fish absent thermal marks were assumed to be wild-origin sockeye or kokanee. DNA samples from Skaha Lake fry (2012-13) were analyzed by DFO and were used to separate resident age-0 kokanee and wild age-0 sockeye. 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).

During 2006-12, fish stomachs were removed from individual fish and all identifiable zooplankton in each stomach were counted to 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 ages1, 2, 3+ kokanee 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 was equal to the average taxonomic weight for individuals captured in zooplankton samples taken on each sampling date.

Assessment of Age-Specific Fish Densities

Acoustic-and-trawl surveys (ATS) were used to determine fish abundance in Skaha (and Osoyoos) lakes on 5-7 dates each year. Density estimates from echo-integration analysis were used to determine total numbers of fish. These data were further partitioned into species and size or age classes within species based on trawl-sample composition combined with acoustics target strength analysis.

Data from echosounding (i.e. target abundance) and trawl catch (otolith and/or DNA and/or otolith thermal mark patterns) were used to identify abundance of wild-origin kokanee, wild-origin sockeye or hatchery-origin sockeye making up pelagic fish mixtures on a given survey date. However, because larger and older fish made up a low, and quite variable, proportion of trawl-catch, these samples could not be used to reliably estimate absolute densities of larger and older kokanee or the even less abundant whitefish. An additional concern was that even though the trawl net was large (mouth opening 3 x 7 m), the greater swimming power of larger fish may have allowed them to evade capture so that basing estimates of these fish on trawl estimates alone would underestimate their abundance relative to age-0 kokanee and age-0 sockeye. To correct for this problem, we used trawl-catch samples to identify the actual size-and-age classes of larger fish making up the mixture of pelagic fish present on a given survey date. Acoustic data files were then interrogated to estimate the abundance of the various size (i.e. target strength) classes of pelagic fish known from trawl samples to be present in the lake.

The steps used to assign each fish to the appropriate "taxonomic" category (*i.e.* kokanee or sockeye, length, weight, age), were as follows: (1) Total fish densities were assessed from acoustics data collected using a Biosonics DT-X sounder (200 kHz sounder with 300 W power, pulse width at 1 ms and a 6.6^0.transducer). (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 2005-11, taxonomic designations for subsets of small fish were based on marked otolith presence (age-0 hatchery sockeye) or absence (age-0 wild kokanee). During 2012-13, taxonomic designations for small fish were based on DNA fingerprinting (age-0 kokanee, age-0 sockeye or age-0 hybrid) for all age-0 fish captured in the trawl nets during October, November and the winter. (5) Ages of larger fish (all kokanee) were assessed from annulus patterns on scales. For each sampling date, these five data sets were combined as follows: (i) Trawl-caught age-0 kokanee and age-0 sockeye were separated based on otoliths or DNA as described above. (ii) Age-1, age-2 and age-3+ kokanee were separated based on scale ages. (iii) Because it was assumed that large kokanee would be more likely to escape the trawl, we used the Sonar-5 length frequency data to estimate densities of juvenile nerkids and larger age-1, 2 and age 3+ kokanee. (iv) Our protocol was to use the trawl data to establish relationships between known fish ages and observed length frequencies and then to extrapolate these length categories to the length frequency data from the echosounder. (v) For age-0s and age-1s, trawl numbers were high, trawl-based length frequencies were well defined and could be reliably extrapolated to the length frequencies derived from the echosounder. For kokanee age-2 and age-3, trawl numbers tended to be higher in the spring and to decline through the summer-fall. These small trawl catches almost certainly resulted in less reliable trawl-based length frequencies and therefore larger errors when applying these length frequencies to the echosounder data. (vi) It must be noted however, that the total densities derived from the echosounder are much more reliable than densities derived from trawl nets alone (but see the next section). Therefore the errors attributed to the protocol described above, are errors in ageing rather than errors in density assessment. If we assume that the echosounder-based density estimates are the best available, then our protocol had no effect on density total but may have influenced numbers in specific age categories. These age-related miss-assignments are less likely to be important for the age-0 and age-1 fish that represent most of the population, and are more likely for the age-2 and age-3 fish that are relatively rare. In summary, because the true densities of age-0 and age-1 nerkids were high, our echosounder-based densities estimates are likely as good as the total echosounder-based estimates. The density estimate for total fish minus the density estimates for age-0 and age-1 nerkids equals the combined density estimate for age-2 and age-3 nerkids together. Therefore, the combined age 2-3 density estimate is also as accurate as the total estimate. However, because the true densities of age-2 and age-3 kokanee were almost always low, the subdivided densities for age-2 and age-3 kokanee (Table 11) are likely to be much less reliable and should be used with caution.

In summary, we combined trawl and echosounder length-frequencies with otolith and DNA data, to estimate relative proportions for each of the six groups of fish (age-0 sockeye, age-0 kokanee, (age-0 hybrids in 2012-13), age-1 kokanee, age-2 kokanee, and age 3+ kokanee). This allowed us to calculate age-frequency densities for each sampling date based on total densities from the acoustic samples.

Fish Density and Hydro-Acoustics 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 Skaha 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 9-14 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 are all reported in the tables that follow. 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 at intervals of several weeks are expected to generate estimates that are more variable. 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 to a few hundred meters) may differ after periods of a few weeks. In the case of Skaha Lake, we certainly found between-sample differences, but they generally reflected the patterns that we would expect from natural mortality. Accordingly, the absence of “random” differences in limnetic fish abundance between most of our sequential 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 may provide a reasonable ‘index” of uncertainty in our estimates of the lake-wide abundance of limnetic fish.

Although most of the sequential density estimates tend to reflect gradual declines, estimates from acoustic surveys crossing seasonal boundaries routinely exhibit significant differences. This is especially obvious in late May to early June. Inspection of the density data shown in Table 12 reveals that population densities, dominated by introductions of age-0 hatchery fry, rapidly decline in the spring and then begin to stabilize in August and remain relatively stable throughout the fall and winter. This pattern is almost certainly due to the high mortality rates that are known to affect fry 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 mortality over time.

Given these obvious seasonal differences, combined with a small number of unexplained single-sample increases (September 2009) or decreases (November 2012) in age-0 sockeye densities, we err on the side of caution in the use of these data by largely relying 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. The second estimate is “presmolt density” based on the average of all samples collected from October –winter. We have chosen these time periods because between-date variability within each of these time periods tends to be relatively low. In addition, the August-November estimate is useful for calculations that involve assessment of the impacts of the fish on their zooplankton prey. 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 an estimate of total egg “deposition” or hatchery fry releases, and for Skaha Lake our recommended standardized survival estimates focus on egg-to-fall fry (average Aug-Nov) and egg-to-presmolt (average Oct-winter) life-history intervals.

Densities of Presmolts versus Smolts

There are no explicit counts or reliable quantitative estimates of smolts as they leave Skaha Lake in the spring of each year. However, Hyatt and Stockwell compared 9 years of acoustic-and-trawl based estimates of presmolt abundance from Osoyoos Lake with independent annual estimates of relative smolt abundance gathered downstream in the Columbia River at Rocky Reach Dam. For brood years 2002-10, Hyatt and Stockwell (unpublished data) found a highly significant relationship (Osoyoos presmolt abundance = 0.0924*RRH cumulative smolt count – 53703) (R^2 = 0.98, n=9). Because this relationship was based on data derived from two sampling programs run entirely independently of each other, employing radically different sampling techniques (see Hyatt et al. 2015 for details) these authors concluded that 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.

Whitefish Sampling

During 2008-09, Skaha Lake whitefish were sampled using gillnets set during night and day at the "north station" (west side of lake opposite station 5; Figure 2) originally used by Northcote et al. (1972). We used gillnet surveys to assess (1) relative numbers of lake whitefish and other species (2) whitefish lengths and weights and (3) whitefish stomach contents for future bioenergetics analysis. The nets were set and retrieved 4 times per day. The first set was about one hour after sundown, the first retrieval 1 hour before sunrise. The second set was approximately one hour before sunrise and the second retrieval one hour after sunrise. The third set was about one hour after sunrise and the third retrieval was one hour before sunset. The fourth set was about one hour before sunset and the fourth retrieval about one hour after sunset. During each sampling period, three gangs of 6-8 panels of 50'(15m) long by 8' (2.5m) sinking gill nets (mesh ranging from 1", 1.5", 2", 2.5", 3", 3.5", 4", 4.5", 5", and 5.5") were used. The gangs of nets were set parallel to shore at the Gilles Site. The first gang was set 1m below the surface. The second was set at the thermocline (10-12 $^{\circ}$C water temperature), the third gang was set at a depth four meters off the bottom.

During the first week of August 2008, a total of 114 fish were captured and the catch breakdown was lake whitefish = 80, burbot = 1, kokanee = 27, pike minnow = 0, rainbow trout = 1, pike minnow = 2, white sucker = 2, sculpin = 1. Seventy seven lake white fish were >33cm, and 6 individuals of other species were >33 cm. From this we concluded that lake whitefish might be expected to comprise 93% of the acoustics targets >33cm. During the first week of August 2009, we gillnetted 125 fish. The catch breakdown was lake whitefish = 68, burbot = 1, kokanee = 14, pike minnow = 38, rainbow trout = 2, adult sockeye = 1, white sucker = 1. Sixty three lake white fish were >33cm, and 5 individual fish of other species were >33 cm. Again we concluded that lake whitefish might be expected to comprise 93% of the acoustics targets >33cm.

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·ha-^{1} wet weight) in units that are traditionally used by limnologists and fisheries biologists. However, to simplify comparisons between trophic levels our bioenergetics data are presented as both µg per L dry weight and as $g \cdot ha^{-1}$ wet weight. We based our conversions on the following assumptions and conventions. (1) To convert from $\mu g \cdot L^{-1}$ to $g \cdot ha^{-1}$ we know that $\mu g \cdot L^{-1}$ equals $mg \cdot m^{-3}$, 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) To convert from dry weight (dw) to wet weight (ww), we found that most literature values for wet:dry ratios for crustaceans and juvenile fish ranged from 10-16% (Downing and Rigler 1984, Hewett and Johnson 1992). We therefore assumed dry weight to be 14% of wet weight (i.e. divide g ha^{-1} ww by 7). (3) In summary, to convert Skaha 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

SKAHA LAKE WATER TEMPERATURES

Table 4. Skaha Lake temperature profiles (°C). Profiles are averaged from data collected at the Gilles and South Basin sites. Shaded area approximates water temperatures generally known to be avoided by juvenile sockeye due to temperature preferences of < 17°C (Brett 1952, 1964, Levy 1990, 1991).

Year 2005 Skaha Lake water temperatures (°C)

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	10.4	16.6	17.9	18.2	20.8	22.1	22.7	17.1	15.1	10.8
2	9.8	15.9	17.6	17.9	20.5	22.1	22.5	17.2	15.0	10.8
3	9.4	15.7	17.4	17.8	20.2	22.1	22.4	17.2	15.0	10.8
4	9.1	15.3	17.3	17.7	20.1	22.1	22.3	17.3	15.0	10.8
5	8.9	14.9	15.6	17.6	20.0	22.1	22.3	17.3	14.9	10.8
6	8.7	14.4	13.7	17.6	19.9	22.1	22.3	17.3	14.9	10.7
7	8.5	13.5	12.9	17.2	19.8	22.0	22.2	17.3	14.9	10.6
8	8.2	12.0	12.1	15.9	18.9	21.8	22.1	17.3	14.9	10.6
9	7.9	10.5	11.7	15.2	17.8	20.9	21.9	17.3	14.9	10.5
10	7.5	9.6	11.3	14.5	16.5	20.0	19.0	17.3	14.9	10.5
11	7.3	8.9	10.5	14.2	14.4	18.4	18.3	17.3	14.9	10.5
12	7.2	8.4	9.7	11.6	13.2	16.1	17.2	17.3	14.9	10.5
13	7.0	7.9	9.5	10.6	12.0	12.2	16.4	15.7	14.9	10.4
14	6.8	7.7	9.2	9.7	10.5	10.5	11.7	14.6	14.8	10.4
15	6.6	7.4	9.1	9.5	10.0	10.3	10.2	13.8	12.7	10.4
16	6.5	7.3	9.0	9.3	9.4	9.4	9.4	10.1	12.1	10.3
17	6.3	7.2	8.8	8.9	9.0	9.1	9.1	9.5	11.4	10.3
18	6.2	7.0	8.4	8.8	8.8	8.9	9.0	9.2	10.3	10.1
19	6.1	6.9	8.0	8.6	8.7	8.7	8.7	8.9	9.5	9.8
20	6.0	6.8	7.9	8.5	8.5	8.5	8.5	8.6	9.2	9.4
24	5.8	6.3	7.1	7.9	8.0	8.2	8.0	8.2	8.5	8.7
28	5.6	6.1	6.5	7.4	7.7	8.0	7.6	7.8	8.1	8.4
32	5.5	5.8	6.2	7.1	7.4	7.8	7.4	7.5	7.8	8.2
36	5.5	5.7	6.0	6.9	6.8	7.4	7.2	7.3	7.5	7.9
40	5.3	5.5	5.9	6.3	6.6	7.2	6.6	6.6	6.8	7.6
44	5.3	5.4	5.7	6.1	6.2	6.5	6.3	6.4	6.6	7.1
48	5.2	5.4	5.6	6.0	6.0	6.2	6.2	6.3	6.4	

Year 2006 water temperatures (°C)

Depth (m)	18-Jan-06	24-Apr-06	23-May-06	12-Jun-06	04- Jul-06	18-Jul-06	21-Aug-06	11-Sep-06	27-Sep-06	23-Oct-06
1	3.5	7.0	13.7	17.9	24.0	21.5	22.0	20.9	17.2	13.1
2	3.6	6.8	13.6	17.8	23.8	21.1	21.9	20.8	17.1	13.1
3	3.6			17.6	23.2	21.7	21.8	20.6	17.1	13.0
4	3.6	6.7	13.3	17.5	22.7	21.7	21.7	20.5	17.1	13.0
5	3.6			17.2	21.6	21.7	21.7	20.4	17.1	13.0
6	3.6	6.6	12.4	16.7	20.5	21.6	21.6	20.3	17.0	13.0
7	3.6			16.6	19.5	21.6	21.6	20.3	17.0	13.0
8	3.6	6.6	11.7	15.7	18.8	21.8	21.5	20.3	17.0	13.0
9	3.6			15.2	17.9	18.0	21.2	19.4	17.0	12.9
10	3.6	6.5	11.0	13.7	16.0	14.9	19.6	18.6	16.9	12.9
11	3.6			13.2	12.9	12.6	17.1	18.1	16.9	12.9
12	3.6	6.4	10.6	12.7	11.5	11.4	14.0	16.2	16.7	12.9
13	3.6			11.1	10.8	10.9	12.2	13.8	15.5	12.9
14	3.6	6.4	9.6	10.2	10.4	10.2	11.2	12.1	13.6	12.8
15	3.6			9.6	9.7	9.3	10.3	10.6	11.2	12.6
16	3.6	6.3	8.6	9.2	9.0	9.0	9.7	9.9	10.0	12.6
17	3.6			9.0	8.7	8.7	9.2	9.4	9.5	11.0
18	3.6	6.3	8.1	8.8	8.4	8.7	8.9	9.2	9.2	10.3
19	3.6			8.6	8.2	8.6	8.7	8.9	8.8	9.9
20	3.6	6.1	7.5	8.4	8.2	8.5	8.5	8.7	8.7	9.5
24	3.6	6.0	7.2	7.9	7.7	8.1	8.1	8.4	8.3	8.6
28	3.6	5.9	6.9	7.5	7.3	7.9	7.8	8.1	8.1	8.2
32	3.6	5.9	6.8	7.3	7.1	7.6	7.6	7.8	8.8	7.9
36	3.6	5.9	6.6	7.1	7.0	7.3	7.4	7.5	7.6	7.6
40	3.6	5.8	6.3	6.9	6.5	7.1	6.8	6.8	6.8	6.9
44	3.6	5.8	6.0	6.4	6.4	6.5	6.6	6.6	6.7	6.8
48	3.6	5.7	5.9	6.3	6.3	6.4	6.4	6.5	6.6	6.6
52					6.2			6.4	6.4	6.5

Year 2007 water temperatures (°C)

Depth (m)	27-Feb-07	18-Apr-07	14-May-07	11-Jun-07	26-Jun-07	9-Jul-07	13-Aug-07	12-Sep-07	17-Sep-07	9-Oct-07	5-Nov-07
1	3.33	6.73	12.58	16.80	18.30	20.79	21.06	18.88	18.46	13.12	9.33
2	2.02	6.34	12.09	16.85	18.31	21.39	21.05	18.81	18.46	13.13	9.32
3	1.83	6.18	11.95	16.79	18.36	21.41	21.06	18.76	18.46	13.13	9.31
4	1.74	6.03	11.65	16.68	18.21	21.38	21.06	18.73	18.42	13.09	9.29
5	1.69	5.97	11.42	16.53	18.11	21.39	21.07	18.71	18.40	13.07	9.28
6	1.61	5.90	11.33	16.45	17.59	21.40	21.06	18.70	18.37	13.06	9.28
7	1.57	5.90	11.19	16.38	17.12	21.35	21.06	18.68	18.35	13.04	9.27
8	1.56	5.81	11.02	16.22	16.96	21.29	21.06	18.65	18.34	13.03	9.26
9	1.56	5.66	10.50	14.67	16.75	20.78	21.01	18.64	18.34	13.02	9.26
10	1.55	5.65	8.97	13.90	15.97	19.07	20.64	18.60	18.33	13.01	9.26
11	1.54	5.59	8.37	13.74	14.38	15.81	16.61	18.55	18.33	12.99	9.25
12	1.51	5.58	8.01	12.86	13.14	14.34	13.18	18.42	18.31	12.94	9.25
13	1.5	5.55	7.81	12.62	12.14	13.33	12.13	17.70	17.68	12.85	9.24
14	1.5	5.53	7.62	11.31	11.36	12.36	10.67	13.08	15.25	12.79	9.23
15	1.5	5.52	7.50	10.35	10.42	11.02	10.02	11.60	12.38	12.68	9.23
16	1.5	5.51	7.41	9.60	9.87	10.40	9.59	10.43	11.14	12.61	9.22
17	1.49	5.50	7.26	8.87	9.16	9.77	9.10	9.77	10.33	11.98	9.22
18	1.49	5.50	7.17	8.65	8.71	9.60	8.94	9.29	9.74	11.54	9.22
19	1.49	5.49	7.01	8.32	8.50	9.26	8.80	8.79	8.90	10.90	9.21
20	1.49	5.49	6.86	8.07	8.28	8.77	8.61	8.64	8.70	10.75	9.21
24	1.52	5.41	6.34	7.53	7.85	8.49	8.10	8.20	8.30	9.27	9.14
28	1.52	5.35	6.19	7.18	7.49	7.76	7.84	7.85	7.95	8.20	8.89
32	1.53	5.33	5.96	7.06	7.08	7.59	7.53	7.37	7.69	7.93	8.19
36	1.53	5.30	5.68	6.55	6.46		7.23	7.01	6.86	7.43	7.77
40	1.53	5.30	5.53	6.26	6.21		6.47	6.76	6.59	7.03	7.22
44	1.53	5.23	5.43	6.10	6.09		6.28	6.42	6.39	6.66	7.12
48	1.55	5.14	5.37	5.81	5.94		6.13	6.27	6.28	6.46	7.02
52	1.58	5.03	5.22	5.61	5.86		6.01	6.14	6.29	6.38	6.92

Year 2008 water temperatures (°C)

Depth (m)	26-Mar-08	08-Apr-08	17-Apr-08	12-May-08	10-Jun-08	24-Jun-08	07-Jul-08	21-Jul-08	28-Jul-08	11-Aug-08	25-Aug-08	07-Sep-08	22-Sep-08	19-Oct-08	19-Nov-08	03-Dec-08
1	3.6	4.6	6.6	10.2	14.5	16.8	20.8	22.4	21.5	21.1	20.3	18.9	16.6	12.0	7.4	6.2
2	3.6	4.5	6.0	9.8	14.4	16.7	20.7	22.2	21.7	21.2	20.4	18.8	16.8	12.1	7.6	6.3
3	3.6	4.5	5.8	9.7	14.3	16.7	20.7	22.0	21.8	21.1	20.4	18.7	16.9	12.1	7.7	6.4
4	3.6	4.5	5.7	9.5	14.2	16.6	20.6	21.5	21.8	21.1	20.4	18.7	17.0	12.1	7.7	6.4
5	3.6	4.4	5.4	9.2	14.2	16.5	20.6	21.0	21.8	21.1	20.4	18.6	17.0	12.1	7.8	6.4
6	3.6	4.4	5.2	9.0	14.1	16.4	20.6	20.6	22.0	21.1	20.4	18.6	17.1	12.0	7.8	6.5
7	3.6	4.4	5.1	8.8	14.1	16.1	19.7	20.0	21.5	21.0	20.4	18.6	17.1	12.0	7.8	6.5
8	3.6	4.4	5.1	8.7	14.0	15.7	18.2	19.7	20.3	21.0	20.4	18.5	17.1	12.0	7.8	6.5
9	3.6	4.4	5.0	8.6	13.1	14.6	17.7	18.8	18.6	19.7	20.4	18.5	17.1	12.0	7.8	6.5
10	3.6	4.3	5.0	8.5	12.6	13.6	16.7	16.1	16.9	16.8	20.4	18.5	17.1	12.0	7.9	6.5
11	3.6	4.3	5.0	8.5	12.3	12.7	13.9	13.5	16.3	15.2	16.3	17.8	16.8	12.0	7.9	6.5
12	3.6	4.3	5.0	8.4	11.9	11.4	11.4	11.5	15.2	13.2	14.1	16.8	15.2	12.0	7.9	6.5
13	3.6	4.3	5.0	8.1	11.6	10.5	10.4	10.9	13.2	12.4	12.6	15.8	14.1	12.0	7.9	6.5
14	3.6	4.3	4.9	7.9	11.2	9.7	9.8	10.0	12.4	11.5	11.1	15.3	11.8	12.0	7.9	6.5
15	3.6	4.3	4.9	7.5	9.8	9.1	9.3	9.9	10.9	10.9	10.3	12.5	10.8	12.0	7.9	6.5
16	3.6	4.3	4.9	7.2	9.3	8.6	8.9	9.5	10.4	9.7	9.8	11.2	10.3	11.9	7.9	6.5
17	3.6	4.3	4.9	7.1	8.2	8.3	8.5	9.1	9.7	9.3	9.3	10.9	9.6	11.9	7.9	6.5
18	3.6	4.3	4.9	6.8	8.1	8.1	8.4	8.9	9.3	9.1	9.1	10.4	9.2	11.3	7.9	6.5
19	3.6	4.3	4.9	6.5	7.9	7.9	8.2	8.6	8.9	8.9	8.9	10.0	9.0	11.0	7.9	6.5
20	3.6	4.2	4.9	6.4	7.4	7.8	7.9	8.4	8.6	8.7	8.7	9.5	8.8	10.6	7.9	6.5
24	3.6	4.2	4.9	5.9	7.0	7.3	7.4	8.0	8.0	8.3	8.1	8.4	8.3	8.6	7.9	6.6
28	3.6	4.2	4.8	5.7	6.6	6.7	7.1	7.5	7.6	7.9	7.5	8.2	8.1	8.0	7.9	6.6
32	3.6	4.2	4.8	5.6	6.4	6.4	6.8	7.3	7.3	7.5	7.1	7.8	7.7	7.7	7.9	6.6
36	3.4	4.0	4.5	5.4	5.9	6.1	6.3	6.8	6.7	6.8	6.7	7.2	7.3	7.3	8.1	6.7
40	3.4	3.9	4.5	5.3	5.7	5.9	6.0	6.5	6.4	6.5	6.4	6.8	7.0	7.0	8.1	6.7
44	3.4	3.9	4.5	5.1	5.5	5.6	5.9	6.0	6.2	6.3	6.2	6.6	6.6	6.8	8.1	6.7
48	3.4	3.9	4.4	5.0	5.4	5.7	5.7	6.0	6.0	6.1	6.0	6.4	6.4	6.5	7.5	6.7
52	3.4	3.9	4.4	5.1	5.4	5.6	5.6	5.9	5.9	6.0	5.9	6.3	6.2	6.4	7.2	6.7

Year 2009 water temperatures (°C)

Depth (m)	14-Apr-09	11-May-09	25-May-09	08-Jun-09	29-Jun-09	13-Jul-09	27-Jul-09	11-Aug-09	25-Aug-09	31-Aug-09	14-Sep-09	21-Sep-09	29-Sep-09	05-Oct-09	22-Oct-09	01-Dec-09	18-Dec-09
1	4.4	9.8	13.6	17.1	19.0	21.2	24.7	22.9	22.5	21.8	19.9	18.5	16.9	15.3	11.8	6.1	3.3
2	4.2	9.5	13.6	16.8	18.9	21.2	24.1	22.8	22.3	21.6	19.6	18.6	17.1	15.4	11.8	6.3	3.2
3	4.2	9.3	13.4	16.4	18.8	21.1	23.9	22.7	22.0	21.6	19.5	18.6	17.1	15.4	11.8	6.3	3.2
4	4.1	8.1	12.8	16.4	18.7	21.1	23.7	22.7	21.8	21.5	19.4	18.6	17.1	15.4	11.8	6.4	3.2
5	4.1	7.7	12.5	16.3	18.7	20.6	23.6	22.6	21.7	21.4	19.3	18.6	17.1	15.4	11.8	6.4	3.2
6	4.1	7.6	12.4	15.8	18.6	19.6	23.2	22.6	21.4	21.4	19.3	18.5	17.2	15.4	11.8	6.4	3.2
7	4.1	7.4	11.7	15.5	18.4	18.9	22.9	22.5	21.2	21.3	19.3	18.5	17.2	15.3	11.8	6.4	3.2
8	4.1	7.3	11.2	15.2	17.9	15.6	21.9	22.4	21.2	21.2	19.4	18.5	17.2	15.3	11.8	6.4	3.2
9	4.1	7.2	10.4	12.6	16.8	14.9	19.3	21.2	21.1	21.0	19.2	18.4	17.2	15.3	11.7	6.4	3.2
10	4.1	7.0	9.9	12.2	15.9	13.7	14.2	19.8	20.6	20.5	19.1	18.4	16.9	15.3	11.7	6.4	3.2
11	4.1	7.0	9.0	11.7	15.3	12.5	11.9	15.5	18.1	17.0	18.7	18.2	16.1	15.3	11.7	6.5	3.2
12	4.0	6.9	8.9	11.4	11.4	11.0	10.5	12.5	15.6	12.8	16.5	16.7	14.6	15.3	11.7	6.5	3.2
13	4.0	6.7	8.8	10.7	10.5	10.2	9.8	10.9	14.7	11.5	12.6	14.5	13.7	15.3	11.6	6.5	3.2
14	4.0	6.6	8.7	10.1	10.0	9.6	9.5	10.3	13.2	10.4	10.7	12.1	12.3	13.9	11.6	6.5	3.2
15	4.0	6.5	8.3	9.4	9.5	9.2	9.1	9.5	12.3	9.8	9.8	11.2	10.9	13.2	11.5	6.5	3.2
16	4.0	6.4	7.9	9.1	9.1	8.8	8.8	9.0	10.9	9.4	9.2	10.1	10.0	13.0	11.0	6.5	3.2
17	4.0	6.2	7.5	8.9	8.9	8.5	8.5	8.7	10.4	9.1	8.9	9.4	9.5	12.7	10.9	6.5	3.2
18	4.0	6.2	7.4	8.5	8.7	8.3	8.3	8.5	9.7	8.8	8.6	9.0	9.3	12.3	10.5	6.5	3.2
19	4.0	6.1	7.2	8.3	8.5	8.2	8.2	8.4	9.3	8.6	8.4	8.8	9.0	9.9	9.6	6.5	3.2
20	4.0	6.1	7.0	8.1	8.3	8.1	8.0	8.2	8.9	8.4	8.3	8.6	8.9	9.2	9.2	6.5	3.2
24	4.0	5.9	6.8	7.5	7.9	7.6	7.6	7.9	8.2	8.0	7.9	8.1	8.5	8.6	8.5	6.5	3.2
28	3.9	5.8	6.6	7.0	7.4	7.3	7.3	7.4	7.8	7.7	7.6	7.8	8.1	8.2	8.1	6.5	3.3
32	3.9	5.5	6.4	6.7	7.1	7.1	7.0	7.3	7.4	7.4	7.4	7.6	7.8	7.9	7.8	6.5	3.3
36	3.6	5.3	6.0	6.2	6.6	6.6	6.7	6.7	6.8	7.0	6.6	6.6	7.3	7.1	7.1	6.6	
40	3.6	5.3	5.8	6.0	6.3	6.3	6.5	6.4	6.6	6.7	6.4	6.4	7.0	6.8	6.9	6.6	
44	3.6	5.0	5.7	5.8	6.1	6.2	6.3	6.2	6.4	6.5	6.3	6.4	6.6	6.7	6.7	6.6	
48	3.6	4.9	5.6	5.7	6.0	6.0	6.1	6.1	6.2	6.4	6.2		6.4	6.6	6.6	6.6	
52		4.9	5.5	5.6	5.9	5.9	6.0	6.0	6.1	6.2	6.0		6.3	6.4	6.5	6.6	

Year 2010 water temperatures (°C)

Depth (m)	15-Feb-10	15-Apr-10	10-May-10	01-Jun-10	14-Jun-10	28-Jun-10	19-Jul-10	27-Jul-10	10-Aug-10	16-Aug-10	23-Aug-10	30-Aug-10	06-Sep-10	14-Sep-10	20-Sep-10	28-Sep-10	03-Oct-10	18-Oct-10	08-Nov-10
1	3.2	7.0	10.6	14.5	17.1	19.5	21.9	22.1	21.6	22.4	21.8	19.9	17.7	17.2	16.7	16.1	15.7	12.5	9.6
2	3.2	6.7	10.5	14.5	17.0	19.3	21.8	22.0	21.7	22.4	21.6	19.9	17.9	17.3	17.1	16.1	15.7	12.9	9.8
3	3.2	6.6	10.5	13.3	16.9	19.2	21.7	17.4	21.8	22.4	21.6	19.8	17.9	17.3	17.1	16.0	15.7	12.9	9.9
4	3.2	6.5	10.5	12.3	16.9	19.0	21.7	16.7	21.8	22.4	21.5	19.7	17.9	17.3	17.1	16.0	15.7	13.0	9.9
5	3.2	6.4	10.4	12.3	16.8	18.8	21.6	16.5	21.8	22.3	21.5	19.7	17.9	17.3	17.1	16.0	16.2	13.0	10.0
6	3.2	6.0	10.4	12.0	16.7	18.6	20.7	16.1	21.8	22.1	21.4	19.7	17.9	17.3	17.1	15.9	16.2	13.0	10.0
7	3.1	6.1	10.4	11.8	16.7	17.5	20.2	15.6	21.8	21.6	21.4	19.7	17.9	17.3	17.1	15.9	16.0	13.1	10.0
8	3.1	6.0	10.3	11.5	16.3	17.0	19.4	15.4	21.8	21.5	21.4	19.6	18.0	17.3	17.1	15.8	16.0	13.1	10.1
9	3.1	5.8	10.1	11.3	15.1	15.8	18.1	15.2	21.7	21.2	21.3	19.6	18.0	17.3	17.1	15.7	15.6	13.1	10.1
10	3.1	5.8	9.8	11.1	13.8	13.8	15.9	13.1	18.0	20.3	21.0	19.0	18.0	17.3	17.1	15.7	15.9	13.1	10.1
11	3.1	5.7	9.6	10.9	12.3	12.8	14.8	10.7	16.1	17.7	19.3	17.2	18.0	16.8	16.0	15.7	15.7	13.1	10.1
12	3.1	5.7	9.5	10.0	11.1	11.8	13.1	10.2	13.5	13.8	17.3	16.4	17.6	15.9	15.5	15.7	15.2	13.1	10.1
13	3.1	5.6	9.3	9.3	10.3	10.3	11.4	9.7	11.9	12.3	14.0	15.7	15.0	15.0	14.5	15.7	14.4	13.1	10.1
14	3.1	5.6	8.9	8.3	9.9	9.9	10.3	8.9	10.6	11.2	12.6	14.9	13.7	14.7	12.6	15.3	12.8	13.1	10.1
15	3.1	5.6	7.7	8.2	9.6	9.6	9.9	8.6	10.2	10.4	11.5	12.9	12.3	14.3	11.0	14.2	11.9	13.1	10.1
16	3.1	5.6	7.7	8.0	9.4	9.2	9.4	8.3	9.8	9.9	10.9	10.9	11.5	14.0	10.5	13.7	11.0	11.8	10.1
17	3.1	5.6	7.5	7.7	9.1	8.9	9.2	8.2	9.6	9.4	10.3	10.0	10.6	13.6	10.1	12.5	10.5	11.4	10.1
18	3.1	5.6	7.2	7.1	8.9	8.6	8.7	8.1	9.2	9.2	9.4	9.8	9.9	10.4	9.7	12.0	10.1	10.9	10.1
19	3.1	5.6	6.9	6.6	8.7	8.4	8.6	8.1	8.9	8.9	9.1	9.5	9.4	9.9	9.4	11.0	9.6	10.4	10.1
20	3.1	5.5	6.8	6.7	8.6	8.2	8.3	7.8	8.8	8.7	8.8	9.3	9.1	9.5	9.1	10.4	9.3	9.9	10.1
24	3.1	5.5	6.5	6.7	8.1	7.7	7.8	7.7	8.2	8.2	8.5	8.6	8.6	9.0	8.4	9.3	8.9	9.1	9.7
28	3.1	5.5	6.2	6.6	7.5	7.2	7.5	7.4	7.9	7.8	8.2	8.2	8.2	9.0	8.1	8.6	8.4	8.6	9.1
32	3.1	5.5	6.0	6.4	7.2	7.0	7.3	7.2	6.1	7.5	7.8	7.9	7.9	8.2	7.8	8.3	8.1	8.3	8.3
36	3.1	5.4	5.8	6.0	6.5	6.3	6.5	6.6	6.9	6.9	7.0	7.2	7.2	7.1	7.0	7.5	7.5	7.8	7.9
40	3.1	5.3	5.7	5.8	6.3	6.2	6.2	6.4	6.7	6.6	6.9	6.8	6.9	6.8	6.7	7.2	7.0	7.4	7.3
44	3.1	5.3	5.6	5.7	6.1	6.0	6.1	6.3	6.4	6.4	6.6	6.6	6.7	6.6	6.6	7.0	5.9	7.1	7.1
48	3.1	5.3	5.5	5.6	6.0	5.9	6.1	6.1	6.3	6.3	6.5	6.4	6.4	6.4	6.4	6.8	6.7	6.9	6.9
52	3.1	5.3	5.5	5.6	5.9	5.9	6.0	6.1	6.2	6.2	6.4	6.4	6.4	6.4	6.3	6.6	6.6	6.7	6.8

Year 2011 water temperatures (°C)

Depth (m)	05-May-11	09-May-11	24-May-11	30-May-11	15-Jun-11	20-Jun-11	12-Jul-11	18-Jul-11	25-Jul-11	08-Aug-11	16-Aug-11	22-Aug-11	28-Aug-11	15-Sep-11	23-Sep-11	07-Oct-11	11-Oct-11	25-Oct-11	02-Nov-11	17-Nov-11	30-Nov-11
1	7.1	8.6	12.4	12.9	15.3	16.6	19.5	19.8	19.7	22.2	21.8	21.3	22.1	20.7	18.8	14.8	14.4	12.3	9.8	7.3	6.5
2	6.9	8.5	12.3	13.0	15.3	16.3	19.4	19.6	19.7	22.1	21.7	21.3	22.1	20.5	18.7	14.8	14.3	12.3	9.8	7.3	6.5
3	6.7	8.5	12.3	12.9	15.3	15.6	19.4	19.5	19.7	22.0	21.7	21.3	22.1	20.5	18.5	14.8	14.3	12.2	9.8	7.3	6.5
4	6.7	8.5	11.5	12.9	15.3	15.2	19.4	19.3	19.5	22.0	21.6	21.2	22.1	20.5	18.4	14.8	14.3	12.3	9.8	7.4	6.5
5	6.6	8.4	11.3	12.7	15.2	14.9	19.3	19.1	19.5	21.9	21.5	21.2	22.0	20.4	18.4	14.9	14.2	12.4	9.7	7.4	6.4
6	6.5	8.4	11.2	12.4	15.1	14.6	19.3	19.0	19.1	21.8	21.5	20.9	22.0	20.4	18.4	14.9	14.2	12.4	9.8	7.4	6.4
7	6.4	8.3	11.1	12.0	15.0	13.9	19.0	18.9	18.7	21.6	21.4	20.8	21.9	20.3	18.3	14.9	14.2	12.2	9.8	7.4	6.4
8	6.4	8.2	10.8	11.6	14.7	13.6	17.6	18.6	18.1	20.9	21.2	20.6	21.5	20.1	18.1	14.9	14.2	12.4	9.8	7.4	6.4
9	6.3	8.0	10.6	11.2	12.4	13.2	15.7	17.3	16.9	18.8	20.8	20.2	20.7	20.1	18.1	14.9	14.2	12.4	9.8	7.4	6.4
10	5.9	7.8	10.2	10.9	10.6	12.1	15.1	16.3	14.9	16.0	18.8	15.3	17.1	19.9	17.2	14.8	14.1	12.4	9.7	7.4	6.4
11	5.9	7.8	10.0	10.2	10.3	11.4	14.2	14.7	12.5	14.1	15.8	17.1	13.8	18.6	17.0	14.8	14.0	12.4	9.7	7.4	6.4
12	5.8	7.7	9.8	9.8	9.6	10.3	12.7	13.0	11.1	12.8	14.3	14.9	12.5	16.2	16.5	14.8	14.0	12.4	9.4	7.4	6.4
13	5.8	7.6	9.5	9.1	9.2	9.9	11.3	11.2	10.2	11.6	12.1	13.5	11.6	12.6	13.9	14.8	13.9	12.4	9.4	7.4	6.4
14	5.7	7.5	9.0	8.9	8.7	9.4	10.1	10.6	9.4	10.6	10.6	11.4	11.2	11.6	12.3	14.8	13.5	12.4	9.4	7.4	6.4
15	5.7	7.4	8.7	8.5	8.4	8.8	9.7	9.8	9.1	9.8	9.9	10.4	10.5	10.5	11.0	14.2	13.3	12.4	9.3	7.4	6.4
16	5.6	7.2	8.3	8.3	8.2	8.6	8.9	9.4	8.7	9.4	9.6	10.0	9.8	9.8	10.3	13.8	12.9	12.4	9.3	7.4	6.4
17	5.6	7.1	7.8	8.1	8.0	8.4	8.7	9.0	8.6	9.0	9.2	9.6	9.4	9.4	9.8	12.8	12.4	12.4	9.3	7.4	6.4
18	5.6	7.0	7.7	7.9	7.9	8.2	8.3	8.6	8.5	8.6	8.9	9.1	9.0	9.0	9.3	11.3	10.8	12.0	9.3	7.4	6.4
19	5.6	6.7	7.5	7.7	7.6	8.0	8.1	8.4	8.3	8.5	8.7	8.7	8.7	8.7	9.1	10.8	10.0	11.4	9.3	7.4	6.4
20	5.6	6.7	7.4	7.4	7.5	7.8	7.9	8.2	8.2	8.3	8.5	8.5	8.5	8.6	8.8	9.7	9.6	10.9	9.3	7.4	6.4
24	5.6	6.5	6.9	6.9	7.1	7.3	7.6	7.6	7.7	7.8	8.1	8.1	8.1	8.1	8.3	9.0	9.0	9.3	9.2	7.4	6.4
28	5.5	6.0	6.5	6.7	6.7	6.9	7.2	7.3	7.4	7.5	7.8	7.6	7.8	7.7	7.9	8.3	8.6	8.4	9.0	7.4	6.4
32	5.4	5.6	6.2	6.4	6.6	6.7	7.0	7.0	7.1	7.2	7.5	7.3	7.5	7.4	7.6	7.8	8.2	8.0	8.9	7.4	6.4
36	5.6	5.5	6.0	6.0	6.2	6.3	6.6	6.4	6.5	6.8	6.8	6.8	6.9	6.7	6.8	7.2	7.6	7.4	8.8	7.5	6.3
40	5.5	5.3	5.9	5.8	5.9	6.1	6.4	6.4	6.3	6.5	6.6	6.6	6.6	6.4	6.6	6.9	7.2	6.9	8.7	7.5	6.3
44	5.2	5.1	5.5	5.6	5.7	5.9	6.2	6.1	6.1	6.2	6.4	6.4	6.4	6.3	6.5	6.7	7.0	6.7	7.3	7.5	6.3
48	5.0	4.9	5.3	5.4	5.6	5.7	5.9	5.9	6.0	6.1	6.2	6.2	6.3	6.2	6.3	6.7	6.7	6.6	7.0	7.5	6.3
52	4.8	4.8	5.2	5.3	5.5	5.6	5.8	5.8	5.9	6.0	6.2	6.1	6.1	6.1	6.2	6.5	6.5	6.5	6.8	7.5	6.3

Year 2012 water temperatures (°C)

Depth (m)	28-Apr-12	05-May-11	22-May-12	11-Jun-12	11-Jul-12	16-Jul-12	30-Jul-12	07-Aug-12	13-Aug-12	20-Aug-12	27-Aug-12	06-Sep-12	17-Sep-12	24-Sep-12	30-Sep-12	09-Oct-12	29-Oct-12	16-Nov-12
1	9.0	7.1	12.8	15.6	22.9	22.6	22.1	22.8	23.5	24.3	21.0	19.9	18.6	18.7	18.0	15.2	10.8	8.1
2	8.4	6.9	12.5	14.6	21.6	22.6	22.1	22.8	23.4	24.3	21.0	19.9	18.7	18.7	18.0	15.2	10.8	8.1
3	8.2	6.7	12.2	14.0	20.8	22.4	21.8	22.8	23.3	24.2	21.0	19.9	18.7	18.6	18.0	15.2	10.8	8.1
4	7.7	6.7	12.1	13.8	19.4	22.1	21.1	22.7	23.2	24.0	20.9	19.9	18.7	18.6	18.0	15.2	10.8	8.2
5	7.4	6.6	12.1	13.5	19.1	21.9	20.5	22.5	23.2	23.5	20.9	19.9	18.7	18.6	18.0	15.1	10.8	8.2
6	7.1	6.5	12.0	13.3	18.5	19.9	20.3	21.8	23.1	23.2	20.6	19.8	18.7	18.6	18.0	15.1	10.8	8.2
7	7.0	6.4	11.9	13.1	17.4	18.6	19.8	21.0	22.9	22.8	18.7	19.8	18.7	18.5	18.0	15.1	10.8	8.2
8	6.9	6.4	11.7	12.3	16.5	17.1	19.7	20.5	21.3	22.0	16.8	19.8	18.6	18.5	18.0	15.1	10.8	8.2
9	6.8	6.3	11.2	11.0	14.8	15.9	18.0	19.0	19.0	19.5	16.5	19.8	18.6	18.5	18.0	15.1	10.7	8.1
10	6.6	5.9	10.3	10.5	13.4	14.6	16.4	14.5	16.6	16.9	16.1	19.5	18.6	18.5	18.0	15.1	10.7	8.1
11	6.5	5.9	9.8	10.0	11.7	12.9	14.2	13.4	14.9	14.1	14.5	19.2	18.6	18.2	17.9	15.1	10.7	8.1
12	6.4	5.8	9.3	9.6	10.6	12.2	12.3	12.2	13.5	12.2	12.0	14.9	16.0	17.1	14.4	15.1	10.7	8.1
13	6.3	5.8	8.4	8.8	9.5	11.6	10.6	10.4	12.1	11.0	10.9	11.3	12.3	14.6	11.7	15.0	10.7	8.1
14	6.2	5.7	8.0	8.4	9.0	10.8	9.5	9.8	10.8	10.2	9.6	10.1	10.7	12.0	10.6	14.9	10.6	8.1
15	6.0	5.7	7.6	8.2	8.7	10.2	8.6	9.2	10.0	9.3	9.1	9.8	9.9	10.1	9.9	13.4	10.6	8.1
16	5.9	5.6	7.5	7.9	8.3	9.4	8.4	8.7	9.3	8.8	8.8	9.2	9.2	9.1	9.2	11.4	10.5	8.1
17	5.8	5.6	7.2	7.5	8.0	8.6	8.2	8.5	8.6	8.5	8.6	9.0	8.8	8.8	8.8	9.5	10.3	8.1
18	5.8	5.6	7.1	7.2	7.8	8.0	7.9	8.3	8.3	8.2	8.4	8.7	8.5	8.5	8.6	9.1	10.2	8.1
19	5.7	5.6	7.0	7.0	7.7	7.7	7.8	8.2	8.0	8.0	8.1	8.5	8.2	8.2	8.4	8.6	10.1	8.1
20	5.6	5.6	6.6	6.9	7.6	7.6	7.6	8.1	7.7	7.8	7.9	8.1	8.1	8.1	8.2	8.4	9.5	8.1
24	5.5	5.6	6.5	6.5	7.2	7.0	7.2	7.7	7.3	7.4	7.3	7.6	7.7	7.7	7.6	7.7	8.2	8.0
28	5.3	5.5	6.1	6.3	6.8	6.7	7.0	7.3	7.0	7.0	7.0	7.4	7.4	7.4	7.3	7.4	7.7	8.0
32	5.2	5.4	5.9	6.0	6.5	6.4	6.7	6.9	6.7	6.8	6.7	7.0	7.1	7.0	7.0	7.0	7.2	7.7
36	5.1	5.6	5.5	5.5	6.1	5.8	6.2	6.4	6.1	6.3	5.9	6.4	6.3	6.3	6.2	6.4	6.7	
40	5.1	5.5	5.4	5.4	5.9	5.7	5.9	6.0	5.9	5.9	6.8	6.1	6.1	6.1	6.0	6.2	6.4	
44	4.9	5.2	5.2	5.2	5.7	5.5	5.7	5.8	5.7	5.7	5.7	5.8	6.0	6.0	5.9	6.0	6.2	
48	4.9	5.0	5.1	5.2	5.5	5.4	5.6	5.7	5.6	5.6	5.6	5.7	5.9	5.8	5.7	5.9	6.1	
52	4.8	4.8	5.1	5.2	5.4	5.4	5.5	5.6	5.5	5.5	5.6	5.6	5.7	5.7	5.7	5.8	6.1	

Year 2013 water temperature (°C)

Depth (m)	23-Apr-13	14-May-13	21-May-13	29-May-13	04-Jun-13	18-Jun-13	24-Jun-13	02-Jul-13	10-Jul-13	15-Jul-13	22-Jul-13	29-Jul-13	13-Aug-13	26-Aug-13	04-Sep-13	11-Sep-13	23-Sep-13	04-Oct-13	15-Oct-13	23-Oct-13	31-Oct-13	12-Nov-13
1	8.7	13.8	14.3	13.2	16.2	18.1	18.1	21.1	21.5	20.6	22.8	23.3	24.2	21.6	21.4	21.1	18.5	12.8	12.6	12.0	10.6	8.6
2	8.3	13.6	13.8	13.2	16.0	18.1	17.7	20.5	21.5	20.6	22.8	23.3	24.1	21.6	21.4	21.1	18.4	14.2	12.6	12.0	10.6	8.6
3	8.2	13.1	13.5	13.2	14.6	18.0	17.5	18.6	21.5	20.6	22.7	23.3	24.0	21.6	21.4	21.1	18.9	14.2	12.6	12.0	10.6	8.6
4	8.1	12.8	13.2	13.1	14.2	18.0	17.0	17.7	21.4	20.6	22.7	23.3	23.9	21.6	21.4	21.0	18.4	14.2	12.6	12.0	10.6	8.6
5	8.0	12.5	12.9	12.7	13.6	18.0	16.8	17.3	21.4	20.6	22.6	23.3	23.8	21.6	21.4	21.0	18.4	14.2	12.6	12.0	10.6	8.6
6	7.5	11.9	12.5	12.4	13.0	17.9	16.4	16.9	21.3	20.6	21.8	23.2	23.7	21.6	21.4	21.0	18.4	14.1	12.6	12.0	10.6	8.6
7	6.8	11.4	12.1	12.1	12.7	17.8	15.7	16.6	21.2	20.5	21.6	23.0	23.6	21.6	21.4	21.0	18.4	14.1	12.6	12.0	10.6	8.6
8	6.6	11.3	11.7	11.1	12.4	15.4	14.9	16.5	18.0	20.2	20.5	21.9	23.5	21.4	21.4	21.0	18.1	14.0	12.6	12.0	10.6	8.6
9	6.3	10.5	10.8	10.3	12.1	12.6	14.1	16.2	17.3	17.0	19.1	21.1	19.7	21.1	21.4	20.9	17.5	13.6	12.6	12.0	10.6	8.6
10	6.1	10.1	10.3	10.0	11.7	11.9	13.2	15.3	16.5	14.0	16.9	17.3	17.9	21.0	19.5	20.0	15.8	13.0	12.6	12.0	10.6	8.6
11	6.1	9.5	9.0	9.8	11.1	11.1	12.5	13.5	16.1	12.6	14.3	15.4	14.4	17.5	17.3	18.3	13.1	12.6	12.5	12.0	10.6	8.6
12	6.0	9.2	8.6	9.4	10.6	10.3	12.0	11.6	15.2	10.7	12.2	12.8	12.7	14.6	16.5	13.0	10.8	12.1	12.5	12.0	10.6	8.6
13	6.0	8.8	8.4	9.1	10.3	9.8	11.2	10.9	13.0	10.4	10.7	12.1	11.5	13.7	15.7	11.7	10.4	12.0	12.5	12.0	10.2	8.6
14	6.0	8.5	8.3	8.3	9.6	9.1	11.1	10.0	11.8	9.8	10.1	11.2	10.3	12.8	13.8	10.8	9.9	12.0	12.5	12.0	10.1	8.6
15	6.0	8.3	8.1	7.9	9.2	8.8	10.1	9.3	11.5	9.2	9.7	10.6	9.6	12.2	12.0	10.1	9.7	11.5	12.5	12.0	10.0	8.6
16	5.9	8.1	8.0	7.6	9.0	8.6	8.4	9.0	9.0	8.8	9.1	10.0	9.2	12.0	10.3	9.7	9.2	11.0	12.1	12.0	9.9	8.6
17	5.8	8.0	7.7	7.5	8.6	8.3	8.3	8.8	8.7	8.6	8.8	9.3	8.7	11.7	9.4	9.3	9.0	9.7	11.8	11.9	9.9	8.6
18	5.8	7.6	7.6	7.3	8.0	8.1	8.0	8.5	8.4	8.5	8.5	8.8	8.6	10.7	9.1	9.0	8.8	9.4	10.9	11.8	9.8	8.6
19	5.8	7.2	7.2	7.2	7.6	8.0	7.8	8.3	8.1	8.3	8.3	8.6	8.4	9.9	8.5	8.7	8.6	9.2	10.0	11.3	9.8	8.6
20	5.7	6.9	7.1	7.1	7.5	7.7	7.7	8.1	8.0	8.1	8.0	8.4	8.2	9.0	8.4	8.5	8.4	8.9	9.3	10.6	9.7	8.6
24	5.6	6.3	6.6	6.7	6.8	7.2	7.1	7.6	7.4	7.7	7.4	7.7	7.8	8.1	7.9	8.0	8.2	8.5	8.5	8.7	9.2	8.6
28	5.4	6.0	6.4	6.5	6.6	6.8	6.8	7.0	7.1	7.4	7.1	7.2	7.5	7.7	7.6	7.6	7.7	8.0	7.8	7.8	8.0	8.1
32	5.3	5.8	6.0	6.3	6.3	6.7	6.6	6.7	6.7	7.1	6.8	6.9	7.2	7.3	7.2	7.3	7.4	7.8	7.5	7.5	7.6	7.6
36	5.0	5.5	5.3	6.1	6.0	6.3	6.0	6.2	6.3	6.5	6.3	6.3	6.5	6.6	6.4	6.6	6.6	7.4	6.9	7.1	7.2	7.0
40	4.9	5.2	5.0	5.9	5.7	6.0	5.5	5.9	6.0	6.3	6.1	6.2	6.3	6.3	6.3	6.4	6.3	7.1	6.6	6.7	7.8	6.8
44	4.7	5.0	5.0	5.7	5.5	5.8	5.6	5.7	5.8	6.0	5.9	6.0	6.1	6.1	6.1	6.2	6.3	6.7	6.4	6.5	7.6	6.7
48	4.6	5.0	4.9	5.3	5.3	5.5	5.5	5.6	5.6	5.8	5.8	5.9	5.8	5.9	6.0	6.0	6.1	6.5	6.2	6.4	7.3	6.6
52	4.6	4.9	4.9	5.2	5.3	5.5	5.4	5.6	5.6	5.7	5.7	5.7	5.8	5.9	5.9	5.8	6.0	6.2	6.2	6.2	6.3	6.5

SKAHA LAKE OXYGEN CONCENTRATIONS

Table 5. Skaha Lake oxygen profiles (mg/L). Profiles are averaged from data collected at the Gilles and South Basin sites. Shaded area approximates areas generally known to be avoided by juvenile sockeye due to preferences for waters with oxygen concentrations > 4µg L^{-1} O_2 (Davis 1975, Brett and Blackburn 1981).

Year 2005 Skaha 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 oxygen concentrations µg L^{-1}

Depth (m)	18-Jan-06	24-Apr-06	23-May -06	12-Jun-06	04-Jul -06	18-Jul-06	21-Aug-06	11-Sep-06	27-Sep-06	23-Oct-06
1	12.8	12.1	11.3	10.3	9.2	8.8	8.7	9.3	9.7	9.7
2	12.8	12.2	11.4	10.3	9.1	8.7	8.8	9.3	9.8	9.7
3	12.7			10.4	9.3	8.7	8.8	9.4	9.8	9.7
4	12.7	12.3	11.5	10.4	9.4	8.7	8.8	9.4	9.8	9.8
5	12.7			10.5	9.5	8.7	8.8	9.4	9.8	9.7
6	12.7	12.3	11.7	10.5	9.5	8.7	8.8	9.4	9.8	9.7
7	12.7			10.5	9.5	8.7	8.8	9.4	9.7	9.7
8	12.7	12.3	11.7	10.6	9.5	8.7	8.8	9.4	9.7	9.7
9	12.6			10.6	9.5	9.3	8.8	9.2	9.7	9.7
10	12.6	12.3	11.7	10.7	9.4	9.0	8.7	9.1	9.6	9.6
11	12.6			10.6	9.1	9.4	8.6	8.8	9.6	9.6
12	12.6	12.3	11.6	10.5	9.1	9.2	8.7	8.8	9.5	9.6
13	12.6			10.6	9.3	9.2	8.6	8.8	8.7	9.6
14	12.6	12.3	11.7	10.7	9.2	9.2	8.3	8.5	8.5	9.6
15	12.6			10.7	9.2	9.0	8.1	8.2	8.1	9.4
16	12.6	12.3	11.6	10.7	9.4	9.0	7.7	7.5	7.6	9.3
17	12.6			10.8	9.5	9.1	7.7	7.5	7.2	7.7
18	12.6	12.3	11.6	10.8	9.6	9.1	7.8	7.5	7.1	7.3
19	12.6			10.8	9.7	9.1	7.8	7.7	7.1	6.9
20	12.6	12.3	11.6	10.8	9.7	9.3	8.0	7.7	7.1	6.7
24	12.6	12.2	11.5	10.9	9.8	9.3	8.3	8.2	7.5	6.8
28	12.6	12.2	11.5	11.0	9.9	9.4	8.5	8.1	7.6	7.0
32	12.6	12.2	11.5	11.1	9.8	9.5	8.6	8.0	7.7	7.0
36	12.6	12.2	11.5	11.1	9.7	9.4	8.4	8.2	7.8	7.0
40	12.6	12.2	11.7	11.1	9.7	9.4	9.0	9.1	8.3	7.5
44	12.5	12.2	11.4	11.4	9.4	9.3	8.9	8.6	7.7	6.6
48	12.5	12.2	11.4	11.4	9.0	9.4	7.9	7.9	7.1	5.8
52					8.6			5.3	5.6	4.8

Year 2007 oxygen concentrations µg L^{-1}

Depth m	27-Feb-07	18-Apr-07	14-May-07	11-Jun-07	26-Jun-07	9-Jul-07	13-Aug-07	12-Sep-07	17-Sep-07	9-Oct-07	5-Nov-07
1	12.18	12.35	11.99	10.59	9.88	9.09	8.75	9.61	9.87	10.17	10.93
2	12.58	12.93	12.24	10.36	10.13	9.02	9.12	9.65	9.88	10.03	10.62
3	12.92	13.30	12.28	10.36	10.40	9.01	9.10	9.76	9.90	9.98	10.49
4	13.12	13.45	12.35	10.38	10.24	9.01	8.57	9.68	9.91	9.91	10.35
5	13.68	13.48	12.36	10.40	10.27	9.01	8.55	9.69	9.91	9.90	10.24
6	13.61	13.49	12.34	10.40	10.43	9.02	8.55	9.68	9.91	9.89	10.20
7	13.49	13.51	12.39	10.39	10.22	9.03	8.55	9.69	9.90	9.87	10.17
8	13.51	13.52	12.42	10.39	10.31	9.04	8.54	9.67	9.89	9.84	10.14
9	13.52	13.52	12.51	10.81	10.28	9.15	8.53	9.65	9.88	9.39	10.10
10	13.54	13.51	12.83	10.83	10.33	9.23	8.56	9.65	9.88	9.82	10.07
11	13.55	13.52	12.84	10.89	10.54	9.55	9.12	9.64	9.88	9.81	10.14
12	13.57	13.52	12.86	10.92	10.67	9.80	9.18	9.58	9.85	9.76	10.02
13	13.59	13.52	12.86	10.92	10.74	9.92	8.99	9.56	9.62	9.72	9.99
14	13.59	13.50	12.86	11.09	10.86	9.98	9.08	9.85	9.29	9.69	9.98
15	13.59	13.50	12.84	11.31	10.86	9.57	9.08	9.69	9.66	9.62	9.97
16	13.59	13.50	12.81	11.21	10.86	9.79	9.02	9.46	9.66	9.35	9.96
17	13.48	13.49	12.79	11.24	10.86	9.78	8.99	9.29	9.35	9.13	9.95
18	13.58	13.49	12.73	11.48	10.85	9.67	8.94	9.17	9.34	9.16	9.94
19	13.59	13.48	12.73	11.34	10.83	9.80	8.93	9.17	8.99	8.89	9.94
20	13.58	13.48	12.75	11.28	10.85	9.78	8.93	9.10	8.85	8.97	9.95
24	13.51	13.47	12.73	11.35	10.89	9.76	8.90	9.16	8.80	8.60	9.88
28	13.58	13.43	12.72	11.35	10.96	9.73	8.92	9.14	8.78	8.23	9.41
32	13.58	13.43	12.74	11.34	10.99	9.69	9.00	9.27	8.79	7.84	8.17
36	13.59	13.41	12.93	11.59	11.39		8.89	9.27	9.58	7.87	8.04
40	13.59	13.43	12.91	11.62	11.34		9.58	9.48	9.48	7.82	7.33
44	13.59	13.42	12.74	11.45	11.28		9.25	9.18	8.84	7.59	6.91
48	13.58	13.43	12.68	11.38	11.01		8.89	8.80	8.19	6.66	6.64
52	13.53	13.40	12.62	10.86	10.71		6.79	6.88	6.76	5.78	6.29

Year 2008 oxygen concentrations µg L^{-1}

Depth (m)	26-Mar-08	08-Apr-08	17-Apr-08	12-May-08	10-Jun-08	24-Jun-08	07-Jul-08	21-Jul-08	28-Jul-08	11-Aug-08	25-Aug-08	07-Sep-08	22-Sep-08	19-Oct-08	19-Nov-08	03-Dec-08
1	14.0	14.6	14.6	12.1	10.0	9.8	8.8	9.2	8.9	9.1	9.3	9.5	10.5	11.8	11.7	12.2
2	14.0	14.7	14.8	12.2	10.1	9.9	8.8	9.3	8.8	9.1	9.3	9.6	10.2	11.6	10.8	11.6
3	14.0	14.7	14.9	12.2	10.1	9.9	8.8	9.3	8.8	9.1	9.3	9.6	10.1	11.5	10.4	11.4
4	14.0	14.7	14.9	12.3	10.1	9.9	8.8	9.4	8.8	9.1	9.3	9.6	10.1	11.4	10.1	11.2
5	14.0	14.8	15.0	12.3	10.1	9.9	8.8	9.4	8.8	9.1	9.3	9.6	10.0	11.3	10.0	11.0
6	14.0	14.8	15.0	12.4	10.1	9.9	8.8	9.5	8.8	9.0	9.3	9.6	10.0	11.2	9.9	10.9
7	14.1	14.8	15.1	12.4	10.1	10.0	8.8	9.6	8.9	9.0	9.3	9.6	10.0	11.2	9.9	10.8
8	14.1	14.8	15.0	12.4	10.1	9.7	9.1	9.6	9.1	9.0	9.3	9.6	9.9	11.2	9.9	10.8
9	14.1	14.8	15.0	12.4	10.2	10.0	9.1	9.6	9.2	9.2	9.3	9.6	9.9	11.1	9.8	10.8
10	14.1	14.8	15.0	12.4	10.2	10.0	9.2	10.1	9.3	9.4	9.2	9.6	9.9	11.1	9.8	10.8
11	14.1	14.8	15.0	12.4	10.3	10.0	9.5	10.2	9.4	9.5	9.1	9.8	9.7	11.1	9.8	10.7
12	14.1	14.8	15.0	12.4	10.3	10.1	10.0	10.3	9.6	9.9	9.3	10.0	9.4	11.0	9.8	10.7
13	14.1	14.8	15.0	12.5	10.3	10.2	9.8	10.4	9.8	9.7	9.3	10.0	9.3	11.0	9.8	10.7
14	14.2	14.8	15.0	12.5	10.2	10.4	9.7	10.4	9.7	9.7	9.2	9.8	9.5	11.0	9.8	10.7
15	14.2	14.8	14.9	12.5	10.4	10.5	9.7	10.4	9.8	9.7	9.2	9.7	9.2	11.0	9.8	10.7
16	14.2	14.8	14.9	12.5	10.4	10.6	8.2	10.4	9.7	9.6	9.1	9.8	9.0	10.9	9.8	10.7
17	14.1	14.9	14.9	12.5	10.6	10.6	9.8	10.4	9.7	9.5	9.1	9.6	8.9	11.0	9.8	10.7
18	14.1	14.9	14.9	12.5	10.6	10.7	9.9	10.4	9.8	9.5	9.1	9.5	8.9	10.9	9.8	10.7
19	14.1	14.9	14.9	12.5	10.6	10.1	9.9	10.4	9.8	9.5	9.1	9.4	8.8	10.6	9.8	10.7
20	14.1	14.9	14.9	12.5	10.8	10.7	10.0	10.4	9.9	9.5	9.2	9.3	8.8	10.3	9.8	10.7
24	14.1	14.9	14.9	12.5	10.8	10.9	10.1	10.5	10.0	9.7	9.4	9.2	8.9	9.8	9.8	10.6
28	14.1	14.9	14.9	12.5	10.9	11.1	10.2	10.4	10.2	9.8	9.9	9.2	8.9	9.4	9.8	10.6
32	14.1	14.9	14.9	12.4	11.0	11.2	10.2	10.7	10.2	9.9	10.2	9.3	9.0	9.3	9.8	10.6
36	14.0	14.9	15.0	12.4	11.0	11.1	10.6	11.3	10.9	10.5	10.8	9.8	9.7	9.4	10.0	10.6
40	14.0	14.9	15.0	12.4	11.1	11.0	10.6	11.1	10.8	10.6	10.7	9.9	9.9	9.5	10.0	10.6
44	14.0	14.9	14.9	12.2	11.0	10.8	10.4	10.8	10.4	10.6	10.6	9.8	9.8	9.3	10.0	10.6
48	14.0	14.9	14.9	11.8	10.6	10.6	10.0	10.8	10.1	10.3	10.0	9.6	9.7	9.0	10.0	10.6
52	14.0	13.6	14.9	11.5	9.1	10.4	9.6	9.9	9.7	10.0	7.7	9.5	9.3	7.9	8.1	10.6

Year 2009 oxygen concentrations µg L^{-1}

Depth (m)	14-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	25-Aug-09	31-Aug-09	14-Sep-09	21-Sep-09	29-Sep-09	05-Oct-09	22-Oct-09	18-Dec-09
1	14.3	11.6	11.1	9.7	9.3	9.4	9.5	8.5	8.2	9.0	8.6	9.1	8.8	9.8	9.1	10.8	12.0
2	14.6	12.0	11.2	9.9	9.4	9.5	9.4	8.4	8.1	9.1	8.6	9.0	8.8	9.7	9.1	10.6	12.0
3	14.7	12.1	11.3	10.0	9.5	9.5	9.4	8.4	8.0	9.0	4.5	8.9	8.7	9.5	9.0	10.6	12.0
4	14.6	12.5	11.6	10.0	9.5	9.5	9.4	8.3	7.8	9.0	8.5	8.8	8.6	9.5	9.0	10.5	12.0
5	14.6	12.5	11.7	10.0	9.5	9.6	9.4	8.3	7.7	9.0	8.4	8.6	8.5	9.3	8.9	10.5	12.0
6	14.6	12.5	11.8	10.1	9.6	9.7	9.4	8.3	7.6	8.9	8.3	8.5	8.4	9.4	8.9	10.4	12.0
7	14.6	12.5	12.0	10.2	9.6	10.1	9.4	8.2	7.5	8.9	8.2	8.4	8.3	9.4	8.9	10.4	12.0
8	14.6	12.5	12.1	10.2	9.6	10.2	9.6	8.2	7.4	8.8	8.2	8.3	8.2	9.3	8.9	10.4	12.0
9	14.6	12.5	12.2	10.8	9.9	10.2	10.0	8.3	7.2	8.7	8.1	8.2	8.1	9.3	8.8	10.3	12.0
10	14.6	12.5	12.3	11.0	10.0	10.3	10.4	8.5	7.1	8.6	8.0	8.0	8.0	9.2	8.8	10.3	12.0
11	14.6	12.5	12.3	11.1	10.2	10.4	10.7	8.8	7.0	9.0	8.3	7.6	7.9	9.0	8.7	10.3	12.0
12	14.6	12.4	12.3	11.2	11.1	10.6	10.7	8.9	7.1	9.1	8.2	7.2	7.6	8.9	8.7	10.2	12.0
13	14.6	12.5	12.3	11.3	11.1	10.8	10.6	9.0		9.1	8.1	7.1	7.3	8.7	8.7	10.2	12.0
14	14.7	12.5	12.3	11.3	11.1	10.8	10.5	9.0		9.0	7.6	7.3	7.1	8.5	8.7	10.1	12.0
15	14.6	12.4	12.4	11.5	11.2	10.7	10.6	8.9		8.9	8.0	7.3	7.1	8.3	8.4	10.1	12.0
16	14.6	12.5	12.4	11.5	11.3	10.8	10.6	8.8		8.9	8.0	7.3	7.1	8.2	8.3	9.5	12.0
17	14.6	12.5	12.3	11.5	11.3	10.7	10.5	8.8		8.7	7.9	7.4	7.1	8.0	8.2	9.5	11.9
18	14.6	12.5	12.3	11.5	11.3	10.8	10.4	8.7		8.7	8.1	7.5	7.1	8.0	8.1	9.4	11.9
19	14.6	12.5	12.3	11.5	11.2	10.8	10.5	8.7		8.7	7.8	7.4	7.1	8.0	7.9	9.2	11.9
20	14.6	12.4	12.3	11.5	11.2	10.8	10.4	8.7	7.6	8.5	7.8	7.4	7.1	7.9	7.5	8.9	11.9
24	14.6	12.5	12.3	11.5	11.3	10.7	10.5	8.8	8.0	8.4	7.8	7.5	7.1	7.9	7.3	8.3	11.9
28	14.6	12.4	12.3	11.5	11.2	10.7	10.5	8.9	7.6	8.4	7.7	7.6	7.1	7.8	7.3	8.1	11.9
32	14.6	12.5	12.3	11.5	11.1	10.7	10.5	8.9	7.6	8.5	7.8	7.6	7.0	7.8	7.3	7.9	11.9
36	14.7	12.5	12.3	11.6	11.5	11.3	11.4	9.3	8.0	9.4	8.3	8.0	7.6	8.3	8.1	8.1	
40	14.6	12.4	12.3	11.6	11.5	11.1	11.4	9.1	7.9	9.4	8.2	7.8	7.1	8.3	8.1	7.6	
44	14.6	12.3	12.2	11.5	11.4	10.8	11.2	8.9	7.3	9.2	8.0	7.6	6.0	8.3	7.9	7.5	
48	14.6	12.2	12.2	11.3	11.1	10.4	10.6	8.6		8.6	7.6	7.2		8.0	7.7	7.5	
52		12.1	12.1	11.1	10.8	9.9	9.9	7.8		7.8	7.0	6.0		7.7	7.6	7.2	

Year 2010 oxygen concentrations µg L^{-1}

Depth (m)	15-Feb-10	15-Apr-10	10-May-10	01-Jun-10	14-Jun-10	28-Jun-10	19-Jul-10	27-Jul-10	10-Aug-10	16-Aug-10	23-Aug-10	30-Aug-10	06-Sep-10	14-Sep-10	20-Sep-10	28-Sep-10	03-Oct-10	18-Oct-10	08-Nov-10
1	15.0	18.9	15.8	13.3	10.8	10.9	10.4	10.5	12.4	11.4	12.8	15.5	18.8	16.9	22.7	9.8	10.0	11.9	14.5
2	15.0	19.0	15.7	13.4	10.8	11.0	10.5	10.5	12.4	11.5	12.9	15.6	18.5	17.0	22.7	9.7	10.0	11.6	14.0
3	15.0	19.0	16.1	13.2	10.8	11.0	10.6	10.6	12.4	11.5	12.9	15.6	18.5	17.0	22.9	9.7	10.1	11.4	13.6
4	15.0	19.0	16.2	13.3	10.8	11.0	10.6	10.5	12.4	11.5	12.9	15.6	18.4	17.2	23.0	9.8	10.1	11.2	13.7
5	15.0	18.9	8.8	13.5	10.8	11.1	10.6	10.5	12.4	11.5	12.9	15.6	18.3	17.0	23.1	9.8	10.1	11.2	13.6
6	15.0	19.0	16.3	13.5	10.9	11.0	10.7	10.6	12.4	11.6	12.9	15.5	18.5	17.3	23.2	9.8	10.1	11.1	13.4
7	15.0	19.0	16.3	13.5	10.9	10.9	10.7	10.6	12.4	11.5	12.9	15.5	18.5	17.3	23.2	9.8	10.1	11.0	13.4
8	15.0	19.0	16.4	13.5	11.0	10.9	10.6	10.7	12.3	11.4	12.9	15.5	18.6	17.3	23.3	9.8	10.1	11.0	13.3
9	15.0	19.0	16.5	13.4	11.2	10.9	10.4	10.7	12.2	11.4	12.9	15.4	18.5	17.3	23.3	9.8	10.1	11.0	13.3
10	15.0	19.0	16.4	13.4	11.4	10.8	10.4	10.9	12.1	11.2	13.0	15.3	18.5	16.9	23.3	9.8	10.1	10.9	13.3
11	14.9	18.9	16.4	13.4	11.5	10.8	10.3	10.6	12.1	11.1	13.0	15.0	18.5	16.6	22.1	9.7	10.0	10.9	13.2
12	14.9	18.9	16.4	13.4	11.6	10.9	10.4	10.5	12.0	10.8	13.0	14.8	18.3	16.1	21.4	9.7	9.9	10.9	13.2
13	14.9	18.8	16.4	13.4	11.6	11.0	10.4	10.5	11.9	10.9	12.7	14.6	17.8	15.9	20.3	9.7	9.7	10.9	13.2
14	14.9	18.8	16.4	13.2	11.4	11.1	10.5	10.5	11.9	10.9	12.3	14.4	16.7	15.9	18.9	9.6	9.5	10.9	13.2
15	14.9	18.8	16.6	13.4	11.6	11.1	10.5	10.8	11.8	10.9	12.1	13.8	16.6	15.6	17.5	9.6	9.1	10.9	13.1
16	14.9	18.8	16.3	13.4	11.6	11.2	10.6	10.9	11.9	10.9	12.0	13.7	15.5	15.4	16.9	9.5	8.7	11.0	13.1
17	14.9	18.7	16.3	13.4	11.6	11.3	10.7	10.9	11.9	11.0	11.9	13.4	15.0	15.3	16.5	9.2	9.4	10.5	13.1
18	14.9	18.7	16.2	13.4	11.6	11.3	10.3	11.0	12.0	11.1	11.8	13.4	14.3	14.3	16.2	9.0	8.4	10.0	13.1
19	14.9	18.7	16.1	13.3	11.6	11.4	10.9	11.0	12.1	11.0	11.8	13.4	14.7	13.7	16.2	8.7	7.9	9.7	13.0
20	14.9	18.6	16.1	13.3	11.6	11.4	10.9	11.1	12.1	11.3	11.8	13.9	14.7	13.3	16.2	8.5	7.8	9.3	13.0
24	14.8	18.6	16.0	13.4	11.7	11.6	11.1	11.1	12.3	11.2	11.8	13.6	14.7	13.0	15.9	8.1	7.7	8.8	12.8
28	14.8	18.5	15.9	13.4	11.8	11.7	11.2	11.2	12.4	11.6	11.8	13.7	14.8	12.8	15.7	7.9	7.6	8.3	12.1
32	14.8	18.5	15.8	13.4	11.8	11.7	11.2	11.3	12.5	11.6	11.9	13.9	15.2	12.7	15.6	7.8	7.7	8.2	11.0
36	14.6	18.2	16.0	13.5	12.0	12.0	11.9	11.7	13.4	12.5	12.7	14.3	15.7	12.3	15.3	8.2	8.2	8.6	9.6
40	14.6	18.1	17.0	13.5	12.0	12.0	11.4	11.4	13.5	12.4	12.6	14.2	15.8	12.1	15.1	8.3	8.1	8.7	9.3
44	14.5	18.1	15.8	13.4	12.0	11.6	10.9	11.0	13.3	12.1	12.5	14.1	15.6	11.3	14.8	8.3	7.8	8.7	8.3
48	14.5	18.1	15.6	13.3	11.8	11.1	10.4	10.6	13.0	11.6	12.4	13.5	14.0	10.6	13.4	8.2	7.4	8.5	8.3
52	14.5	18.0	15.5	12.9	11.7	11.1	9.7	10.2	11.7	10.7	12.2	13.2	13.4	10.0	12.1	7.6	6.9	6.6	7.7

Year 2011 oxygen concentrations µg L^{-1}

Depth (m)	05-May-11	09-May-11	24-May-11	30-May-11	15-Jun-11	20-Jun-11	12-Jul-11	18-Jul-11	25-Jul-11	08-Aug-11	16-Aug-11	22-Aug-11	28-Aug-11	15-Sep-11	23-Sep-11	07-Oct-11	11-Oct-11	25-Oct-11	02-Nov-11	17-Nov-11	30-Nov-11
1	12.5	12.0	11.6	11.2	10.7	10.8	10.4	9.4	8.8	9.3	8.9	9.1	9.2	9.2	8.5	14.1	15.2	10.1	8.6	7.1	9.8
2	12.6	12.2	11.9	11.3	10.8	10.9	10.4	9.4	8.8	9.2	8.9	9.1	9.2	9.1	8.5	14.0	15.2	9.9	8.3	6.9	9.5
3	12.7	12.2	12.0	11.4	10.8	11.1	10.4	9.3	8.7	9.2	9.0	9.2	9.2	9.1	8.5	14.0	15.2	9.9	8.2	6.8	9.4
4	12.8	12.2	12.3	11.5	10.8	11.1	10.4	9.3	8.7	9.2	9.0	9.1	9.2	9.1	8.5	14.0	15.2	9.9	8.1	6.7	9.3
5	12.8	12.3	12.3	11.5	10.8	11.1	10.3	9.2	8.6	9.2	9.0	9.1	9.2	9.1	8.4	13.9	15.2	9.9	8.1	6.7	9.3
6	12.8	12.3	12.3	11.6	10.8	11.0	10.3	9.1	8.6	9.2	9.0	9.1	9.2	9.1	8.4	13.9	15.2	9.8	8.1	6.7	9.2
7	12.8	12.3	12.2	11.7	10.7	11.0	10.2	9.0	8.5	9.2	8.9	9.0	9.2	9.1	8.4	13.9	15.2	9.8	8.1	6.7	9.1
8	12.8	12.3	12.3	11.7	10.7	10.9	10.1	8.9	8.3	9.1	8.8	9.0	9.1	9.1	8.3	13.9	15.2	9.8	8.1	6.7	9.1
9	12.8	12.4	12.3	11.8	10.9	11.4	9.9	8.9	8.1	8.9	8.8	8.9	9.1	9.0	8.3	13.8	15.2	9.8	8.0	6.7	9.1
10	12.9	12.4	12.4	11.8	11.0	11.4	9.9	8.7	7.9	8.9	9.0	8.7	9.0	8.9	8.1	13.9	15.2	9.8	8.0	6.7	9.1
11	12.9	12.4	12.5	11.9	11.0	10.9	9.9	8.6	7.8	8.6	8.9	8.5	8.9	8.5	8.0	13.8	15.2	9.8	8.0	6.7	9.1
12	12.8	12.4	12.5	11.9	11.1	11.1	9.9	8.4	7.6	8.6	8.7	8.4	8.7	7.9	7.9	13.8	15.1	9.8	7.9	6.7	9.1
13	12.8	12.4	12.6	12.0	11.1	11.4	10.0	8.5	7.6	8.6	8.6	8.3	8.6	7.8	7.7	13.8	15.1	9.7	7.7	6.7	9.1
14	12.8	12.4	12.5	12.0	11.2	11.3	10.2	8.6	7.7	8.7	8.6	8.4	8.6	7.8	7.4	13.8	14.9	9.7	7.7	6.7	9.1
15	12.8	12.4	12.4	12.0	11.3	11.2	10.3	8.7	7.7	8.8	8.6	8.4	8.6	7.8	7.1	13.4	14.7	9.7	7.6	6.7	9.1
16	12.8	12.4	12.4	12.0	11.3	11.3	10.5	8.9	7.8	8.9	8.6	8.5	8.6	7.8	7.1	13.2	14.5	9.7	7.6	6.7	9.1
17	12.8	12.4	12.4	12.0	11.3	11.3	10.6	9.0	7.8	9.0	8.7	8.5	8.6	7.9	7.1	12.7	14.2	9.7	7.6	6.7	9.1
18	12.7	12.4	12.4	12.0	11.3	11.3	10.8	9.1	7.9	9.1	8.8	8.6	8.5	7.9	7.1	12.0	13.8	9.6	7.5	6.7	9.1
19	12.7	12.5	12.4	12.0	11.3	11.4	10.9	9.1	8.0	9.2	8.8	8.8	8.6	7.9	7.1	11.7	13.0	8.8	7.5	6.7	9.1
20	12.7	12.5	12.4	12.0	11.4	11.4	11.0	9.2	8.1	9.2	8.9	8.8	8.7	8.1	7.2	11.2	12.4	8.4	7.5	6.7	9.1
24	12.7	12.5	12.5	12.1	11.5	11.5	11.2	9.4	8.2	9.4	8.9	9.0	9.0	8.2	7.3	11.0	12.0	7.7	7.4	6.7	9.1
28	12.7	12.6	12.4	12.1	11.6	11.6	11.3	9.6	8.3	9.6	9.2	9.2	9.2	8.4	7.5	11.0	11.8	7.4	7.3	6.7	9.1
32	12.7	12.5	12.4	12.1	11.7	11.6	11.3	9.7	8.4	9.6	9.3	9.4	9.3	8.6	7.7	10.9	11.7	7.3	7.1	6.7	9.0
36	12.8	12.4	12.6	12.3	12.0	11.9	11.9	10.0	8.4	10.4	10.2	10.1	10.2	9.5	8.3	11.6	12.1	7.7	7.6	6.7	11.3
40	12.8	12.4	12.6	12.3	11.9	11.9	11.9	9.8	8.4	10.3	10.1	10.0	9.7	9.2	8.1	11.6	12.0	7.5	7.1	6.7	11.3
44	12.8	12.4	12.6	12.2	11.7	11.9	11.7	9.7	8.3	10.1	10.0	9.4	9.1	8.6	7.7	11.5	11.8	7.3	6.6	6.7	11.3
48	12.6	12.3	12.1	12.0	11.3	11.7	11.4	9.0	8.1	9.9	9.7	9.1	8.9	7.6	7.1	11.1	11.6	6.9	6.2	6.7	11.3
52	12.6	12.2	11.8	11.7	11.1	11.3	10.7	8.8	7.9	8.8	9.3	8.4	8.2	6.4	6.0	10.9	11.3	6.1	5.7	6.7	11.2

Year 2012 oxygen concentrations µg L^{-1}

Depth (m)	05-May-12	22-May-12	11-Jun-12	11-Jul-12	16-Jul-12	30-Jul-12	07-Aug-12	13-Aug-12	20-Aug-12	27-Aug-12	06-Sep-12	17-Sep-12	24-Sep-12	30-Sep-12	09-Oct-12	29-Oct-12	16-Nov-12
1	12.5	11.8	11.1	nd	nd	8.1	8.7	8.5	8.8	8.7	8.7	9.1	9.3	9.3	9.8	10.3	12.1
2	12.6	11.9	11.1	nd	nd	8.1	8.8	8.5	8.8	8.6	8.7	9.1	9.3	9.3	9.7	9.9	11.7
3	12.7	11.4	11.3	nd	nd	8.1	8.6	8.4	8.8	8.6	8.7	9.1	9.3	9.3	9.7	9.9	11.5
4	12.8	11.7	11.3	nd	nd	8.1	8.5	8.4	8.8	8.6	8.7	9.1	9.3	9.3	9.7	9.8	11.4
5	12.8	11.7	11.4	nd	nd	8.1	8.5	8.4	8.8	8.7	8.7	9.1	9.3	9.3	9.7	9.8	11.3
6	12.8	11.7	11.4	nd	nd	8.1	8.6	8.4	8.4	8.7	8.7	9.1	9.3	9.3	9.7	9.8	11.2
7	12.8	11.7	11.7	nd	nd	8.0	8.8	8.3	8.9	9.0	8.7	9.1	9.3	9.3	9.7	9.8	11.2
8	12.8	11.8	11.5	nd	nd	8.0	8.8	8.4	8.7	9.0	8.7	9.1	9.2	9.3	9.7	9.8	11.2
9	12.8	11.8	11.6	nd	nd	8.1	8.8	8.6	8.9	9.0	8.6	9.1	9.2	9.3	9.7	9.8	11.2
10	12.9	12.1	11.2	nd	nd	8.2	9.6	8.7	9.3	9.0	8.6	9.1	9.2	9.3	9.7	9.8	11.2
11	12.9	12.2	11.6	nd	nd	8.3	9.5	8.9	9.7	9.1	8.6	9.1	9.2	9.3	9.6	9.8	11.2
12	12.8	12.3	11.6	nd	nd	8.4	9.6	9.1	10.1	9.4	9.0	9.2	9.1	9.2	9.6	9.8	11.2
13	12.8	12.6	11.5	nd	nd	8.5	9.9	9.3	10.0	9.6	9.3	9.3	9.0	9.2	9.6	9.7	11.2
14	12.8	12.5	11.8	nd	nd	8.5	9.7	9.3	9.9	9.6	9.0	9.2	9.1	8.6	9.5	9.6	11.2
15	12.8	12.6	11.7	nd	nd	8.4	9.6	8.9	9.8	9.1	8.9	9.0	9.0	8.4	8.8	9.5	11.2
16	12.8	12.5	11.7	nd	nd	8.3	9.5	9.0	9.6	9.1	8.7	8.8	8.7	8.1	8.3	9.4	11.3
17	12.8	12.6	11.9	nd	nd	8.3	9.5	9.0	9.3	9.0	8.6	8.6	8.4	7.9	8.0	9.3	11.2
18	12.7	12.6	12.0	nd	nd	8.3	9.4	9.0	9.2	9.0	8.5	8.5	8.3	7.8	7.8	9.2	11.3
19	12.7	12.6	12.0	nd	nd	8.4	9.1	9.0	9.2	9.1	8.4	8.4	8.3	7.7	7.8	9.1	11.2
20	12.7	12.7	12.1	nd	nd	8.4	9.1	9.0	9.2	9.0	8.4	8.4	8.2	7.8	7.7	8.8	11.2
24	12.7	12.0	12.1	nd	nd	8.4	8.6	9.1	9.3	9.1	8.6	8.4	8.4	8.1	8.0	8.6	11.1
28	12.7	11.6	12.2	nd	nd	8.4	8.4	9.2	9.4	9.1	8.6	8.5	8.4	8.3	8.1	7.9	10.9
32	12.7	12.5	12.3	nd	nd	8.5	8.5	9.1	9.4	9.0	8.7	8.5	8.6	8.3	8.0	7.7	9.9
36	12.8	12.2	12.5	nd	nd	9.0	9.9	9.4	10.0	9.6	9.4	9.1	9.2	9.0	8.4	7.7	
40	12.8	12.4	12.7	nd	nd	9.1	9.9	9.3	9.9	9.7	9.2	9.0	9.1	8.4	8.3	7.4	
44	12.8	12.3	12.2	nd	nd	8.9	9.8	9.2	9.9	9.1	8.9	8.6	8.8	7.8	8.1	7.1	
48	12.6	11.9	12.1	nd	nd	8.5	9.5	8.9	9.5	8.2	8.5	8.1	8.3	7.0	7.7	6.8	
52	12.6	10.9	11.8	nd	nd	8.2	9.2	8.0	8.6	7.6	7.4	7.5	8.0	6.3	6.7	3.6	

Year 2013 oxygen concentrations µg L^{-1}

Depth (m)	23-Apr-13	14-May-13	21-May-13	29-May-13	04-Jun-13	18-Jun-13	24-Jun-13	02-Jul-13	10-Jul-13	15-Jul-13	22-Jul-13	29-Jul-13	13-Aug-13	04-Sep-13	23-Sep-13	04-Oct-13	15-Oct-13	23-Oct-13	31-Oct-13	12-Nov-13	17-Dec-13
1	12.3	10.5	10.3	11.7	10.6	10.4	9.8	10.8	10.1	9.9	9.9	10.6	8.1	7.6	8.1	9.2	10.0	10.3	10.6	11.0	12.6
2	12.2	10.5	10.4	11.4	10.6	10.1	9.7	10.7	10.0	9.6	9.7	10.4	8.1	7.9	7.6	8.9	9.9	10.0	10.5	10.6	12.3
3	12.1	10.5	10.4	11.2	10.9	9.9	9.6	10.9	9.8	9.3	9.5	10.3	8.1	8.1	7.6	8.7	9.9	10.0	10.4	10.4	12.3
4	12.1	10.5	10.4	11.1	10.9	9.9	9.5	10.7	9.7	9.3	9.5	10.2	8.1	8.0	7.6	8.4	9.8	10.0	10.3	10.4	12.3
5	12.1	10.6	10.4	11.1	11.0	9.8	9.4	10.4	9.7	9.2	9.4	10.1	8.1	7.8	7.7	8.4	9.8	10.0	10.3	10.2	12.3
6	12.2	10.8	10.4	11.1	11.0	9.8	9.3	10.3	9.5	9.1	9.3	10.0	8.0	7.9	7.6	8.3	9.8	10.0	10.3	10.2	12.3
7	12.4	10.9	10.5	10.9	10.9	9.8	9.3	9.9	9.5	9.0	8.9	9.9	8.0	7.9	7.6	8.3	9.8	10.0	10.3	10.2	12.3
8	12.4	10.9	10.4	11.1	10.9	10.1	9.2	9.8	9.8	8.9	8.8	10.0	8.0	8.0	7.5	8.3	9.8	10.0	10.3	10.2	12.3
9	12.4	11.1	10.6	11.1	10.8	10.8	9.3	9.8	5.2	9.2	8.5	10.1	7.9	8.1	7.2	8.3	9.8	10.0	10.3	10.2	12.3
10	12.4	11.1	10.6	11.2	10.7	10.6	9.3	9.9	9.7	9.5	8.7	10.3	7.9	7.9	7.0	8.1	9.8	10.0	10.3	10.2	12.3
11	12.3	11.2	10.8	11.2	10.8	10.5	9.2	9.9	9.7	9.3	8.9	10.3	8.5	8.1	6.9	7.9	9.8	10.0	10.3	10.1	12.3
12	12.2	11.2	10.9	11.2	10.8	10.6	9.2	10.1	9.8	9.5	9.0	10.8	8.6	7.8	6.6	7.8	9.8	10.0	10.3	10.1	12.3
13	12.1	11.2	10.9	11.2	10.8	10.6	9.2	10.2	10.2	9.4	9.3	10.7	8.7	7.8	6.3	7.6	9.7	9.9	10.1	10.1	12.3
14	12.0	11.3	10.9	11.3	10.9	10.7	9.2	10.2	10.3	9.4	9.4	10.6	8.7	7.9	6.3	7.6	9.7	10.0	9.7	10.1	12.3
15	12.0	11.2	10.9	11.4	10.8	10.6	9.2	10.2	10.0	9.5	9.4	10.6	8.7	7.9	6.2	7.5	9.7	9.9	9.5	10.1	12.3
16	12.0	11.2	10.9	11.5	10.8	10.6	9.4	10.2	10.7	9.4	9.5	10.6	8.8	7.7	6.3	7.3	9.6	9.9	9.3	10.1	12.3
17	12.0	11.2	11.0	11.4	10.9	10.6	9.5	10.2	10.5	9.4	9.6	10.6	8.8	7.7	6.3	7.4	9.2	9.9	9.2	10.1	12.3
18	12.0	11.2	11.0	11.4	11.0	10.6	9.5	10.2	10.4	9.4	9.7	10.7	8.8	7.8	6.3	7.1	8.9	9.6	9.2	10.1	12.3
19	11.9	11.2	11.0	11.4	11.0	10.6	9.5	10.3	10.4	9.4	9.7	10.7	8.9	7.8	6.3	6.9	8.5	9.1	9.2	10.1	12.3
20	11.9	11.3	11.0	11.4	11.0	10.7	9.6	10.3	10.4	9.4	9.9	10.7	9.0	7.9	6.3	6.9	7.9	8.6	9.1	10.1	12.3
24	11.9	11.3	11.1	11.4	11.1	10.8	9.7	10.3	10.5	9.5	10.1	10.9	9.2	8.1	6.4	6.8	7.6	8.0	8.8	10.1	12.3
28	11.9	11.3	11.1	11.4	11.2	10.9	9.8	10.4	10.6	9.6	10.2	11.0	9.4	8.1	6.7	6.6	7.6	7.6	8.0	9.8	12.3
32	11.8	11.3	11.1	11.4	11.2	11.1	9.8	10.4	10.6	9.6	10.3	11.1	9.4	8.3	6.7	6.6	7.6	7.4	7.3	8.4	12.3
36	12.0	11.4	11.3	11.5	11.5	11.5	10.3	10.2	10.8	10.2	11.0	11.9	10.3	9.0	6.9	6.8	8.0	7.8	7.9	8.1	12.2
40	12.0	11.2	11.3	11.6	11.7	11.5	10.1	10.3	10.8	10.2	11.0	11.8	10.1	8.7	6.9	6.8	7.6	7.4	7.7	7.5	12.2
44	12.0	11.3	11.0	11.5	11.6	11.5	9.9	10.2	10.7	10.2	10.7	11.6	9.8	8.5	6.8	6.8	7.2	7.2	7.3	7.1	12.2
48	11.9	10.8	10.7	11.5	11.5	11.3	9.7	10.0	10.5	10.1	10.4	11.4	9.6	7.9	6.8	6.8	6.5	6.3	6.5	6.8	12.2
52	11.8	10.7	10.6	11.2	11.2	11.0	9.5	9.8	10.1	9.8	10.0	11.1	9.3	7.1	6.6	6.3	5.8	5.7	5.7	6.6	12.2

SKAHA LAKE WATER CHEMISTRY

Table 6**.** Skaha Lake water chemistry summary. Chla = Chlorophyll a. TP and TN = total phosphorus and total nitrogen, Secchi = Secchi depth, Epi = epilimnion and Hypo = Hypolimnion.

Year 2005 water chemistry

Sampling Dates	Epi TP (µg/L)	Epi TN (µg /L)	Chla (µg/L)	Hypo TP (µg/L)	Hypo TN (µg /L)
Year 2005					
26-Apr-05	6.0	235	1.65	4.8	215
31-May-05	9.5	245	1.65	6.3	197
12-Jul-05	5.5	295	2.34	4.5	280
22-Aug-05	4.5	240	1.70	6.8	220
8-Sep-05	5.0	195	1.85	12.5	240
4-Oct-05	6.0	210	1.98	10.8	227
Year 2006					
18-Jan-06	6.5	0.20	6.2	8.0	0.21
28-Feb-06	8.0	0.22	1.5	7.0	0.22
24-Apr-06	12.0	0.19	2.9	7.0	0.19
23-May-06	8.0	0.26	3.1	6.5	0.23
18-Jul-06	5.0	0.20	0.9	7.5	0.19
21-Aug-06	7.0	0.21	3.4	9.5	0.20
7-Sep-06	4.5	0.20	5.3	10.0	0.19
27-Sep-06	nd	0.21	1.9	nd	0.22
23-Oct-06	nd	0.22	2.9	nd	0.25
2-Nov-06	nd	nd	3.3	nd	nd
Year 2007					
18-Apr-07	7	0.02	2.4	4.8	9
14-May-07			3.3	5.3	
11-Jun-07	7	0.20	3.1	4.8	7
09-Jul-07		0.22	0.9	6.2	9
13-Aug-07	8	0.23	2.5	7.3	14
17-Sep-07			1.5	6.0	
09-Oct-07	3	0.22	1.9	5.5	3
05-Nov-07			3.0	6.2	
Year 2008					
12-May-08	18	180	1.53	6.65	11.5
10-Jun-08	22	200	2.10	3.60	8.0
7-Jul-08	9	150	1.95	5.15	9.5
21-Jul-08	10	170	1.68	6.30	13.0
11-Aug-08	6	170	2.15	7.05	7.0
7-Sep-08	7	150	2.33	nd	6.5
19-Oct-08	9	140	2.13	4.73	5.5

Sampling Dates	Epi TP (µg/L)	Epi TN (µg /L)	Chla (µg/L)	Hypo TP (µg/L)	Hypo TN (µg /L)
Year 2009					
11-May-09	7	210	1.6	5.0	6.0
8-June-09	7	310	1.5	3.9	6.5
13-Jul-09	2	130	2.3	4.4	2.0
11-Aug-09	5	150	1.7	5.4	7.5
14-Sep-09	8	140	0.7	5.6	7.5
22-Oct-09	6	180	1.7	5.3	7.0
Year 2010					
10-May-10	4.0	90	1.2	4.0	4.0
8-Jun-10	6.0	150	2.1	4.2	5.5
19-Jul-10	5.0	250	2.0	4.6	7.0
16-Aug-10	6.0	240	0.9	6.9	13.5
14-Sep-10	7.0	310	1.8	4.8	15.0
18-Oct-10	5.0	210	1.6	5.3	12.0
Year 2011					
24-May-11	9	280	3.0	2.6	7
20-Jun-11	8	240	2.4	3.3	6
18-Jul-11	5	220	3.6	4.1	5
16-Aug-11	5	240	2.1	6.0	6
15-Sep-11	4	240	1.0	6.2	9
11-Oct-11	6	310	2.1	4.3	11
Year 2012					
12-May-12	9.3	238	0.7	4.0	7.65
11-Jun-12	9.6	243	1.6	4.3	8.65
16-Jul-12	7.3	252	1.3	4.4	8.40
13-Aug-12	4.4	217	1.1	7.5	9.45
24-Sep-12	4.7	205	0.9	6.9	12.45
29-Oct-12	5.4	341	2.8	6.3	12.35
Year 2013					
21-May-13	10.4	208	2.9	2.6	187.5
24-Jun-13	7.7	243	1.3	3.6	250.0
22-Jul-13	4.3	207	1.2	7.0	208.0
13-Aug-13	5.5	232	3.0	6.1	253.5
23-Sep-13	8.1	258	1.7	5.9	221.0
21-Oct-13	6.5	175	2.4	5.5	215.0

SKAHA LAKE PHYTOPLANKTON BIOMASS

Table 7. Skaha Lake 2005-13 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**
26-Apr-05	116	9	73	0	76	13	0	72	0	705	**1063**
17-May-05	99	19	51	0	83	3	0	87	0	298	**638**
1-Jun-05	108	6	33	0	68	5	0	55	0	215	**490**
20-Jun-05	70	31	13	0	56	26	0	82	0	133	**410**
12-Jul-05	146	11	47	0	142	2	0	130	0	337	**814**
2-Aug-05	41	17	28	0	36	3	0	60	0	91	**276**
22-Aug-05	99	23	21	1	85	9	0	105	0	73	**415**
12-Sep-05	74	8	24	0	37	10	0	66	0	169	**388**
4-Oct-05	96	7	48	0	46	5	0	125	0	45	**373**
01-Nov-05	301	3	54	0	14	3	0	106	0	174	**655**
26-Apr-06	168	15	40	0	2	5	0	19	0	213	**461**
23-May-06	392	38	122	0	216	0	0	58	0	698	**1525**
12-Jun-06	126	47	201	0	62	43	0	89	0	473	**1042**
04-Jul-06	64	15	71	0	100	35	0	35	0	185	**505**
18-Jul-06	60	21	34	0	30	6	0	42	0	182	**375**
21-Aug-06	98	6	61	5	158	3	0	75	0	52	**459**
11-Sep-06	191	16	28	0	37	16	0	59	0	27	**375**
27-Sep-06	242	3	28	0	13	8	0	38	0	32	**365**
23-Oct-06	662	4	92	0	28	3	0	31	0	370	**1190**
14-May-07	243	9	21	0	71	3	0	37	0	317	**701**
11-Jun-07	176	27	24	0	82	25	0	49	0	402	**787**
09-Jul-07	136	25	18	0	100	10	0	123	0	219	**632**
13-Aug-07	61	1	22	0	26	2	0	45	0	36	**192**
17-Sep-07	140	2	15	0	30	1	0	43	0	34	**264**
09-Oct-07	604	10	36	0	25	13	0	68	0	101	**856**
05-Nov-07	704	12	42	0	31	14	0	36	0	170	**1009**
17-Apr-08	460	14	17	0	19	23	1	29	0	565	**1128**
12-May-08	110	17	20	0	48	10	5	31	0	110	**351**
09-Jun-08	134	6	67	0	68	13	9	91	0	314	**703**
07-Jul-08	145	33	58	0	363	9	2	274	0	268	**1151**
21-Jul-08	199	3	24	0	80	2	2	403	0	270	**984**
11-Aug-08	294	25	10	0	12	12	0	54	0	227	**634**
07-Sep-08	284	10	12	0	45	26	1	64	0	64	**506**
19-Oct-08	908	12	65	0	36	20	7	78	0	106	**1233**
19-Nov-08	386	7	64	0	18	12	1	24	0	247	**759**

Sampling Date	Cyanophyta	Dinophyta	Cryptophyta	Euglenophyta	Chrysophyta	Haptophyta	Tribophyta	Chlorophyta	Raphidophyta	Bacillariophyta	**TOTAL**
11-May-09	461	1	12	0	40	44	0	68	0	204	**831**
08-Jun-09	216	7	31	0	69	2	0	87	0	223	**635**
13-Jul-09	148	24	18	0	174	5	11	135	0	364	**880**
11-Aug-09	212	5	24	0	43	8	1	147	0	59	**499**
14-Sep-09	64	12	26	0	23	6	2	78	0	52	**263**
22-Oct-09	479	19	50	0	13	8	1	38	0	101	**709**
10-May-10	1038	5	15	0	98	23	11	42	0	83	**1315**
14-Jun-10	262	38	39	0	34	13	5	58	0	119	**567**
19-Jul-10	367	17	41	0	90	35	3	131	0	113	**797**
16-Aug-10	159	4	54	0	32	4	0	38	0	99	**388**
14-Sep-10	432	4	37	0	25	9	0	67	0	90	**665**
18-Oct-10	443	3	67	0	42	16	1	88	0	129	**788**
24-May-11	705	22	37	0	68	22	5	136	0	622	**1618**
20-Jun-11	153	37	85	0	70	26	1	28	0	273	**673**
18-Jul-11	140	21	86	0	55	16	0	66	0	341	**725**
16-Aug-11	135	6	62	0	123	5	0	51	0	487	**870**
15-Sep-11	64	5	20	3	42	6	0	64	0	181	**385**
11-Oct-11	404	7	50	0	22	2	0	64	0	157	**706**
22-May-12	330	4	25	0	10	0	0	28	0	103	**501**
11-Jun-12	244	13	8	0	21	0	1	41	0	113	**441**
16-Jul-12	211	8	21	0	45	1	0	29	0	120	**436**
13-Aug-12	193	10	10	0	18	2	1	47	0	71	**352**
24-Sep-12	102	6	57	0	40	8	1	21	0	22	**257**
29-Oct-12	301	47	57	0	22	7	1	73	0	99	**608**
21-May-13	178	13	44	0	307	4	3	88	0	168	**805**
24-Jun-13	118	9	39	0	36	0	0	18	0	254	**474**
22-Jul-13	48	11	33	0	84	1	1	26	0	169	**372**
13-Aug-13	60	2	27	0	54	5	3	35	0	52	**239**
23-Sep-13	214	6	10	0	33	8	1	102	0	90	**465**
23-Oct-13	446	1	51	0	31	14	1	54	0	126	**724**

Table 8. Skaha Lake 2005-13 EDIBLE 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	1	0	73	0	75	13	0	50	0	38	**250**
17-May-05	7	0	51	0	80	3	0	70	0	44	**254**
1-Jun-05	10	0	33	0	64	5	0	42	0	62	**216**
20-Jun-05	7	1	13	0	55	26	0	61	0	54	**218**
12-Jul-05	5	1	47	0	138	2	0	84	0	140	**416**
2-Aug-05	14	4	28	0	36	3	0	40	0	31	**157**
22-Aug-05	12	15	21	1	85	9	0	74	0	24	**241**
12-Sep-05	13	6	24	0	35	10	0	44	0	15	**147**
4-Oct-05	3	2	48	0	46	5	0	83	0	15	**200**
1-Nov-05	1	3	54	0	13	3	0	96	0	37	**207**
26-Apr-06	3	0	40	0	1	5	0	1	0	177	**226**
23-May-06	12	0	122	0	11	0	0	26	0	109	**280**
12-Jun-06	9	21	201	0	41	43	0	48	0	136	**499**
04-Jul-06	1	11	71	0	88	35	0	28	0	63	**297**
18-Jul-06	6	21	34	0	13	6	0	37	0	49	**166**
21-Aug-06	9	6	61	0	146	3	0	57	0	10	**292**
11-Sep-06	5	16	28	0	33	16	0	32	0	18	**148**
27-Sep-06	7	3	28	0	13	8	0	19	0	22	**100**
23-Oct-06	4	0	92	0	23	3	0	21	0	349	**491**
14-May-07	11	9	21	0	71	3	0	17	0	93	**224**
11-Jun-07	12	3	22	0	82	25	0	18	0	146	**308**
19-Jul-07	4	9	18	0	100	10	0	50	0	69	**260**
13-Aug-07	1	0	22	0	19	2	0	30	0	14	**88**
17-Sep-07	2	2	15	0	30	1	0	39	0	18	**106**
09-Oct-07	6	8	36	0	25	13	0	34	0	63	**185**
05-Nov-07	3	0	42	0	31	14	0	29	0	120	**238**
17-Apr-08	1	0	17	0	15	23	2	11	0	371	**440**
12-May-08	5	0	20	0	21	10	5	13	0	21	**95**
09-Jun-08	13	2	67	0	68	13	9	25	0	105	**302**
07-Jul-08	1	6	58	0	363	9	2	32	0	119	**591**
21-Jul-08	0	3	24	0	39	2	2	34	0	30	**135**
11-Aug-08	12	2	10	0	12	12	0	35	0	22	**105**
07-Sep-08	30	10	12	0	44	26	1	30	0	32	**185**
19-Oct-08	5	12	65	0	36	20	7	31	0	72	**247**
19-Nov-08	2	1	64	0	18	12	1	15	0	168	**281**

Sampling Date	Cyanophyta	Dinophyta	Cryptophyta	Euglenophyta	Chrysophyta	Haptophyta	Tribophyta	Chlorophyta	Raphidophyta	Bacillariophyta	**TOTAL**
11-May-09	1	0	12	0	40	44	0	6	0	**78**	**181**
08-Jun-09	1	0	31	0	69	2	0	4	0	**130**	**237**
13-Jul-09	1	2	18	0	30	5	11	46	0	**25**	**138**
11-Aug-09	10	5	24	0	42	8	1	130	0	**37**	**256**
14-Sep-09	2	10	26	0	23	6	2	71	0	**44**	**183**
22-Oct-09	3	8	50	0	13	8	1	14	0	**58**	**156**
10-May-10	0	0	15	0	33	23	11	15	0	36	**134**
14-Jun-10	0	1	39	0	27	13	5	4	0	46	**135**
19-Jul-10	2	14	41	0	88	35	3	21	0	20	**223**
16-Aug-10	3	4	54	0	32	4	0	33	0	67	**196**
14-Sep-10	3	3	37	0	22	9	0	38	0	74	**187**
18-Oct-10	4	1	67	0	38	16	1	44	0	83	**254**
24-May-11	1	0	37	0	36	22	5	55	0	148	**304**
20-Jun-11	0	2	85	0	59	26	1	9	0	111	**294**
18-Jul-11	0	0	86	0	33	16	0	49	0	57	**241**
16-Aug-11	7	6	62	0	121	5	0	10	0	81	**292**
15-Sep-11	0	5	20	3	37	6	0	54	0	69	**196**
11-Oct-11	5	6	50	0	21	2	0	34	0	91	**210**
22-May-12	0	4	25	0	5	0	0	15	0	50	**99**
11-Jun-12	0	0	8	0	15	0	1	33	0	56	**113**
16-Jul-12	7	5	21	0	45	1	0	17	0	53	**150**
13-Aug-12	5	1	10	0	18	2	1	39	0	42	**119**
24-Sep-12	2	6	57	0	40	8	1	14	0	22	**149**
29-Oct-12	6	44	57	0	22	7	1	41	0	60	**237**
21-May-13	1	8	44	0	89	4	3	61	0	81	**291**
24-Jun-13	1	3	39	0	31	0	0	10	0	95	**179**
22-Jul-13	2	4	33	0	84	1	1	17	0	14	**156**
13-Aug-13	13	2	27	0	43	5	3	28	0	16	**138**
23-Sep-13	6	6	10	0	24	8	1	96	0	30	**182**
23-Oct-13	5	1	51	0	29	14	1	39	0	41	**181**

SKAHA LAKE ZOOPLANKTON BIOMASS

Table 9. Skaha 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	Nauplii	*Diacyclops*	*Leptodiaptomus*	*Epischura*	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*	**TOTAL**
27-Apr-05		1.2	5.1	11.6	0.0	0.0	0.0	0.0	0.0	**17.9**
19-May-05		5.6	28.0	48.2	1.2	0.0	0.0	0.0	0.0	**83.0**
09-Jun-05		6.6	16.1	65.7	0.2	1.2	0.0	0.1	0.0	**90.1**
22-Jun-05		5.3	21.2	53.3	1.8	4.9	2.2	3.3	0.0	**92.0**
14-Jul-05		6.0	29.3	57.8	6.3	1.8	38.3	3.5	1.0	**144.0**
03-Aug-05		8.3	30.7	39.7	5.9	0.7	73.6	3.3	0.3	**162.6**
25-Aug-05		3.2	25.4	45.7	4.2	2.7	28.8	0.9	0.2	**111.0**
14-Sep-05		1.6	17.8	32.9	4.6	1.6	3.0	1.6	0.0	**63.1**
07-Oct-05		2.6	18.8	37.8	6.7	1.0	2.5	1.8	0.0	**71.3**
02-Nov-05		2.4	18.0	24.0	0.6	0.3	0.3	0.1	0.0	**45.8**
21-Nov-05		1.6	17.7	25.6	0.1	0.5	0.0	0.0	0.0	**45.5**
26-Apr-06		12.9	23.8	49.4	0.0	0.8	0.0	0.0	0.0	**86.9**
24-May-06		5.2	19.8	3.7	0.3	0.4	0.0	0.0	0.0	**29.4**
13-Jun-06		3.5	45.5	7.5	0.1	10.9	0.3	0.0	0.0	**67.9**
29-Jun-06		4.9	91.0	17.9	1.1	1.6	5.0	0.1	0.1	**121.6**
24-Jul-06		10.3	105.8	30.0	0.4	0.1	16.6	4.9	0.0	**168.1**
31-Aug-06		3.0	85.7	37.2	12.9	3.1	7.1	0.6	0.8	**150.4**
06-Sep-06		2.4	83.2	57.4	16.6	3.7	6.3	1.5	0.1	**171.1**
28-Sep-06		5.0	81.1	68.4	12.6	5.5	5.0	6.5	0.0	**184.2**
25-Oct-06		3.4	34.9	31.4	5.3	0.6	1.0	0.6	0.0	**77.2**
13-Mar-07		3.4	27.1	25.3	0.0	0.3	0.0	0.0	0.0	**56.2**
18-Apr-07		3.9	13.5	20.4	0.0	0.0	0.0	0.0	0.0	**37.8**
16-May-07		6.0	26.6	61.8	0.0	0.0	0.0	0.0	0.0	**94.4**
14-Jun-07		7.2	52.2	44.0	1.8	2.7	0.0	0.3	0.0	**108.2**
26-Jun-07		6.9	66.5	57.8	1.1	5.6	0.6	1.5	0.5	**140.6**
12-Jul-07		9.5	103.9	58.5	13.6	1.4	10.5	29.0	1.8	**228.3**
25-Jul-07		4.2	72.5	34.9	13.3	0.4	22.4	5.5	0.4	**153.6**
15-Aug-07		4.0	33.7	42.8	12.0	0.2	46.3	3.8	0.0	**142.7**
28-Aug-07		3.3	39.2	37.8	13.9	0.9	5.7	4.5	0.0	**105.5**
12-Sep-07		4.5	57.2	46.3	10.7	5.4	17.6	6.1	0.0	**147.9**
24-Sep-07		4.3	46.4	54.2	13.8	7.8	15.2	1.7	0.0	**143.4**
24-Oct-07		2.6	31.3	43.8	1.9	0.0	0.7	0.5	0.0	**80.9**
19-Nov-07		2.1	39.5	26.5	0.3	0.3	0.0	0.0	0.0	**68.7**
08-Jan-08		3.4	24.4	28.8	0.0	0.3	0.0	0.0	0.0	**56.9**

Sampling Date	Rotifer	Nauplii	*Diacyclops*	*Leptodiaptomus*	*Epischura*	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*	**TOTAL**
26-Mar-08	0.0	2.7	13.1	36.9	0.0	0.0	0.0	0.0	0.0	**52.7**
08-Apr-08	2.9	4.3	22.5	35.0	0.0	0.3	0.0	0.0	0.0	**65.0**
13-May-08	7.0	7.5	22.8	75.8	0.0	0.0	0.0	0.0	0.0	**113.1**
26-May-08	4.4	6.2	24.4	58.3	0.0	0.0	0.0	0.0	0.0	**93.4**
16-Jun-08	3.4	9.8	36.5	117.8	0.1	1.4	0.0	0.0	0.0	**169.0**
23-Jun-08	2.8	6.4	29.6	33.7	0.1	4.2	0.1	0.6	0.0	**77.5**
09-Jul-08	3.1	7.7	36.3	36.7	0.9	6.1	2.1	8.9	0.3	**102.0**
22-Jul-08	1.1	7.1	60.5	55.9	4.1	0.3	19.7	23.9	1.2	**173.7**
28-Jul-08	0.9	5.1	50.6	52.4	5.2	0.1	25.7	4.9	1.1	**145.9**
13-Aug-08	0.1	5.1	53.2	71.2	4.8	0.5	90.0	1.4	0.0	**226.4**
21-Aug-08	0.5	2.7	34.0	45.1	6.8	1.5	9.9	1.5	0.0	**101.9**
07-Sep-08	0.6	1.6	36.3	47.1	12.7	3.4	5.8	3.3	0.0	**110.8**
23-Sep-08	0.2	2.5	18.6	48.0	15.9	4.6	5.6	2.5	0.0	**97.9**
17-Oct-08	0.2	3.3	18.3	33.3	6.2	0.4	3.4	0.9	0.0	**66.0**
12-May-09	15.7	8.8	34.8	97.0	0.0	0.0	0.0	0.0	0.0	**156.2**
25-May-09	4.0	5.5	30.1	63.3	0.0	0.0	0.0	0.0	0.0	**102.9**
09-Jun-09	5.5	13.4	62.2	116.9	0.1	0.2	0.0	0.0	0.0	**198.3**
29-Jun-09	6.2	9.1	54.9	79.1	0.4	12.5	1.7	2.7	0.0	**166.5**
14-Jul-09	3.3	8.6	37.9	64.8	4.1	0.5	16.7	9.6	0.8	**146.1**
28-Jul-09	2.0	7.8	53.3	62.0	4.8	0.1	54.2	3.6	0.5	**188.3**
12-Aug-09	0.5	6.7	26.2	73.3	7.2	0.4	40.4	3.9	0.6	**159.3**
27-Aug-09	0.2	2.5	36.0	63.9	5.6	2.8	48.5	2.7	0.0	**162.2**
15-Sep-09	0.1	1.6	37.5	54.3	7.1	1.3	11.0	6.8	0.0	**119.7**
01-Oct-09	0.1	2.3	30.9	50.9	6.9	1.3	8.5	2.7	0.2	**103.6**
20-Oct-09	0.5	2.2	32.0	71.7	7.7	2.0	5.2	1.0	0.0	**122.2**
25-Nov-09	0.7	2.6	25.9	39.4	0.2	0.9	0.0	0.0	0.0	**69.7**
18-Dec-09	1.4	4.0	21.0	43.8	0.0	1.2	0.0	0.0	0.0	**71.5**
5-Feb-10	5.5	4.1	15.4	22.1	0.0	0.9	0.0	0.0	0.0	**48.1**
15-Apr-10	6.5	2.6	11.0	28.0	0.0	0.0	0.0	0.0	0.0	**48.0**
9-May-10	2.8	6.3	9.1	48.9	0.0	0.0	0.0	0.0	0.0	**67.0**
1-Jun-10	0.5	2.5	10.9	6.6	0.2	0.6	0.1	0.0	0.0	**21.3**
15-Jun-10	1.2	3.2	33.9	6.5	0.1	8.8	0.2	0.3	0.0	**54.1**
28-Jun-10	0.9	3.6	63.3	9.5	1.7	2.1	1.1	4.3	0.6	**87.1**
06-Jul-10	1.0	5.7	59.2	9.4	2.2	0.6	4.3	4.4	0.0	**86.8**
19-Jul-10	0.8	4.7	77.2	27.9	3.1	0.1	17.3	3.2	0.9	**135.2**
26-Jul-10	0.9	3.4	77.9	22.4	3.4	0.4	33.1	3.1	1.9	**146.5**
16-Aug-10	0.5	1.4	51.3	38.5	8.9	0.7	63.3	5.9	0.4	**170.8**
31-Aug-10	0.1	1.1	49.3	38.3	6.7	1.4	46.3	0.8	0.1	**144.2**
14-Sep-10	0.2	0.6	24.4	42.4	3.8	0.7	9.2	1.9	0.0	**83.2**
28-Sep-10	0.0	0.6	36.6	39.7	3.9	1.0	2.4	2.0	0.5	**86.8**

Sampling Date	Rotifer	Nauplii	*Diacyclops*	*Leptodiaptomus*	*Epischura*	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*	**TOTAL**
09-May-11	9.0	5.0	21.4	52.2	0.0	0.0	0.0	0.0	0.0	**87.6**
30-May-11	13.4	4.1	27.0	25.4	0.0	0.3	0.0	0.0	0.0	**70.3**
16-Jun-11	7.4	3.0	34.3	34.9	0.0	0.5	0.0	0.1	0.0	**80.2**
21-Jun-11	4.3	2.9	40.2	4.2	0.0	1.7	0.1	0.0	0.0	**53.4**
09-Jul-11	2.4	5.6	53.8	13.4	0.8	5.4	1.4	1.2	0.0	**83.9**
21-Jul-11	0.8	3.2	38.7	11.5	0.3	1.0	7.0	4.1	0.0	**66.7**
08-Aug-11	0.2	4.8	33.1	20.1	1.2	0.1	36.8	7.7	0.5	**104.5**
28-Aug-11	0.1	2.9	39.0	31.0	2.4	0.1	17.1	6.4	0.3	**99.3**
23-Sep-11	0.1	0.8	28.4	14.5	6.9	1.1	16.4	1.9	0.0	**70.2**
07-Oct-11	0.3	0.6	20.7	17.3	12.3	0.4	5.1	0.8	0.0	**57.3**
2-Nov-11	0.3	1.2	10.1	17.8	2.4	0.0	0.3	0.1	0.0	**32.1**
17-Nov-11	0.7	1.4	6.8	17.3	1.3	0.4	1.3	0.1	0.0	**29.2**
28-Apr-12	3.3	2.9	3.8	56.8	0.0	0.0	0.0	0.0	0.0	**66.8**
22-May-12	2.8	2.7	4.8	54.2	0.1	0.0	0.0	0.0	0.0	**64.6**
11-Jun-12	1.2	3.7	12.8	43.1	0.8	0.1	0.0	0.0	0.0	**61.6**
25-Jun-12	1.7	4.1	40.4	55.1	0.3	3.9	0.1	0.3	0.0	**105.9**
11-Jul-12	0.5	2.8	22.4	19.6	2.8	3.6	0.7	1.3	0.1	**53.8**
24-Jul-12	0.4	2.7	27.4	31.6	4.2	0.8	6.6	6.4	0.1	**80.0**
14-Aug-12	0.2	3.8	13.1	16.8	4.3	0.3	26.3	2.0	0.3	**67.2**
27-Aug-12	0.2	1.4	20.3	28.2	4.4	0.2	56.0	2.6	0.0	**113.3**
17-Sep-12	0.0	0.8	32.7	29.7	6.6	0.4	9.5	1.1	0.0	**80.7**
09-Oct-12	0.0	0.9	16.8	27.9	3.3	1.0	6.7	1.6	0.2	**58.4**
31-Oct-12	0.1	2.1	22.6	26.3	1.6	0.4	0.8	0.2	0.0	**54.1**
24-Nov-12	0.2	1.6	29.5	36.5	0.2	0.5	0.0	0.1	0.0	**68.5**
23-Apr-13	15.0	6.4	17.2	101.8	0.0	0.4	0.0	0.0	0.0	**140.9**
15-May-13	11.5	6.2	13.9	57.6	0.5	0.1	0.0	0.0	0.0	**89.8**
27-May-13	3.3	3.2	13.8	33.4	0.2	0.0	0.0	0.0	0.0	**53.9**
18-Jun-13	1.4	1.3	7.7	8.6	0.3	7.0	0.1	2.3	0.0	**28.7**
02-Jul-13	1.2	5.9	48.1	19.9	1.8	1.0	2.9	3.7	0.0	**84.5**
15-Jul-13	0.6	3.2	12.2	13.9	1.2	0.0	7.5	7.3	0.0	**46.0**
29-Jul-13	0.1	2.9	18.1	15.5	2.9	0.1	37.2	3.9	0.3	**80.9**
14-Aug-13	0.1	1.6	19.6	13.5	2.7	0.3	16.3	0.4	0.2	**54.6**
26-Aug-13	0.1	1.5	17.2	20.6	4.0	0.5	14.8	1.5	0.1	**60.3**
12-Sep-13	0.0	0.7	10.5	11.9	2.8	0.4	5.3	3.6	0.0	**35.1**
23-Sep-13	0.1	1.1	16.1	30.6	3.5	0.2	3.5	2.6	0.0	**57.6**
15-Oct-13	0.1	1.3	13.3	14.8	5.8	0.5	3.9	0.2	0.0	**39.9**

SKAHA LAKE ZOOPLANKTON DENSITY

Table 10. Skaha 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	Nauplii	*Diacyclops* adults & copepodids	*Leptodiaptomus* adults & copepodids	*Epischura* adults & copepodids	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*
27-Apr-05		8.0	2.1	3.9	0.0	0.0	0.0	0.0	0.0
19-May-05		38.7	9.3	17.3	0.0	0.0	0.0	0.0	0.0
09-Jun-05		42.3	7.2	21.2	0.0	1.2	0.0	0.0	0.0
22-Jun-05		32.3	12.2	17.8	0.1	3.7	0.2	0.8	0.0
14-Jul-05		40.3	13.3	18.3	0.3	1.0	2.6	0.7	0.0
03-Aug-05		53.3	14.4	14.7	0.4	0.4	5.4	0.7	0.0
25-Aug-05		15.0	11.3	13.0	0.4	1.7	2.0	0.2	0.0
14-Sep-05		9.8	8.9	10.1	0.4	1.3	0.6	0.3	0.0
07-Oct-05		16.3	8.8	10.3	0.5	0.6	0.4	0.3	0.0
02-Nov-05		11.9	6.2	7.6	0.0	0.2	0.0	0.0	0.0
21-Nov-05		9.5	6.0	8.8	0.0	0.3	0.0	0.0	0.0
26-Apr-06		58.00	9.27	16.49	0.00	0.20	0.00	0.00	0.00
24-May-06		27.67	8.69	0.84	0.01	0.18	0.00	0.00	0.00
13-Jun-06		17.67	28.22	3.23	0.01	5.33	0.06	0.01	0.00
29-Jun-06		24.67	35.00	2.12	0.04	0.94	0.68	0.01	0.00
24-Jul-06		57.36	39.34	9.10	0.04	0.00	1.81	0.99	0.00
31-Aug-06		16.67	34.67	8.80	0.90	1.83	0.67	0.11	0.00
06-Sep-06		12.78	30.00	10.08	0.86	1.89	0.67	0.27	0.00
28-Sep-06		21.67	27.67	12.57	0.69	3.00	0.56	1.30	0.00
25-Oct-06		13.22	10.11	8.03	0.26	0.22	0.12	0.11	0.00
19-Dec-06		6.94	9.17	9.92	0.00	0.36	0.01	0.00	0.00
13-Mar-07		15.33	5.78	8.02	0.00	0.20	0.00	0.00	0.00
18-Apr-07		14.00	4.02	6.97	0.00	0.00	0.00	0.00	0.00
16-May-07		30.00	10.17	21.33	0.00	0.00	0.00	0.00	0.00
14-Jun-07		30.67	19.90	16.87	0.07	1.23	0.00	0.05	0.00
26-Jun-07		30.00	24.56	15.11	0.05	3.00	0.03	0.25	0.02
12-Jul-07		44.67	35.67	10.76	0.69	0.83	0.88	5.83	0.02
25-Jul-07		21.00	21.33	8.33	0.80	0.14	2.39	0.98	0.00
15-Aug-07		19.00	12.11	10.94	0.71	0.09	2.67	0.69	0.00
28-Aug-07		13.83	14.11	8.67	0.86	0.61	0.49	0.87	0.00
12-Sep-07		21.67	23.17	10.56	0.63	2.89	2.08	1.18	0.00
24-Sep-07		18.33	17.00	10.78	0.78	4.50	2.00	0.33	0.00
24-Oct-07		11.16	10.44	9.56	0.10	0.00	0.05	0.07	0.00
19-Nov-07		10.78	10.44	8.47	0.01	0.17	0.00	0.01	0.00

Sampling Date	Rotifer	Nauplii	*Diacyclops* adults & copepodids	*Leptodiaptomus* adults & copepodids	*Epischura* adults & copepodids	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*
08-Jan-08		19.00	6.06	9.57	0.00	0.11	0.00	0.00	0.00
26-Mar-08		9.43	4.17	11.50	0.00	0.01	0.00	0.00	0.00
08-Apr-08	18.00	18.33	7.37	10.83	0.00	0.08	0.00	0.00	0.00
13-May-08	51.26	33.33	9.60	19.20	0.00	0.00	0.00	0.00	0.00
26-May-08	37.00	34.00	10.09	16.60	0.00	0.00	0.00	0.00	0.00
16-Jun-08	25.33	53.33	15.96	30.33	0.00	0.86	0.00	0.01	0.00
23-Jun-08	20.00	33.33	13.62	9.16	0.00	2.40	0.02	0.12	0.00
09-Jul-08	23.17	40.67	14.73	8.49	0.04	4.80	0.20	1.59	0.01
22-Jul-08	8.17	39.33	21.56	13.47	0.14	0.19	2.29	4.25	0.01
28-Jul-08	6.89	27.67	17.33	13.33	0.21	0.04	1.96	0.81	0.01
13-Aug-08	0.53	26.00	18.86	21.33	0.27	0.27	6.67	0.25	0.00
21-Aug-08	4.67	15.11	12.30	11.16	0.39	0.73	0.64	0.26	0.00
07-Sep-08	5.83	8.00	13.67	11.30	0.88	1.78	0.57	0.60	0.00
23-Sep-08	1.67	10.89	6.67	10.17	0.92	2.56	0.61	0.42	0.00
17-Oct-08	1.47	13.53	6.39	8.89	0.33	0.18	0.47	0.17	0.00
19-Nov-08	6.67	12.67	6.81	9.25	0.01	0.07	0.00	0.01	0.00
03-Dec-08	9.11	15.44	7.48	8.36	0.00	0.14	0.00	0.00	0.00
26-Mar-09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14-Apr-09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12-May-09	102.67	38.67	19.64	29.33	0.00	0.00	0.00	0.00	0.00
25-May-09	28.22	20.00	11.43	13.33	0.00	0.00	0.00	0.00	0.00
09-Jun-09	42.11	62.67	24.89	32.33	0.01	0.04	0.00	0.00	0.00
29-Jun-09	50.00	46.67	20.89	20.22	0.02	8.44	0.28	0.51	0.00
14-Jul-09	25.33	46.67	14.93	15.67	0.25	0.27	1.57	1.60	0.02
28-Jul-09	15.78	40.67	21.60	14.49	0.34	0.06	4.42	0.61	0.01
12-Aug-09	4.95	38.86	12.60	16.67	0.35	0.29	3.00	0.67	0.00
27-Aug-09	2.33	14.58	13.33	14.67	0.46	1.25	3.67	0.49	0.00
15-Sep-09	0.77	8.27	14.33	11.13	0.43	0.77	0.90	1.22	0.00
01-Oct-09	0.76	13.33	12.60	10.94	0.52	0.67	0.88	0.46	0.00
20-Oct-09	3.93	14.33	12.23	18.60	0.48	1.20	0.63	0.17	0.00
25-Nov-09	7.89	16.33	7.00	13.44	0.01	0.44	0.00	0.00	0.00
18-Dec-09	17.07	28.33	5.71	17.43	0.00	0.48	0.00	0.00	0.00

Sampling Date	Rotifer	Nauplii	*Diacyclops* adults & copepodids	*Leptodiaptomus* adults & copepodids	*Epischura* adults & copepodids	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*
05-Feb-10	44.00	28.00	3.56	11.33	0.00	0.33	0.00	0.00	0.00
15-Apr-10	34.92	12.80	9.04	10.31	0.00	0.00	0.00	0.00	0.00
09-May-10	21.73	34.44	7.29	16.33	0.00	0.33	0.00	0.00	0.00
01-Jun-10	4.33	15.93	7.89	2.09	0.01	0.29	0.00	0.01	0.00
15-Jun-10	10.50	16.00	19.00	1.28	0.01	4.50	0.03	0.06	0.00
28-Jun-10	7.63	17.08	36.22	4.26	0.08	0.89	0.16	0.95	0.04
06-Jul-10	8.22	26.67	30.44	2.60	1.23	0.37	0.52	0.88	0.00
19-Jul-10	4.61	20.67	31.56	11.70	0.17	0.07	1.71	0.56	0.01
26-Jul-10	7.50	18.22	31.67	7.94	0.38	0.33	2.33	0.54	0.02
16-Aug-10	4.61	7.33	22.17	12.22	0.54	0.22	3.33	1.03	0.00
31-Aug-10	0.73	7.01	18.22	12.03	0.41	0.85	2.54	0.13	0.00
14-Sep-10	1.63	3.11	9.83	10.11	0.23	0.32	0.79	0.32	0.00
28-Sep-10	0.58	3.50	14.00	10.00	0.21	0.58	0.27	0.37	0.01
19-Oct-10	1.33	5.87	5.04	9.36	0.10	0.80	0.23	0.03	0.00
14-Nov-10	4.00	10.50	6.00	14.00	0.01	0.17	0.01	0.01	0.00
09-May-11	84.00	26.92	11.51	24.09	0.00	0.00	0.00	0.00	0.00
30-May-11	126.81	29.55	14.81	8.62	0.00	0.27	0.00	0.00	0.00
16-Jun-11	78.13	16.67	14.90	6.20	0.00	0.26	0.01	0.01	0.00
21-Jun-11	41.56	17.78	17.78	0.71	0.00	0.95	0.01	0.01	0.00
09-Jul-11	20.83	38.67	24.89	4.17	0.03	4.22	0.27	0.27	0.00
21-Jul-11	9.67	19.33	16.80	3.80	0.01	0.65	1.14	0.84	0.00
08-Aug-11	2.35	34.00	13.67	7.33	0.05	0.11	3.73	1.56	0.00
28-Aug-11	1.33	18.22	15.56	9.67	0.16	0.05	1.23	1.18	0.00
23-Sep-11	0.80	5.42	11.00	4.25	0.64	0.86	1.13	0.32	0.00
07-Oct-11	3.17	4.36	7.33	3.89	0.73	0.26	0.50	0.12	0.00
02-Nov-11	3.50	8.08	3.06	4.58	0.11	0.03	0.03	0.01	0.00
17-Nov-11	11.83	9.17	2.81	5.67	0.06	0.26	0.40	0.02	0.00

Sampling Date	Rotifer	Nauplii	*Diacyclops* adults & copepodids	*Leptodiaptomus* adults & copepodids	*Epischura* adults & copepodids	*Bosmina*	*Daphnia*	*Diaphanosoma*	*Leptodora*
28-Apr-12	21.00	10.33	1.11	20.00	0.00	0.00	0.00	0.00	0.00
22-May-12	23.33	13.33	2.51	16.67	0.01	0.00	0.00	0.00	0.00
11-Jun-12	10.00	17.78	6.67	13.17	0.02	0.03	0.00	0.00	0.00
25-Jun-12	15.56	21.78	16.25	13.78	0.01	1.58	0.01	0.05	0.00
11-Jul-12	4.49	14.67	7.22	5.90	0.11	2.56	0.05	0.24	0.01
24-Jul-12	4.67	12.33	8.83	9.83	0.17	0.43	0.78	1.11	0.00
14-Aug-12	2.50	19.90	4.60	5.15	0.19	0.21	1.74	0.32	0.00
27-Aug-12	1.75	7.92	8.80	8.09	0.21	0.15	2.42	0.40	0.00
17-Sep-12	0.31	4.90	12.33	8.94	0.32	0.22	0.65	0.18	0.00
09-Oct-12	0.10	4.22	7.67	5.86	0.16	0.52	0.62	0.28	0.00
31-Oct-12	0.90	10.56	8.33	6.56	0.06	0.20	0.07	0.03	0.00
24-Nov-12	2.67	9.33	7.83	9.22	0.01	0.20	0.00	0.01	0.00
23-Apr-13	76.33	26.00	7.13	21.67	0.00	0.15	0.00	0.00	0.00
15-May-13	88.00	31.00	4.48	17.11	0.02	0.11	0.00	0.00	0.00
27-May-13	27.56	18.67	4.28	7.50	0.01	0.00	0.00	0.00	0.00
18-Jun-13	16.67	8.67	5.08	4.28	0.03	4.89	0.01	0.45	0.00
02-Jul-13	10.22	28.00	12.67	7.42	0.06	0.42	0.28	0.66	0.00
15-Jul-13	7.56	21.00	8.42	10.33	0.09	0.02	1.41	1.67	0.00
29-Jul-13	1.04	19.67	11.41	7.79	0.18	0.07	3.47	0.74	0.01
14-Aug-13	0.99	12.00	11.00	7.16	0.21	0.24	1.19	0.08	0.00
26-Aug-13	0.85	10.93	13.78	10.29	0.45	0.50	1.37	0.35	0.00
12-Sep-13	0.32	5.67	6.81	5.47	0.26	0.33	0.65	0.94	0.00
23-Sep-13	0.83	8.17	10.63	11.42	0.29	0.19	0.35	0.54	0.00
15-Oct-13	0.78	7.00	5.00	4.10	0.30	0.21	0.44	0.04	0.00

SKAHA LAKE *MYSIS RELICTA* BIOMASS

Table 11. Skaha 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	released females	gravid female	embryos	**TOTAL**
06-Jun-05	1.00	4.76	3.95	0.10	2.01	0.00	0.00	0.00	**11.83**
14-Jul-05	0.00	3.08	3.44	0.00	0.46	0.00	0.00	0.00	**6.99**
04-Aug-05	0.00	5.64	7.67	2.62	3.24	0.00	0.00	0.00	**19.18**
12-Sep-05	0.00	3.27	2.99	11.99	8.16	0.00	0.00	0.00	**26.41**
03-Oct-05	0.00	1.20	3.21	7.52	11.95	1.01	0.30	0.00	**25.19**
02-Nov-05	0.00	0.61	0.71	12.60	11.02	2.80	10.00	0.91	**38.66**
21-Nov-05	0.00	2.40	0.90	13.12	4.91	4.11	31.80	2.52	**59.76**
20-Jan-06	0.00	0.23	0.00	0.33	0.00	1.35	1.36	0.09	**3.37**
28-Mar-06	0.40	0.30	0.40	0.20	2.01	1.40	1.83	0.10	**6.65**
26-Apr-06	0.89	0.56	0.67	0.56	6.56	0.78	0.11	0.00	**10.12**
24-May-06	2.89	3.57	3.90	0.23	5.77	0.25	0.00	0.01	**16.62**
29-Jun-06	0.50	7.11	7.11	0.20	4.01	0.00	0.00	0.00	**18.94**
31-Jul-06	0.00	9.00	10.70	0.60	3.30	0.00	0.00	0.00	**23.60**
17-Aug-06	0.00	7.10	5.50	2.30	4.30	0.00	0.00	0.00	**19.20**
28-Sep-06	0.00	0.85	2.46	7.17	9.76	0.00	0.64	0.05	**20.93**
25-Oct-06	0.00	1.06	1.17	13.88	14.82	0.00	4.56	0.25	**35.73**
19-Dec-06	0.00	0.96	0.95	1.16	0.65	1.05	11.41	0.00	**16.17**
07-Mar-07	0.67	0.57	0.46	0.91	2.38	3.53	6.45	0.32	**15.28**
16-May-07	1.33	0.76	0.50	3.56	0.21	0.43	0.02	0.02	**6.84**
14-Jun-07	1.34	3.39	3.78	0.10	4.38	0.00	0.20	0.00	**13.19**
12-Jul-07	0.49	6.91	5.81	0.00	3.20	0.00	0.00	0.00	**16.41**
28-Aug-07	0.01	4.67	5.11	2.41	2.41	0.00	0.00	0.00	**14.61**
24-Sep-07	0.00	3.12	5.33	7.13	7.59	0.34	0.21	0.01	**23.73**
19-Nov-07	0.00	2.11	1.56	14.00	9.11	4.89	21.44	1.69	**54.80**
08-Jan-08	0.01	1.63	1.53	2.55	0.51	3.66	12.80	0.72	**23.40**
26-Mar-08	0.42	1.64	0.83	0.00	2.86	2.29	4.12	0.31	**12.47**
08-Apr-08	0.48	0.70	0.60	0.00	2.21	0.50	0.90	0.06	**5.45**
13-May-08	0.72	1.14	0.72	0.00	2.69	0.00	0.00	0.00	**5.27**
12-Jun-08	1.64	6.56	6.00	0.00	11.41	0.00	0.00	0.00	**25.61**
09-Jul-08	0.34	7.86	8.57	0.11	3.55	0.00	0.00	0.00	**20.43**
13-Aug-08	0.04	9.90	10.60	1.44	3.38	0.00	0.00	0.00	**25.36**
23-Sep-08	0.03	2.48	4.03	12.06	12.03	0.00	0.00	0.00	**30.64**
19-Nov-08	0.00	1.28	1.59	10.22	3.92	1.25	12.63	0.87	**31.77**
03-Dec-08	0.00	1.38	2.02	5.71	2.93	1.97	16.57	1.16	**31.74**

Sampling Date	juvenile	immature male	immature female	adult male	adult female	released females	gravid female	embryos	**TOTAL**
26-Mar-09	0.11	1.54	0.63	0.00	0.56	2.12	3.72	0.24	**8.93**
14-Apr-09	0.27	0.72	0.50	0.00	1.65	0.81	0.72	0.06	**4.73**
12-May-09	0.49	0.31	0.41	0.10	1.65	0.10	0.30	0.02	**3.39**
09-Jun-09	1.84	1.11	1.50	0.00	2.10	0.10	0.10	0.01	**6.75**
14-Jul-09	0.93	7.33	7.13	0.10	4.53	0.00	0.00	0.00	**20.01**
12-Aug-09	0.14	6.93	6.17	0.21	2.16	0.00	0.00	0.00	**15.61**
15-Sep-09	0.04	4.64	4.11	5.34	3.42	0.00	0.00	0.00	**17.54**
20-Oct-09	0.00	2.19	5.19	8.53	14.70	0.00	3.24	0.28	**34.12**
01-Dec-09	0.00	1.14	1.24	5.12	1.81	0.60	9.08	0.72	**19.70**
18-Dec-09	0.00	1.41	0.91	4.13	0.71	0.20	9.02	0.66	**17.04**
15-Feb-10	0.03	0.30	0.41	0.00	0.00	0.00	3.55	0.24	**4.53**
15-Apr-10	1.22	1.02	1.76	0.14	6.67	0.14	0.15	0.01	**11.12**
10-May-10	2.30	1.30	0.80	0.10	1.80	0.20	0.10	0.01	**6.61**
15-Jun-10	0.88	5.00	5.40	0.10	7.00	0.00	0.00	0.00	**18.38**
17-Aug-10	0.02	10.59	9.42	2.32	7.12	0.00	0.00	0.00	**29.47**
28-Sep-10	0.01	2.48	4.46	7.37	11.44	0.00	0.10	0.01	**25.87**
14-Nov-10	0.00	1.56	2.03	15.56	10.37	0.41	17.57	1.44	**48.94**
14-Dec-10	0.00	1.60	0.90	3.00	3.01	3.40	11.81	0.76	**24.48**
07-Mar-11	0.18	1.11	0.40	0.80	0.60	3.10	6.72	0.37	**13.28**
09-May-11	0.09	1.04	1.70	0.10	6.86	0.10	2.46	0.14	**12.49**
15-Jun-11	4.38	6.50	7.70	0.00	11.70	0.00	0.40	0.03	**30.71**
08-Aug-11	0.24	17.18	15.40	1.53	8.94	0.00	0.00	0.00	**43.29**
23-Sep-11	0.00	4.00	5.40	5.70	6.10	0.00	0.00	0.00	**21.20**
17-Nov-11	0.00	4.42	3.72	21.56	10.03	1.40	25.56	1.69	**68.39**
20-Dec-11	0.00	3.02	3.12	7.24	2.11	7.11	28.00	1.73	**52.34**
01-Mar-12	0.21	5.08	5.16	0.12	1.72	9.12	13.90	1.08	**36.38**
11-Jun-12	2.39	9.80	10.80	1.40	15.40	0.00	0.40	0.02	**40.21**
25-Jun-12	1.38	15.30	14.10	0.20	13.40	0.30	0.10	0.01	**44.79**
24-Jul-12	0.41	20.70	15.90	0.20	16.50	0.00	0.10	0.01	**53.82**
21-Aug-12	0.02	14.50	14.50	3.80	12.00	0.00	0.00	0.00	**44.82**
25-Sep-12	0.01	3.30	6.50	11.20	12.20	0.00	0.10	0.01	**33.32**
31-Oct-12	0.01	3.80	6.50	7.70	20.70	0.40	6.10	0.50	**45.71**
26-Jan-13	0.00	2.30	2.60	0.10	0.30	0.40	7.30	0.52	**13.53**
23-Apr-13	0.69	2.64	3.17	0.00	5.81	0.31	0.61	0.03	**13.27**
29-May-13	2.89	6.32	7.13	0.00	5.35	0.00	0.00	0.00	**21.69**
02-Jul-13	0.51	10.45	10.79	0.00	5.89	0.11	0.00	0.00	**27.75**
29-Jul-13	0.17	19.70	19.28	1.41	17.85	0.00	0.00	0.00	**58.40**
11-Sep-13	0.02	3.54	3.43	8.52	7.29	0.00	0.00	0.00	**22.81**
13-Nov-13	0.00	2.61	1.30	7.21	6.11	4.80	6.61	0.74	**29.39**

SKAHA LAKE *MYSIS RELICTA* DIETS

Table 12. Skaha Lake 2005-2013 *Mysis relicta* diets as average number of prey per *Mysis*.

Sampling Date	**Number Mysis processed**	*Daphnia*	*Bosmina*	Cyclopoid	Calanoid	Nauplii	Rotifers	*Diaphanosoma*
24-May-06	30	0.00	0.03	0.27	0.07	0.00	0.00	0.00
31-Jul-06	30	0.53	0.27	0.17	0.00	0.00	0.00	0.00
17-Aug-06	30	0.63	0.00	0.20	0.07	0.00	0.00	0.00
28-Sep-06	21	0.19	0.14	0.10	0.05	0.00	0.00	0.00
25-Oct-06	30	0.10	0.40	0.07	0.17	0.00	0.00	0.00
16-May-07	30	0.07	0.07	0.10	0.20	0.00	0.53	0.00
14-Jun-07	30	0.11	0.16	0.00	0.05	0.00	0.00	0.00
12-Jul-07	30	0.07	0.07	0.03	0.00	0.00	0.00	0.00
28-Aug-07	30	0.07	0.07	0.13	0.10	0.00	0.10	0.00
24-Sep-07	30	0.00	0.63	0.10	0.00	0.00	0.00	0.00
19-Nov-07	30	0.00	0.37	0.10	0.00	0.00	0.13	0.00
08-Jan-08	30	0.00	0.04	0.33	0.00	0.00	0.19	0.00
13-May-08	13	0.00	0.00	0.08	0.00	0.00	0.00	0.00
16-Jun-08	30	0.00	0.00	0.07	0.03	0.00	0.90	0.00
09-Jul-08	30	0.00	0.20	0.00	0.00	0.00	1.03	0.00
13-Aug-08	30	0.00	0.07	0.10	0.00	0.00	0.00	0.00
23-Sep-08	30	0.00	0.37	0.00	0.00	0.00	0.00	0.00
01-Nov-08	30	0.00	0.23	0.20	0.00	0.00	0.00	0.00
12-May-09	40	0.20	0.10	0.13	0.00	0.05	0.20	0.00
09-Jun-09	36	0.00	0.08	0.67	0.06	0.00	0.33	0.00
14-Jul-09	174	0.01	0.06	0.16	0.09	0.01	0.24	0.00
12-Aug-09	103	0.50	0.00	0.12	0.09	0.00	0.02	0.00
15-Sep-09	108	0.20	0.14	0.05	0.01	0.00	0.01	0.01
20-Oct-09	117	0.09	0.49	0.09	0.03	0.00	0.00	0.00
01-Dec-09	86	0.01	0.15	0.30	0.14	0.00	0.01	0.00
15-Jun-10	100	0.00	0.97	0.58	0.00	0.00	0.64	0.00
17-Aug-10	113	1.04	0.03	0.09	0.01	0.00	0.01	0.02
28-Sep-10	68	0.24	0.40	0.10	0.03	0.00	0.01	0.00
19-Oct-10	83	0.30	0.78	0.33	0.00	0.00	0.00	0.00

Sampling Date	**Number Mysis processed**	*Daphnia*	*Bosmina*	Cyclopoid	Calanoid	Nauplii	Rotifers	*Diaphanosoma*
15-Jun-11	210	0.00	0.02	0.11	0.00	0.00	1.68	0.00
23-Sep-11	97	0.29	0.23	0.07	0.00	0.00	0.01	0.00
07-Oct-11	143	0.38	0.15	0.11	0.01	0.02	0.00	0.00
22-May-12	130	0.00	0.00	0.08	0.00	0.00	0.75	0.00
25-Jun-12	132	0.00	0.09	0.14	0.00	0.00	0.14	0.00
11-Jul-12	98	0.03	1.07	0.09	0.01	0.00	0.18	0.00
21-Aug-12	109	0.88	0.06	0.04	0.01	0.00	0.00	0.00
25-Sep-12	100	0.58	0.04	0.13	0.01	0.00	0.00	0.00
31-Oct-12	100	0.07	0.29	0.26	0.01	0.00	0.03	0.01
29-May-13	100	0.00	0.02	0.21	0.01	0.00	0.16	0.00
02-Jul-13	100	0.01	0.15	0.20	0.02	0.00	0.10	0.00
29-Jul-13	100	0.77	0.00	0.06	0.01	0.00	0.02	0.02
14-Aug-13	100	0.63	0.00	0.06	0.00	0.00	0.00	0.02
11-Sep-13	101	0.33	0.09	0.02	0.01	0.00	0.00	0.02
15-Oct-13	95	0.17	0.15	0.01	0.01	0.00	0.00	0.00

SKAHA LAKE FISH LENGTH, WEIGHT, and DENSITY

Table 13. Year 2005-2013 species-specific (sockeye, kokanee, whitefish) and age-specific (age-1,2,3 kokanee) densities, lengths and weights. The numbers in the box include lake whitefish, adult salmon spawners, and rare occurrences of very large kokanee, very large pikeminnow, and large rainbow trout. The single red number is the late fall estimate of whitefish densities.

Year 2005 Skaha Lake fish summary

Year 2005	17-May -2005 release	26-May-05	13-Jul-05	30-Aug-05	12-Sept-2005	25-Nov -13 Dec 2005	18-Jan-05
Density per ha							
age-0 sockeye	668	506	241	198	301	85	72
age-0 kokanee		13	241	276	99	171	186
age-1 kokanee		204	189	187	157	128	55
age-2 kokanee		148	138	136	114	68	74
age-3 kokanee		46	43	42	36	0	0
whitefish		9	9	8	7	5	4
Total (echosounder)		927 ± 242	860 ± 194	848 ± 200	713 ± 122	456 ± 195	390 ± 48
Mean Fish Length (cm)							
age-0 sockeye		4.6	7	7	7.9	9	9.2
age-0 kokanee		2.7	4.7	4.6	5.7	6.8	7.2
age-1 kokanee		8.7	12.5	11.6	13.9	15.1	14.9
age-2 kokanee		nd	20.4	19.8	20.9	19.8	21.3
age-3 kokanee		nd	23.3	22.9	25.8	spawn	spawn
whitefish		42.6	42.6	42.6	42.6	42.6	42.6
Mean Fish Weight (g)							
age-0 sockeye		1.1	2.8	4.2	5.3	7.5	7.3
age-0 kokanee		0.3	0.9	0.9	1.9	3.1	3.3
age-1 kokanee		8.5	16.3	18.8	31.8	38.6	31.5
age-2 kokanee		nd	79.8	95.5	109.2	90	114.6
age-3 kokanee		nd	105.1	148.2	218.3	spawn	spawn
whitefish		nd	nd	nd	nd	nd	nd

Year 2006 Skaha Lake fish summary

Year 2006	16-19 May 2006 release	26-Jun-06	24 Jul- 03 Aug. 2006	20-27 Sept 2006	23-Nov-06	26-27 Feb 2007
Density per ha						
age-0 sockeye	692	103	194	100	nd	66
age-0 kokanee		16	210	148	nd	109
age-1 kokanee		51	42	63	nd	60
age-2 kokanee		56	97	48	nd	35
age-3 kokanee		77	179	51	nd	spawn
whitefish		2	11	9	nd	2
Total (echosounder)	nd	305 ±	734 ±	414 ± 8		278 ±
Mean Fish Length (cm)						
age-0 sockeye	5.5	6.2	6.8	7.3	9.2	9.6
age-0 kokanee		3.5	4.5	5.7	7	7.1
age-1 kokanee		10	10.2	13.5	13.6	14.8
age-2 kokanee		16.8	19	19.6	nd	19.2
age-3 kokanee		22.4	22.5	22.6	spawn	spawn
whitefish		nd	nd	nd	nd	nd
Mean Fish Weight (g)						
age-0 sockeye	2.1	2.5	3.4	4.1	8.2	9.1
age-0 kokanee		0.4	1	1.8	3.4	3.4
age-1 kokanee		10.9	11.4	28	25.4	31.4
age-2 kokanee		49.7	75.6	85.5	nd	74.4
age-3 kokanee		121.8	126.6	121.5	spawn	spawn
whitefish		nd	nd	nd	nd	nd

Year 2007 Skaha Lake fish summary

Year 2007	11-20 June 2007	16-23 July 2007	13-15 Aug 2007	1-2 Oct 2007	13-22 Nov 2007	20-Dec-07	13-18 Mar 2008
Density per ha							
age 0 sockeye	nd	223	110	154	78	56	99
age 0 kokanee	nd	145	180	112	109	78	116
age 1 kokanee	nd	63	135	133	85	80	105
age 2 kokanee	nd	76	108	55	54	57	45
age 3 kokanee	nd	120	128	94	10	11	8
fish >33 cm whitefish and others	nd	6	13	6	3	3	4
Total (echosounder)		634	674	553	339	285	376
Mean Fish Lengths (cm)							
age 0 sockeye	5.5	6.2	7.3	8.4	8.9		9.8
age 0 kokanee	2.9	4	4.6	5.6	6.6		7.0
age 1 kokanee	8.8	9.7	11.8	12.4	13.5		14.3
age 2 kokanee	nd	16.8	18.4	17.8	19.0		20.2
age 3 kokanee	nd	20.2	20.9	20.8	spawn		spawn
whitefish	42.9	42.9	42.9	42.9	42.9		42.9
Mean Fish Weights (g ww)							
age 0 sockeye	1.7	2.6	4.1	6.5	7.3		9.7
age 0 kokanee	0.2	0.5	0.9	1.8	2.6		3.4
age 1 kokanee	7.4	10.3	18.4	21.9	25.4		30.3
age 2 kokanee	nd	53.3	79.6	65.5	71.2		90.8
age 3 kokanee	nd	90.1	110.9	107.6	spawn		spawn
whitefish							

Year 2008 Skaha Lake fish summary

Year 2008	01-Jul 2008	5 - 8 Aug 2008	3-10 Sept 2008	30 Sept - 01 Oct 2008	04 Nov 2008	09 April 2009
Density per ha						
age 0 sockeye	136	157	156	41	87	
age 0 kokanee	59	54	89	115	85	166
age 1 kokanee	106	63	104	66	61	40
age 2 kokanee	95	63	67	46	35	21
age 3 kokanee	116	72	83	50	12	
fish >33 cm whitefish and others	16	13	16	13	9	0.3
age 1 sockeye	0	0	4	0	2	0.0
Total (echosounder)	529	422	518	331	291	248
Mean Fish Length (cm)						
age 0 sockeye	5.7	6.3	7.6	7.8	9.2	9.3
age 0 kokanee	3.8	4.3	5.3	5.7	6.7	7.3
age 1 kokanee	8.7	9.6	10.7	12.6	12.3	13.0
age 2 kokanee	17.7	18.1	18.5	18.6	19.0	
age 3 kokanee	22.6	22.7	22.3	22.9	25.5	36.0
whitefish		1056				
age 1 sockeye			15.2		14.5	
Mean Fish Weight (g)						
age 0 sockeye	1.7	2.8	5.0	5.3	8.5	8.8
age 0 kokanee	0.4	0.8	1.4	1.9	2.9	3.9
age 1 kokanee	6.3	9.8	13.8	21.2	19.8	21.8
age 2 kokanee	57.5	71.0	72.9	72.2	74.2	71.2
age 3 kokanee	124.1	140.3	121.3	135.9	186.4	
whitefish						
age 1 sockeye			42.1		33.6	

Year 2009 Skaha Lake fish summary

Year 2009	2 June 2009 release	16-Jun-09	20-Jul-09	26-Aug-09	30-Sep-09	26-Nov-09	11-Feb-10
Density per ha							
age 0 sockeye	830	321	303	435	152	119	290
age 0 kokanee		58	88	194	318	205	73
age 1 kokanee		68	127	204	111	103	86
age 2 kokanee		43	67	84	43	27	23
age 3 kokanee		65	109	93	50	19	15
fish >33 cm whitefish and others		10	21	28	20	7	6
Age 1 sockeye		0	0	0	0	0	0
Total (echosounder)		565	714	1037	695	479	493
Mean Fish Length (cm)							
age 0 sockeye	5.0	5.2	5.9	6.9	7.9	9.3	9.7
age 0 kokanee		3.0	3.9	4.8	5.7	6.6	7.3
age 1 kokanee		8.4	9.8	11.4	12.5	nd	14.5
age 2 kokanee		13.6	16.3	16.4	19.0	19.4	20.1
age 3 kokanee		19.8	20.0	20.2	22.6	nd	nd
whitefish				43.0			
Mean Fish Weight (g)							
age 0 sockeye	1.1	1.4	2.2	3.2	5.3	7.9	8.6
age 0 kokanee		0.2	0.6	1.0	2.0	2.5	3.6
age 1 kokanee		6.2	10.0	17.1	22.0	nd	31.5
age 2 kokanee		27.4	49.5	54.6	80.1	77.8	87.3
age 3 kokanee		79.8	90.1	98.9	138.7	nd	nd
whitefish				997.4			1000

Year 2010 Skaha Lake fish summary

Year 2010	2 June 2010 release	23-Jun-10	5-22 July 10	10-18 Aug 10	8-9 Sept 10	4-5 Oct 10	4-9 Nov 10	7-9 March	Average
Skaha Lake density per ha									
age-0 sockeye	224	172	172	130	88	42	17	28	109
age-0 kokanee		34	40	64	85	109	114	60	72
age 1 kokanee		110	82	63	54	41	22	42	59
age 2 kokanee		60	67	58	35	25	19	17	40
age 3 kokanee		27	39	41	20	10	7	10	22
fish >33 cm whitefish and others		16	23	28	20	11	8	5	16
age 1 sockeye		0	0	0	0	0	1	0	0
Total (echosounder)		419	423	385	301	238	187	160	318
Mean fish length (cm)									
age-0 sockeye		5.5	6.3	6.9	8.0	8.5	9.1	10	
age-0 kokanee		3.5	4.3	5.1	5.8	6.2	6.9	7.9	
age 1 kokanee		9.1	10.1	11.4	12.2	12.7	14.1	14.8	
age 2 kokanee		16.4	16.8	18.6	19.2	19.9	nd	19.5	
age 3 kokanee		20.4	20.4	21.6	22.7	23.5	nd	nd	
whitefish									
age 1 sockeye		nd	nd	nd	nd	nd	14.9	nd	
Mean fish weight (g)									
age-0 sockeye		1.7	2.5	3.5	5.3	6.7	8.1	10.0	
age-0 kokanee		0.4	0.7	1.4	1.9	2.3	3.3	4.9	
age 1 kokanee		8.3	11.4	16.8	20.9	23.1	28.5	35.0	
age 2 kokanee		45.3	53.7	71.7	84.2	87.6	nd	78.6	
age 3 kokanee		90.3	93.5	108.0	139.0	153.7	nd	nd	
whitefish									
age 1 sockeye		nd	nd	nd	nd	nd	36.1	nd	

Year 2011 Skaha Lake fish summary

Year 2011	1-2 June 2011 release	28 June-04 Jul 2011	21 Jul - 25 Jul 2011	31 Aug 2011	25 Oct - 26 Oct 2011	24 Nov - 06 Dec 2011	6-15 March 2012	Average
Density per ha								
age-0 sockeye	462	343	397	203	70	198	173	264
age-0 kokanee		34	71	225	201	236	142	152
age-1 kokanee		51	67	101	98	71	77	78
age-2 kokanee		46	75	83	42	44	22	52
age-3 kokanee		58	48	40	0	19	8	29
fish >33 cm whitefish and others		22	29	43	15	21	6	18
age-1 sockeye		0	0	0	0	0	0	0
Total (echosounder)		554	687	652	426	587	428	
Mean Fish Length (cm)								
age-0 sockeye		5.9	6.4	7.5	8.7	9.4	9.8	
age-0 kokanee		4.2	4.2	5.0	6.4	6.9	7.3	
age-1 kokanee		10.4	11.8	12.1	14.0	15.6	15.7	
age-2 kokanee		19.0	18.9	20.8	20.6	20.2	21.0	
age-3 kokanee		23.9	49.1	nd	nd	26.8	nd	
fish >33 cm (whitefish)		nd	nd	nd	nd	nd	nd	
age-1 sockeye		nd	nd	nd	nd	nd	nd	
Mean Fish Weight (g)								
age-0 sockeye	1.1	2.1	2.8	4.5	7.4	9.1	9.8	
age-0 kokanee		0.8	0.7	1.2	2.8	3.2	3.9	
age-1 kokanee		12.4	18.7	22.0	32.2	40.6	40.6	
age-2 kokanee		74.6	76.9	112.8	97.6	91.8	103.7	
age-3 kokanee		140.0	1385.0	nd	nd	251.1	nd	
fish >33 cm (whitefish)		nd	nd	nd	nd	nd	nd	
age-1 sockeye		nd	nd	nd	nd	nd	nd	

Year 2012 Skaha Lake fish summary

Year 2012	No hatchery fry released	16-Jun-12	16-Jul-12	6-Sep-12	20-Oct-12	16-Nov-12	16-17 Feb 2013
Density per ha							
age 0 kokanee	0	33	26	166	504	212	231
age 1 kokanee		75	64	59	47	41	73
age 2 kokanee		67	59	29	26	18	18
age 3 kokanee		69	39	32	10	4	6
fish >33 cm whitefish and others		30	30	26	13	4	3
wild sockeye		693	722	634	140	250	273
Total (echosounder)		967	939	946	740	529	604
Mean Fish Length (cm)							
age 0 kokanee		3.0	3.5	4.8	5.8	6.4	nd
age 1 kokanee		8.5	9.1	11.2	nd	12.7	10.9
age 2 kokanee		17.0	19.9	19.8	nd	17.3	18.25
age 3 kokanee		21.8	28.3	23.9	nd	nd	nd
wild sockeye		4.2	5.5	6.7	7.9	7.9	nd
Mean Fish Weight (g)							
age 0 kokanee		0.2	0.4	1.0	2.0	2.7	nd
age 1 kokanee		6.7	7.9	15.2	nd	21.7	12.6
age 2 kokanee		51.7	83.5	89.1	nd	57.5	68.5
age 3 kokanee		110.6	292.1	164.4	nd	nd	nd
wild sockeye		0.7	1.7	3.1	5.5	5.2	nd

Year 2013 Skaha Lake fish summary

Year 2013	01-Jun-13	09-Jul-13	2-Aug-13	04-Sep-13	04-Oct-13	04-Nov-13	12-Mar-14
Skaha Lake density per ha							
All age-0 nerkids	270	458	528	617			
Age 0 kokanee					261	280	228
Age 0 wild sockeye					33	19	21
Age 0 hybrids					27	16	13
Age 1 kokanee	324	125	102	145	114	126	125
Age 2 kokanee	66	57	36	52	54	15	15
Age 3 kokanee	83	56	35	57	59	33	7
fish >33 cm whitefish and others	7	6	7	24	20	13	6
Total (echosounder)	750	701	708	896	568	503	416
Mean fish length (cm)							
Age 0 kokanee					5.9	6.7	7.6
Age 0 wild sockeye					7.5	8.1	8.9
Age 0 hybrids					6.4	7.3	8.0
Age 1 kokanee	8.3	9.3	10.1	11.7	11.7	13.2	13.1
Age 2 kokanee	13.4	16.3	16.8	17.5	nd	18.5	19.8
Age 3 kokanee	26.2	25.5	22.0	22.5	nd	29.8	nd
Mean fish weight (g)							
Age 0 kokanee					2.1	3.2	4.5
Age 0 wild sockeye					4.7	5.9	7.3
Age 0 hybrids					2.9	4.2	5.3
Age 1 kokanee	6.0	9.2	12.6	19.1	17.4	24.9	23.1
Age 2 kokanee	25.5	48.5	56.1	62.5	nd	66.7	82.7
Age 3 kokanee	267.3	190.3	125.3	126.3	nd	323.2	nd

SKAHA LAKE FISH STOMACHS

Table 14. Year 2006-2013 fish stomach summary as average numbers of each prey type found in stomachs collected through the summer-fall from age-0 sockeye, age-0 kokanee and ages 1,2,3+ kokanee.

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

Year 2006	**Number of fish processed**	*Diacyclops*	*Leptodiaptomus*	*Epischura*	*Bosmina*	*Daphnia*	*Leptodora*	*Polyphemus*	*Diaphanosoma*	*Mysis* adult	*Mysis* larval stage	Chironomid Larva	*Sida*
<u>June 26</u>													
age 0 sockeye	15	29	19	8	1	43	0	0	1	0	0	0	0
age 0 kokanee	4	27	2	3	0	1	0	0	0	0	0	0	0
age 1 kokanee	10	22	4	7	1	201	0	0	3	0	0	0	3
age 2 kokanee	6	36	9	1	2	189	0	0	1	1	0	0	0
age 3 kokanee	2	4	7	1	0	16	0	0	3	11	0	0	0
<u>Jul 24 - Aug 3</u>													
age 0 sockeye	39	11	0	3	0	72	0	0	0	1	0	0	0
age 0 kokanee	48	46	0	4	0	33	0	0	0	0	0	0	0
age 1 kokanee	10	1	0	1	0	249	0	0	0	0	0	0	0
age 2 kokanee	2	1	0	1	0	747	7	0	0	15	0	0	0
age 3 kokanee	4	1	0	0	0	15	0	0	1	37	0	0	0
<u>Sept 20 - 27</u>													
age 0 sockeye	3	32	0	62	0	16	0	0	0	0	0	0	0
age 0 kokanee	106	58	0	52	0	15	0	0	0	0	0	0	0
age 1 kokanee	2	1	3	35	0	91	0	0	11	0	0	0	0
age 2 kokanee	1	0	0	0	0	451	0	0	0	0	0	0	0
age 3 kokanee	1	0	0	7	0	348	0	0	11	1	0	0	0
<u>Dec 13 - 15</u>													
age 0 sockeye	10	6	234	3	0	0	0	0	0	0	0	0	0
age 0 kokanee	24	4	117	13	0	0	0	0	0	0	0	0	0
age 1 kokanee	0												
age 2 kokanee	0												
age 3 kokanee	0												

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

Year 2007	**Number of fish processed**	Nauplii	*Diacyclops*	*Leptodiaptomus*	*Epischura*	*Bosmina*	*Daphnia*	*Leptodora*	*Polyphemus*	*Diaphanosoma*	*Mysis* adult	*Mysis* larval stage	Chironomid larva	*Sida*	Mayfly	Adult fly
June 11 - 20																
age 0 sockeye	29	0	17	0	19	1	1	0	0	0	0	0	0	0	0	0
age 0 kokanee	4	0	26	0	7	0	0	0	0	0	0	0	0	0	0	0
age 1 kokanee	7	0	63	0	33	1	0	0	0	0	0	0	0	0	0	0
age 2 kokanee	0															
age 3 kokanee	0															
July 16 - 23																
age 0 sockeye	21	0	19	0	43	0	40	0	0	0	0	0	0	0	0	0
age 0 kokanee	12	0	24	0	6	0	2	0	0	0	0	0	0	0	0	0
age 1 kokanee	23	0	12	4	20	0	385	1	0	0	0	0	0	0	0	0
age 2 kokanee	11	0	20	2	12	0	345	2	0	0	0	0	0	0	0	0
age 3 kokanee	7	0	15	7	9	1	303	0	0	0	0	0	0	0	0	0
Aug 13-15																
age 0 sockeye	27	0	19	0	10	0	90	0	0	0	0	0	0	0	0	0
age 0 kokanee	31	0	27	0	9	0	34	0	0	0	0	0	0	0	0	0
age 1 kokanee	5	0	1	0	3	6	196	0	0	0	0	0	0	0	0	0
age 2 kokanee	18	0	25	0	8	1	633	0	0	0	0	0	0	0	0	0
age 3 kokanee	25	0	19	0	17	0	942	0	0	0	0	0	0	0	0	0
Oct 1 - 2																
age 0 sockeye	25	0	45	0	27	0	63	0	0	0	0	0	0	0	0	1
age 0 kokanee	26	0	31	0	30	0	41	0	0	0	0	0	0	0	0	0
age 1 kokanee	15	0	5	0	11	50	59	0	0	0	1	0	0	0	0	0
age 2 kokanee	2	0	0	0	74	0	310	0	0	0	20	0	0	0	0	0
age 3 kokanee	33	0	4	0	5	0	164	0	0	0	4	0	0	0	0	1
Nov 13																
age 0 sockeye	25	0	158	0	22	0	0	0	0	0	1	0	0	0	0	0
age 0 kokanee	25	0	47	0	4	0	0	0	0	0	0	0	0	0	0	0
age 1 kokanee	5	0	763	0	4	0	1	0	0	0	0	0	0	0	0	0
age 2 kokanee	1	0	58	0	0	0	0	0	0	0	4	0	0	0	0	0
age 3 kokanee	0															

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

Year 2008	**Number of fish processed**	Nauplii	*Diacyclops*	*Leptodiaptomus*	*Epischura*	*Bosmina*	*Daphnia*	*Leptodora*	*Polyphemus*	*Diaphanosoma*	*Mysis* adult	*Mysis* larval stage	Chironomid larva	Mayfly	Adult fly	fly larva
July 20																
stocked sockeye	18	0	53	0	0	2	0	0	0	0	0	0	1	0	0	0
age 0 kokanee	21	0	42	0	0	1	0	0	0	0	0	0	0	0	0	0
age 1 kokanee	34	0	122	0	0	0	9	0	0	0	0	0	0	0	0	0
age 2 kokanee	6	0	189	0	27	5	79	0	0	0	0	0	0	0	0	0
age 3 kokanee	5	0	14	0	8	0	0	0	0	0	34	0	0	0	0	0
Age 2 sockeye																
Aug 5																
stocked sockeye	12	0	20	0	11	2	23	0	0	0	1	0	1	0	0	0
age 0 kokanee	11	0	14	0	10	0	30	0	0	0	0	0	0	0	0	0
age 1 kokanee	15	0	24	0	16	0	96	0	0	0	1	0	0	0	0	0
age 2 kokanee	7	0	27	0	10	0	210	4	0	0	2	0	0	0	0	0
age 3 kokanee	1	0	0	0	13	0	641	7	0	0	0	0	0	0	0	0
Age 2 sockeye																
Sept 3																
stocked sockeye	0															
age 0 kokanee	0															
age 1 kokanee	25	0	17	0	28	0	97	0	0	0	1	0	0	0	0	0
age 2 kokanee	19	0	38	0	40	0	245	0	0	8	1	0	0	0	0	0
age 3 kokanee	10	0	140	0	32	0	115	0	0	10	12	0	0	0	0	0
Age 2 sockeye	2	0	0	0	0	0	4	0	0	0	10	0	0	0	0	0

(2008 continued)

Year 2008	**Number of fish processed**	Nauplii	*Diacyclops*	*Leptodiaptomus*	*Epischura*	*Bosmina*	*Daphnia*	*Leptodora*	*Polyphemus*	*Diaphanosoma*	*Mysis* adult	*Mysis* larval stage	Chironomid larva	Mayfly	Adult fly	fly larva
Oct 1																
stocked sockeye	14	0	20	0	35	0	10	0	0	0	1	0	0	0	1	0
age 0 kokanee	21	0	21	0	59	0	24	0	0	0	0	0	0	0	0	0
age 1 kokanee	9	0	26	0	57	0	74	0	0	5	0	0	0	0	12	0
age 2 kokanee	23	0	113	0	208	0	78	0	0	7	2	0	0	0	1	0
age 3 kokanee	16	0	226	0	382	0	97	0	0	16	12	0	0	0	3	0
Age 2 sockeye																
Nov 4																
stocked sockeye	20	0	111	0	53	0	1	0	0	0	2	0	0	0	0	0
age 0 kokanee	12	0	97	0	11	0	0	0	0	0	0	0	0	0	0	0
age 1 kokanee	17	0	54	0	87	0	1	0	0	0	2	0	0	0	0	0
age 2 kokanee	14	0	71	0	126	0	0	0	0	0	3	0	0	0	1	0
age 3 kokanee	1	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Age 2 sockeye	1	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0

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

Year 2009	**Number of fish processed**	*D. thomasi*	*L. ashlandi*	*Epischura*	*Bosmina*	*Daphnia*	*Leptodora*	*Diaphanosoma*	*Mysis*	Chironomid
June 16										
stocked sockeye	11	77	5	2	0	0	0	0	0	0
age 0 kokanee	9	37	0	0	1	0	0	0	0	0
age 1 kokanee	15	150	6	3	0	0	0	0	0	0
age 2 kokanee	8	225	1	60	0	1	0	0	0	1
age 3 kokanee	1	0	0	2	0	0	0	0	18	0
July 20										
stocked sockeye	21	10	0	39	0	14	0	0	0	0
age 0 kokanee	16	39	1	7	0	7	0	1	0	0
age 1 kokanee	4	7	0	32	0	126	5	0	0	0
age 2 kokanee	13	6	0	20	0	553	4	5	0	0
age 3 kokanee	11	9	0	23	0	684	5	11	1	0
Aug 26										
stocked sockeye	15	44	0	44	0	46	0	0	0	0
age 0 kokanee	8	42	0	37	0	5	0	0	0	1
age 1 kokanee	0									
age 2 kokanee	11	4	0	24	0	475	0	6	0	0
age 3 kokanee	5	0	0	22	0	907	0	2	9	0
Sep 30										
stocked sockeye	50	0	0	62	0	41	0	0	1	0
age 0 kokanee	24	2	0	31	0	12	0	0	0	0
age 1 kokanee	2	22	0	41	0	16	0	0	0	0
age 2 kokanee	1	144	0	254	2	511	0	4	0	0
age 3 kokanee	4	79	0	161	0	330	4	5	4	0
Nov 31										
stocked sockeye	34	99	0	61	0	0	0	0	1	0
age 0 kokanee	12	88	0	23	0	0	0	0	0	0
age 1 kokanee	0									
age 2 kokanee	4	69	0	24	0	0	0	0	3	0
age 3 kokanee	0									

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

Year 2010	**Number of fish processed**	*D. thomasi*	*L. ashlandi*	*Epischura*	*Bosmina*	*Daphnia*	*Leptodora*	*Diaphanosoma*	*Mysis*	Chironomids
June 23										
stocked sockeye	9	53	0	3	0	4	0	0	0	0
age 0 kokanee	1	32	0	1	6	11	0	1	0	0
age 1 kokanee	15	112	0	18	1	150	0	12	0	0
age 2&3 kokanee	16	59	0	14	0	434	0	6	0	0
July 22										
stocked sockeye	6	9	0	2	1	27	0	0	1	0
age 0 kokanee	0	20	0	1	3	24	0	1	0	0
age 1 kokanee	14	19	0	3	0	416	0	1	0	0
age 2&3 kokanee	0	29	0	95	0	516	0	3	2	0
Sept 1										
stocked sockeye	16	3	0	16	0	43	0	0	1	0
age 0 kokanee	1	8	0	0	0	37	0	0	0	0
age 1 kokanee	1	56	0	81	0	0	0	0	0	0
age 2&3 kokanee	0	29	0	95	0	516	0	3	2	0
Oct 5										
stocked sockeye	10	0	0	86	0	66	0	0	0	0
age 0 kokanee	21	1	1	76	0	41	0	0	0	0
age 1 kokanee	0	56	0	81	0	0	0	0	0	0
age 2&3 kokanee	1	0	0	175	0	598	0	0	4	0

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

Year 2011	**Number of fish processed**	*Diacyclops*	*Leptodiaptomus*	*Epischura*	*Bosmina*	*Daphnia*	*Leptodora*	*Diaphanosoma*	*Mysis*	Chironomids	Adult fly
June 30											
stocked sockeye	31	109	0	2	1	8	0	0	0	0	9
age 0 kokanee	0										
age 1 kokanee	26	148	0	26	0	56	0	2	0	0	4
age 2&3 kokanee	24	181	0	2	0	2	0	0	1	0	0
July 25											
stocked sockeye	31	9	0	5	0	213	0	1	0	1	0
age 0 kokanee	0										
age 1 kokanee	9	44	0	10	0	487	0	11	1	0	2
age 2&3 kokanee	13	127	0	27	0	719	0	0	2	0	0
Aug 31											
stocked sockeye	22	41	0	14	0	180	0	0	2	0	0
age 0 kokanee	14	140	0	23	0	19	0	0	0	0	0
age 1 kokanee	5	41	0	7	0	601	0	0	0	0	0
age 2&3 kokanee	18	102	0	39	0	994	0	3	0	0	0
Oct 25											
stocked sockeye	22	53	0	53	0	8	0	0	4	0	1
age 0 kokanee	21	43	0	44	0	5	0	0	0	0	0
age 1 kokanee	6	207	0	190	0	12	0	0	2	0	10
age 2&3 kokanee	11	186	0	83	0	10	0	0	4	0	0

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

Year 2012	**Number of fish processed**	*Bosmina*	*Diacyclops*	*Leptodiaptomus*	*Daphnia*	*Epischura*	*Diaphanosoma*	*Leptodora*	*Mysid*	Chironomids	Insects
June 16											
age 0 nerkids	30	0	11	5	0	13	0	0	0	0	0
age 1 kokanee	20	0	113	29	0	51	0	0	0	0	2
age 2 kokanee	20	0	46	113	0	34	0	0	0	0	2
age 3 kokanee	20	0	12	45	0	6	0	0	2	0	0
July 17											
age 0 nerkids	48	0	59	7	15	54	39	0	0	0	0
age 1 kokanee	14	0	93	6	83	39	77	0	0	1	0
age 2 kokanee	11	1	25	2	87	41	95	1	2	2	0
age 3 kokanee	11	0	20	3	20	48	16	0	1	0	0
Sept 6											
age 0 nerkids	50	0	5	0	326	19	0	0	0	0	0
age 1 kokanee	9	0	0	0	2369	10	0	0	0	0	0
age 2 kokanee	2	0	11	5	2987	11	0	0	0	0	0
age 3 kokanee	2	0	0	8	3912	8	0	0	0	0	0
Oct 14											
age 0 nerkids	50	0	7	26	46	53	3	0	0	0	0
Nov 16											
age 1 kokanee	11	0	103	887	0	112	12	0	2	0	0
age 2 kokanee	1	0	0	0	0	0	0	0	3	0	0

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

Year 2013	**Number of fish processed**	*Cyclops*	Calanoid	*Epischura*	*Daphnia*	*Bosmina*	*Leptodora*	*Diaphanosoma*	*Mysis*	Chironomid larvae	Adult fly	Fish
June 4												
age-0 nerkids	4	75	230	95	0	0	0	0	0	0	0	0
age-1 kokanee	36	297	154	22	0	7	0	0	0	0	3	0
age-2 kokanee	31	886	799	36	0	7	0	1	0	0	4	0
age-3 kokanee	5	225	247	3	0	2	0	0	1	0	1	32
July 10												
age-0 nerkids	30	66	5	31	3	0	0	1	1	0	0	0
age-1 kokanee	30	12	6	51	208	0	0	357	0	0	0	0
age-2 kokanee	44	27	19	10	347	0	0	700	0	0	0	0
age-3 kokanee	4	13	10	12	129	0	0	229	0	0	0	0
Aug 2												
age-0 nerkids	30	73	20	41	7	0	0	1	0	0	0	0
age-1 kokanee	30	6	0	27	66	0	0	5	0	0	0	0
age-2 kokanee	16	4	0	4	548	0	0	99	0	0	0	0
age-3 kokanee	1	42	22	16	14	0	18	28	1	0	0	0
Sept 4												
age-0 nerkids	30	305	75	75	1	0	0	1	0	0	0	0
age-1 kokanee	30	8	2	235	482	0	0	20	0	0	0	0
age-2 kokanee	7	8	14	29	1072	0	0	86	0	0	0	0
age-3 kokanee	1	10	30	50	5500	0	50	380	0	0	0	0
Oct 4												
age-0 nerkids	30	3	33	149	94	1	0	5	0	0	0	0
age-1 kokanee	10	6	20	246	198	2	0	22	0	0	0	0
age-2 kokanee	0											
age-3 kokanee	0											
Nov 5												
age-0 nerkids	30	32	112	195	0	0	0	0	0	0	0	0
age-1 kokanee	30	175	1275	850	0	0	0	0	0	0	2	0
age-2 kokanee	4	10	270	590	0	0	0	10	0	0	2	0
age-3 kokanee	2	1	3	5	0	0	0	1	18	0	0	0

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