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# Preliminary assessment of the suitability of Canadian Great Lakes tributaries for Asian carp spawning

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**Foreword**

This series documents the scientific basis for the evaluation of aquatic resources and ecosystems in Canada. As such, it addresses the issues of the day in the time frames required and the documents it contains are not intended as definitive statements on the subjects addressed but rather as progress reports on ongoing investigations.

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## ABSTRACT

Grass Carp (*Ctenopharyngodon idella*), Bighead Carp (*Hypophthalmichthys nobilis*), Silver Carp (*H. molitrix*), and Black Carp (*Mylopharyngodon piceus*), collectively known as Asian carps, are invasive species that have become established in the Mississippi River basin of North America and have had significant ecological and socio-economic impacts on its ecosystem. Previous risk assessments identified broad, potential risks to Canada and the United States, including the Great Lakes. These risk assessments included assessing the likelihood of establishment based on the availability of spawning and nursery habitats. Kocovsky et al. (2012) used more detailed data on thermal and hydrologic conditions to predict the suitability of eight tributaries in the western basin of Lake Erie for Asian carp spawning. The objective of this study is to refine the predictions of suitable spawning tributaries in the Canadian Great Lakes basin (bound downstream in the St. Lawrence River at 45°N) based on: unimpounded tributary length and a predictive decision-tree based on the reproductive biology of Asian carps and methods of Kocovsky et al. (2012).

Forty-three tributaries in the Canadian Great Lakes basin were identified as unimpounded from their mouth at the Great Lakes to at least 100 km upstream. Sixteen of these tributaries were in the Lake Superior basin, 14 in the Huron basin, five in the Erie basin, and eight in the Ontario basin. Based on the methods of Kocovsky et al. (2012), spawning conditions were determined to be suitable or highly suitable in 12 of 14 Erie tributaries with sufficient gauging data, 21 of 29 Huron tributaries, 18 of 40 Ontario tributaries, all four St. Lawrence tributaries in Ontario, and six of 12 Superior tributaries.

## INTRODUCTION

Grass Carp (*Ctenopharyngodon idella*), Bighead Carp (*Hypophthalmichthys nobilis*), Silver Carp (*H. molitrix*), and Black Carp (*Mylopharyngodon piceus*), collectively known as Asian carps, are invasive species that have become established in the Mississippi River basin of North America and have had significant ecological and socio-economic impacts on its ecosystem (Chapman and Hoff 2011). These species were first introduced in the southern portion of the basin in the 1970s and have dispersed northward towards the Great Lakes basin (Kelly et al. 2011). The Great Lakes and Mississippi basins are hydrologically connected by the Chicago Sanitary and Shipping Canal (Moy et al. 2011). This connection has allowed the movement of fishes between the basins (e.g., Round Goby (*Neogobius melanostomus*) into the Mississippi (Laird and Page 1996, Koel et al. 2000, Chick and Pegg 2001)). Such movement is currently inhibited by the presence of electrical barriers in the canal (Moy et al. 2011); however, Asian carps might eventually circumvent the barriers in the event of barrier failure or by other human-mediated means such as movement and release through the bait and live food trades (Cudmore et al. 2012, 2017). Recently, increasing numbers and evidence of reproduction of Grass Carp have been reported in the Lake Erie basin (Chapman et al. 2013, Embke et al. 2016).

Risk assessments have identified broad, potential risks to Canada and the United States, including the Great Lakes (Mandrak and Cudmore 2004, Kolar et al. 2007, Cudmore et al. 2012, 2017). These risk assessments included assessing the likelihood of establishment based on the availability of spawning and nursery habitats. Asian carp spawning has been documented to occur in tributaries generally longer than 100 km (Krykhtin and Gorbach 1981, Kolar et al. 2007). Kolar et al. (2007) identified 22 American tributaries to lakes Erie, Huron, Michigan, and Superior that were unimpounded from the mouth to at least 100 km upstream. Mandrak and Cudmore (2004) took a more conservative approach, assuming that Asian carps may be able to spawn in shorter rivers, and identified 84 Canadian tributaries to the Great Lakes that were unimpounded from the mouth to at least 50 km upstream. Based on these results and the presence of suitable nursery habitats (wetlands), both risk assessments concluded that Asian carps could reproduce and establish in the Great Lakes if they were introduced.

The 100 km threshold for the minimum tributary length is related to the reproductive biology of Asian carps. It is believed that Silver Carp require an average of 2,685 total degree-days per year (GDD0; sum of mean daily water temperatures for all days above 0 °C) for each of several years to mature (Gorbach and Krykhtin 1981). In a northern native population, female Silver Carp matured at 4–10 years and males at 6–10 years (Gorbach and Krykhtin 1981). Once mature, they require a minimum water temperature of 17 °C and minimum number of total annual degree-days above 15 °C (GDD15) to reach spawning condition: 655 GDD15 for onset of spawning; and, 900 GDD15 for mass spawning (Gorbach and Krykhtin 1980). Asian carps are only known to spawn in rivers and it is believed that a rising hydrograph (flood event) is a primary spawning cue (Kolar et al. 2007). Spawning commonly occurs where there is a mixing of water, such as the confluence of rivers, rapids, or behind sandbars or islands (Kolar et al. 2007). Once the eggs are released and fertilized, it is thought that the semi-buoyant, fertilized eggs need to remain suspended in current until they hatch (Kolar et al. 2007). As fertilized eggs are approximately neutrally buoyant, they require a flow of about 0.1 m/s to remain suspended (Gorbach and Krykhtin 1980). Hatching time is related to temperature (Kolar et al. 2007 and references therein). It is thought that the newly hatched larvae need to settle in productive habitats (e.g., wetlands) for feeding and/or protection (Kolar et al. 2007). A recent spawning model has concluded that Grass Carp may be able to spawn in substantially shorter rivers depending on the amount of turbulence and dead zones in the river (Heer et al. 2020a,b).

Kocovsky et al. (2012) used thermal and hydrologic conditions to predict the suitability of eight tributaries in the western Lake Erie basin for Asian carp spawning. They used length of undammed river, predicted summer temperatures, and predicted water velocity during flood events to determine whether sufficient lengths of river are available for spawning of Asian carps. Most rivers examined were unimpounded for at least 100 km from the mouth and had summer temperatures suitable (> 21 °C) for rapid incubation of eggs of Asian carps. Predicted water velocity and temperature were sufficient to ensure that incubating eggs, drifting in the water column, would hatch before reaching Lake Erie for most flood events in most of the rivers if spawned far enough upstream. The Maumee, Sandusky, and Grand rivers were predicted to be the most likely to support Asian carp spawning, and the Black, Huron, Portage, and Vermilion rivers were predicted to be less suitable. The model of Kocovsky et al. (2012) assumed simple linear velocity of eggs; however, the continued suspension and flow of eggs will be influenced by turbulence. To account for turbulence, Garcia et al. (2013) developed a three-dimensional model of the egg position in the water column over time. This model requires Acoustic Doppler Current Profiler surveys or a hydrodynamic model, both of which require considerable resources and data (Murphy and Jackson, 2013, Garcia et al. 2015). However, to date, such data or models are generally not available for tributaries in the Canadian Great Lakes basin (but see Heer et al. 2019). Heer et al. (2019) used daily flow and temperature data obtained from the Toronto Region Conservation Authority in a model similar to the Kocovsky et al. (2012) to determine the suitability of eight Toronto-area Lake Ontario tributaries for Asian carp spawning. Inter-annual suitability varied greatly, and six tributaries were found to be suitable in at least one of six years over the study period, 2009–2014.

The objective of this study is to refine the predictions of suitable spawning tributaries across the Canadian Great Lakes basin (bound downstream in the St. Lawrence River at 45°N) based on unimpounded tributary length (sensu Mandrak and Cudmore 2004, Kolar et al. 2007), and by developing a predictive decision-tree based on the reproductive biology of Asian carps, data available for tributaries in the Canadian Great Lakes basin, and methods of Kocovsky et al. (2012).

## METHODS

For the Canadian Great Lakes basin, tributaries suitable for Asian carp spawning were identified by using only unimpounded tributary length and by predicting suitability based on reproductive requirements similar to Kocovsky et al. (2012).

In the event that 50 km, as used in Mandrak and Cudmore (2004), is too short for successful spawning, tributaries unimpounded from their mouth at a Great Lake to at least 100 km upstream were identified as done in Kolar et al. (2007). Unimpounded stream length was measured using Network Analyst in ArcMap 9.3. A network was developed using the 1:10,000 Waterflow layer compiled by the Ontario Ministry of Natural Resources and Forestry (OMNRF). A barrier layer was constructed using data from OMNRF (Dams and Barriers, Water Structures, DrainagePoint (Falls object only), DrainagePoint (Falls object only) layers), and Natural Resources Canada CanVec (BlockedPassage, HydrographicObstacle (Falls object only), ManmadeHydrographicEntity). Unimpounded stream length was measured from a point created at the intersection of each tributary and the Great Lakes shoreline to 100 km, or the first barrier, whatever came first.

Tributaries suitable for Asian carp spawning were also identified based on their reproductive requirements related to water temperature and velocity (sensu Kocovsky et al. 2012). The Water Survey of Canada (WSC) has online data reporting mean discharge and, sometimes, temperature, but does not report velocity, which is a key driver of Asian carp spawning, or

provide discharge ratings curve that can be used to back-calculate velocity from discharge. Therefore, manually measured velocity and temperature data used to develop discharge ratings curves at their gauging stations were obtained from WSC for 865 stations in the Canadian Great Lakes basin including the St. Lawrence River to the Quebec border (Figure 1). The data were generally measured on multiple dates per year over multiple years, 1960–2010, but were not sufficient to calculate mean daily or weekly values. Therefore, mean, maximum, and minimum values for temperature and velocity were calculated on a biweekly basis and plotted for each of 865 stations with at least five years of data (Figure 1, Figure 2). A line parallel to the x-axis was added to the plot to represent velocity of 0.7 m/s (Figure 2), commonly reported in the literature as a threshold velocity required to trigger spawning (Kocovsky et al. 2012), although simply a rising hydrograph may be sufficient (Verigin 1979, Yi et al. 1988, Embke et al. 2016). The temperature data were also used to determine if GDD0 of 2,685 total degree-days per year, required over several years for maturity, was reached at each gauging station. Trend surfaces for GDD0 were interpolated using inverse weighted distance from the Water Survey of Canada gauging station data to determine the general patterns of these variables in the Canadian Great Lakes basin. As the Asian carps may actually mature in the Great Lakes proper prior to undertaking spawning migrations into tributaries, GDD0 was also obtained for the Great Lakes from the National Oceanic and Atmospheric Administration (NOAA) Great Lakes Coastal Forecasting System.

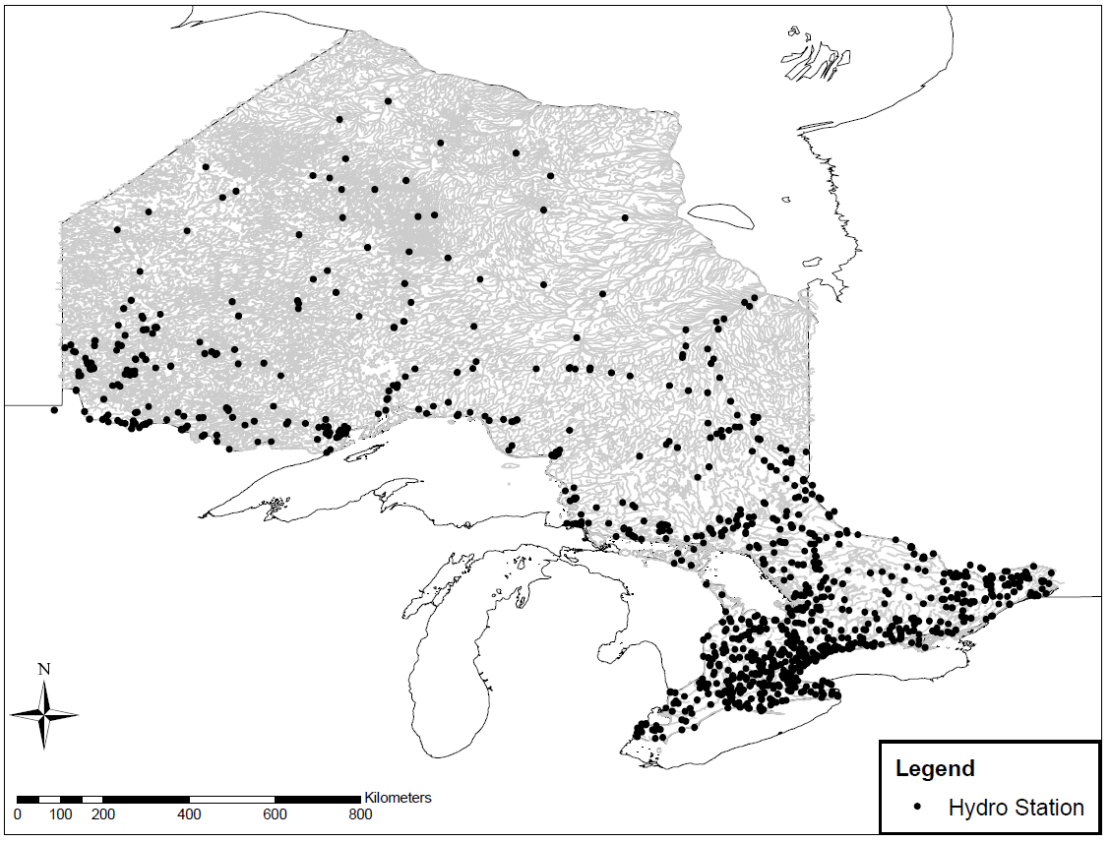


*Figure 1. The 865 Water Survey of Canada stream gauging stations considered in this survey.*

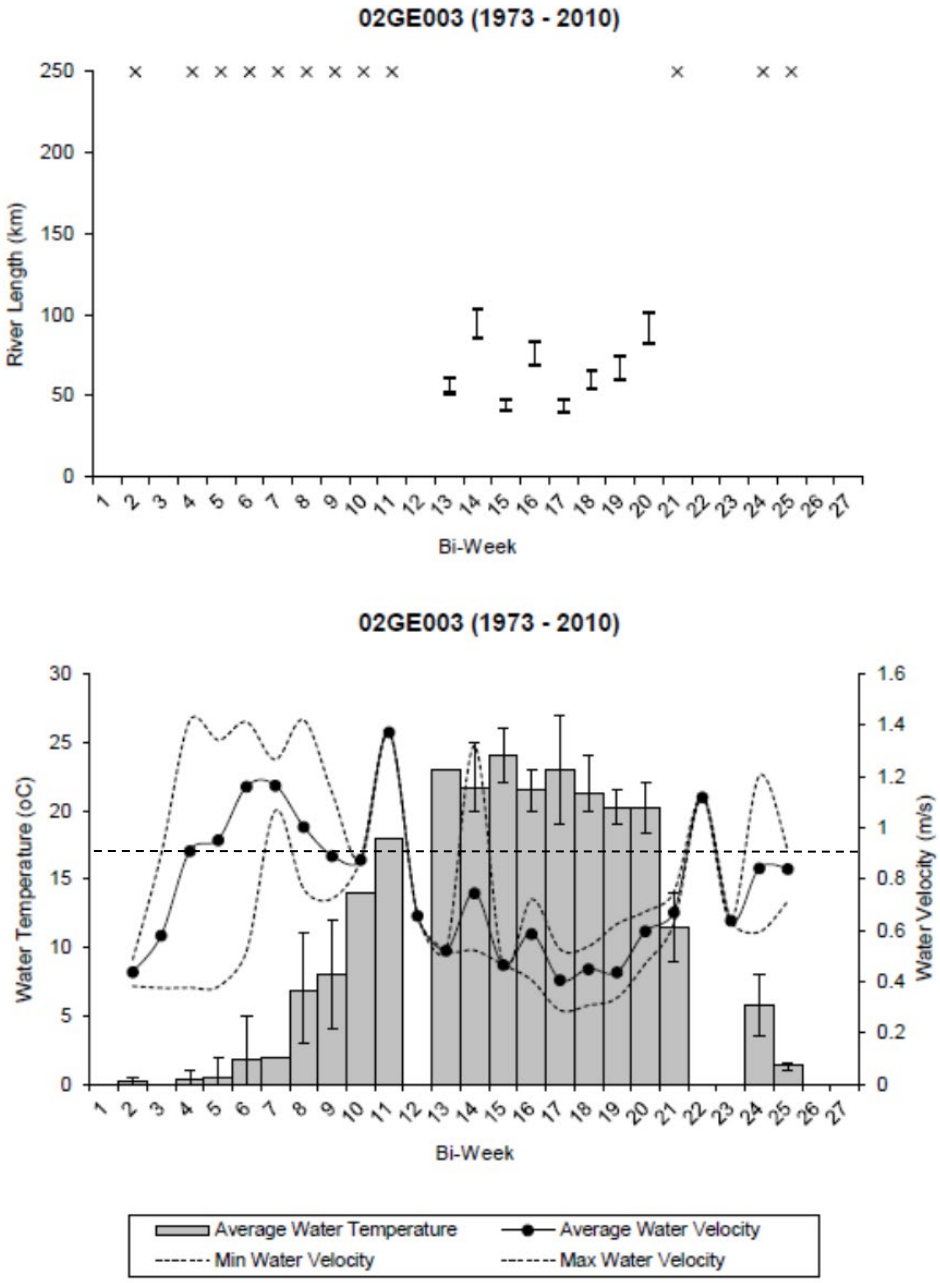


*Figure 2. An example of the graphs used to assess suitability of tributaries in the Great Lakes basin for Asian carp spawning on a biweekly basis. In this example, "02GE003" is the gauging station number and "(1973–2010)" is the range of years for which data are available. Note that this analysis was done only for stations with a minimum of five years of records. Top graph: The bars represent the range of river length required based on Equation 1, which is based on water velocity and water temperature requirements for egg drift and hatch. The horizontal lines on the bar represent, from top to bottom, the results based on: average values using the equation of Anonymous (1970); average values using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (min-max) continuous lines. The horizontal dashed line represents a water velocity of 0.7 m/s, often identified as minimum flow required to trigger spawning.*

Calculations of 655 and 900 GDD15, required for onset and mass spawning at maturity, based on the biweekly water temperatures at the gauging stations indicated that these values would generally not be attained in the rivers (data obtained from the Great Lakes Aquatic Habitat Framework). However, these temperatures would not be representative of all, potentially warmer, microhabitats in the river or areas at the mouth and in the lake adjacent to the spawning river.

Length (km) of river required for egg hatching (D) was calculated and plotted (Figure 2) on a biweekly basis based on hatching time and stream velocity using the following equation (after Kocovsky et al. 2012):

$$D = 3600 * V * 1/1000 = 3.6 * V * I \qquad \text{(Equation 1)}$$

where V = stream velocity (m/s), I = estimated incubation time (h), 3600 = s/h, and 1,000 = m/km.

Estimated incubation times for Asian carps have been published by several authors. Nico et al. (2005) provided two equations for egg hatching times in Asian carps from the Chinese literature: Black Carp (Chang 1966); and, Grass Carp (Anonymous 1970 as cited in Nico et al. 2005) (Table 1). Egg hatching times are also provided for Silver Carp by Guo (1980) and Tsuchiya (1980, as cited in Kolar et al. 2007). Power equations based on the four studies are not significantly different (ANOVA, F = 0.38, p = 0.77); therefore, we used the equations that gave the lowest and highest mean hatching times over the 15–35°C temperature range – Anonymous (1970; as cited in Nico et al. 2005) and Chang (1966), respectively. Using these two equations, length of river required for hatching was calculated on a biweekly basis using average velocity and temperature to determine average river length required and maximum velocity and temperature to determine minimum river length required (Figure 2).

*Table 1. Hatching rates for Asian carp eggs. y = hatching time (h); x = water temperature (°C). The equations are not significantly different (ANOVA; F = 0.38, p = 0.77).*

| Species | Equation | $R^2$ | Reference |
|---|---|---|---|
| *C. idella* | $y = 233855x^{-2.4915}$ | 0.9902 | Anonymous 1970 (cited in Nico et al. 2005) |
| | $y = 18779x^{-1.979}$ | 0.9736 | Guo 1980 |
| *H. molitrix* | $y = 22456x^{-2.0989}$ | 0.988 | Guo 1980 |
| | $y = 21311x^{-2.8057}$ | 0.9539 | Tsuchiya 1980 (cited in Kolar et al. 2007) |
| *M. piceus* | $y = 2\ 33855x^{-2.822}$ | 0.9736 | Chang 1966 |

A decision tree was developed based on the spawning requirements of Asian carps related to water temperature (used to measure growing degree-days and calculate hatching rate) and velocity (used to identify rising hydrographs and calculate minimum unimpounded river length) (Figure 3). As wetlands are present throughout the basin and in most tributary mouths (Mandrak and Cudmore 2004), nursery habitat is likely present in the lower reaches of most tributaries; therefore, nursery habitat was not included in the final decision tree.

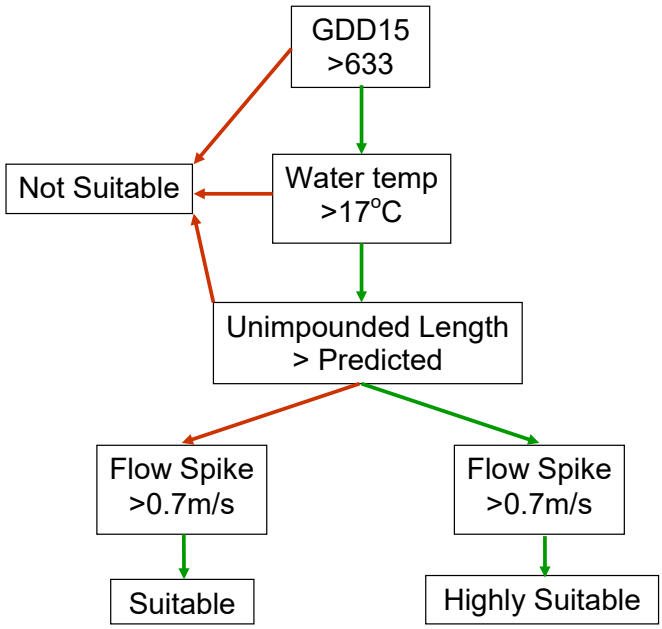


*Figure 3. Decision tree used to assess suitability of tributaries in the Canadian Great Lakes basin for Asian carp spawning.*

The decision tree (Figure 3) was applied to the figures for each gauging station with sufficient temperature and velocity data and the following information was recorded (Appendix 2):

i. unimpounded length using the method described above or using Google Earth where barriers were known but not in GIS barrier layer;

ii. biweek by which water temperature > 17 °C;

iii. minimum length of stream required by biweek when water temperature > 17 °C;

iv. shortest of the minimum length of stream required;

v. biweeks of flow spikes;

vi. biweeks of possible spawning;

vii. biweeks of possible spawning with flow spikes > 0.7 m/s;

viii. final spawning suitability; and,

ix. comments on reason why deemed not suitable.

As many tributaries had several gauging stations, overall suitability for each tributary was determined to be the maximum suitability among the gauging stations found in the tributary.

## RESULTS AND DISCUSSION

### PREDICTIONS BASED ON UNIMPOUNDED RIVER LENGTH

Forty-three tributaries in the Canadian Great Lakes basin were identified as unimpounded from their mouth at the Great Lakes to at least 100 km upstream (Figure 4). Sixteen of these tributaries were in the Lake Superior basin, 14 in the Huron basin, five in the Erie basin, and seven in the Ontario basin. These counts are based on the intersections of tributaries and the

coastline (i.e. the mouths) in Figure 4. These tributaries are less than half of the 84 tributaries unimpounded for 50 km identified by Mandrak and Cudmore (2004).

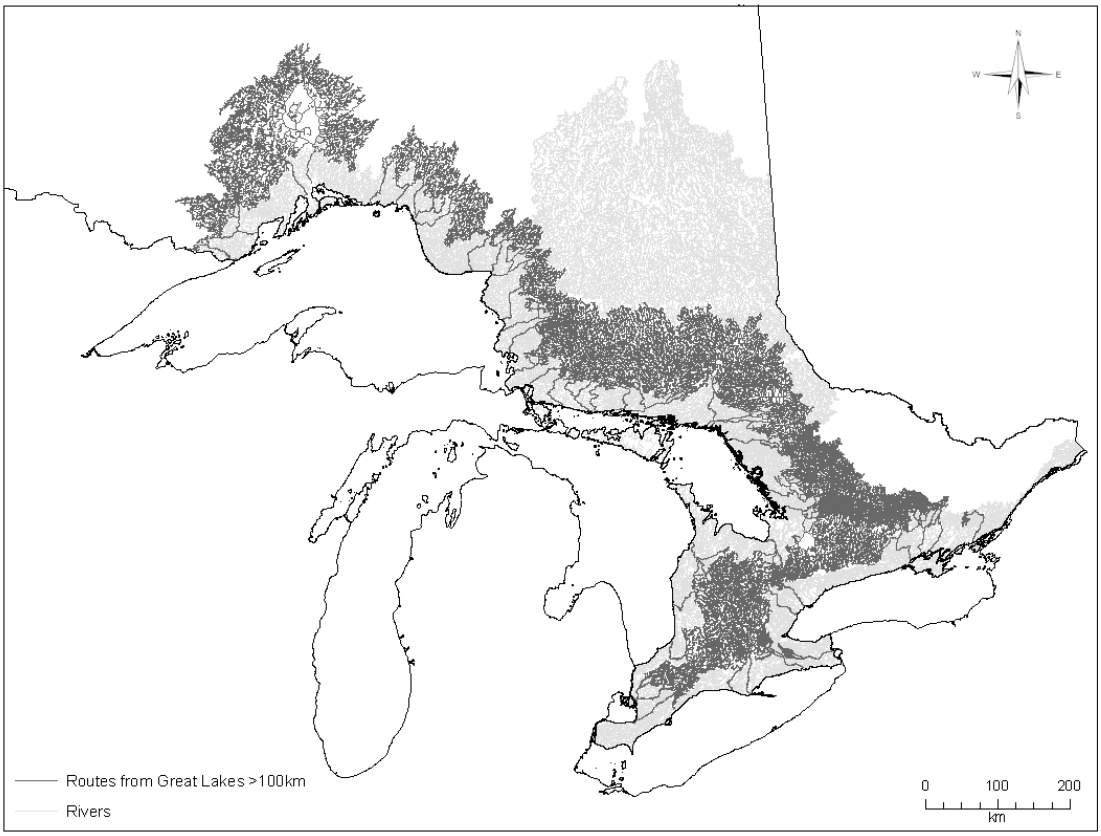


*Figure 4. Tributaries in the Canadian Great Lakes basin unimpounded from the mouth at a Great Lake to at least 100 km upstream (represented by dark grey lines).Combined light grey and dark grey lines represent all major tributaries in the Canadian Great Lakes basin at a scale of 1:10 000.*

## PREDICTIONS BASED ON SPAWNING SUITABILITY DECISION TREE

GDD0 reaches 2,655 for the gauging stations in the Erie, Huron, and Ontario basins, but only one of 12 otherwise suitable stations in the Superior basin. When interpolated from the gauging station data, GDD0 exceeds 2,600 in all basins but Superior (Figure 5). GDD0 exceeds 2,865 in most of lakes Erie, Huron, and Ontario, and large parts of Lake Superior (Figure 6). This indicates that Asian carps could mature to spawning condition in either the tributaries or lake proper of lakes Erie, Ontario, and Huron. Asian carps could mature in large parts of Lake Superior proper but not in most of its tributaries.

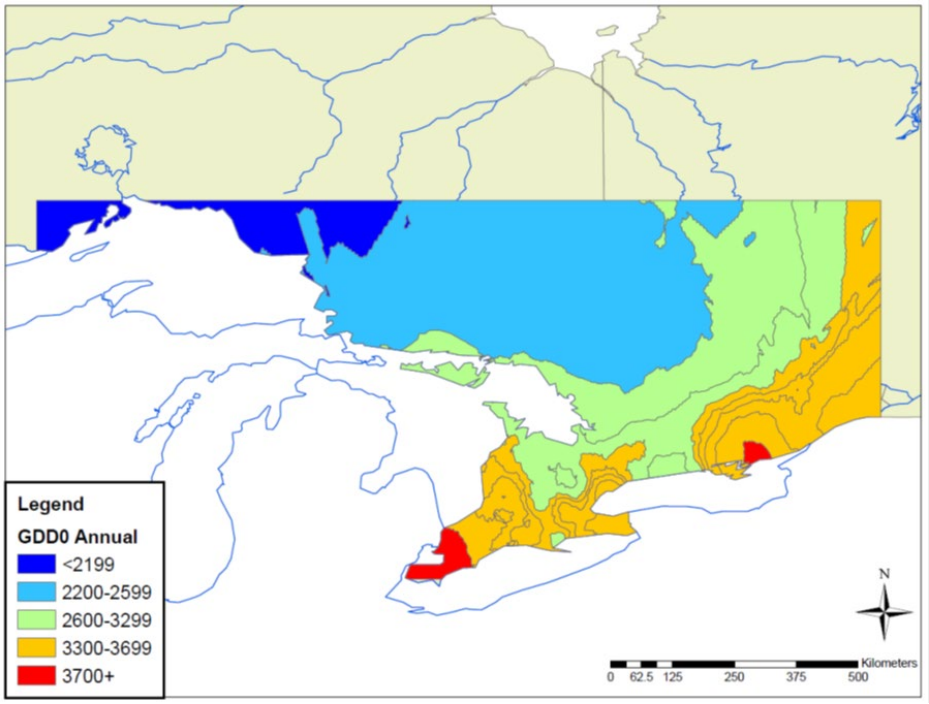


*Figure 5. Annual cumulative growing degree-days above 0 °C based on data for Water Survey of Canada gauging stations. An average of greater than 2,685 is required over several years for Asian carp maturation.*

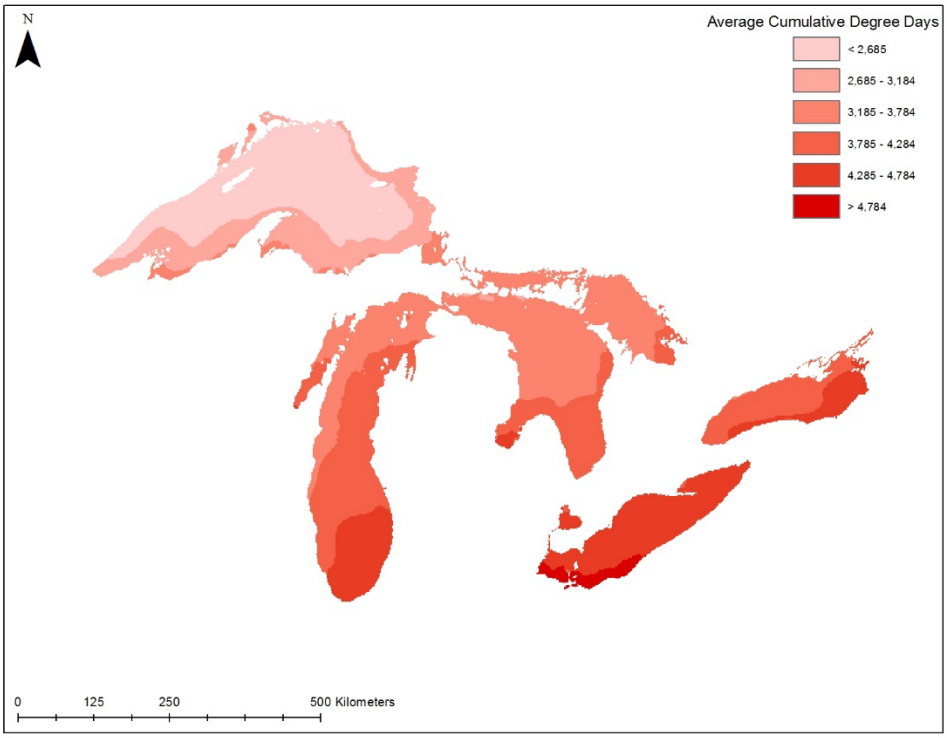


*Figure 6. Mean annual cumulative growing degree-days above 0 °C based on Great Lakes mean daily surface temperatures, 1995–2013. Data obtained from the Great Lakes Aquatic Habitat Framework. An average of greater than 2,685 is required over several years for Asian carp maturation.*

Of the 572 gauging stations with sufficient data to produce suitability graphs, there was sufficient data on the graphs to determine suitability at 222 stations in 99 tributaries (Appendix 2). Spawning conditions in the Canadian Great Lakes basin were determined to be suitable or highly suitable in 12 of 14 Erie tributaries with sufficient gauging data, 21 of 29 Huron tributaries, 18 of 40 Ontario tributaries, all four St. Lawrence tributaries, and six of 12 Superior tributaries (Tables 2, 3; Figures 7, 8). Tributaries that lacked suitable spawning conditions in Lake Huron and Lake Ontario tributaries largely were typically too short (Table 4), which is not surprising given the number of anthropogenic barriers in these basins. Lake Erie tributaries lacking suitable spawning conditions were either too short or exhibited no flow spike to trigger spawning as many Canadian Lake Erie watersheds are short in length and small in area. Some Lake Superior tributaries were not suitable due to barriers, typically dams, or lack or lateness of flow spikes that may be the result of headwater damming.

*Table 2. Tributaries in the Canadian Great Lakes basin ((a) Erie, (b) Huron, (c) Ontario, (d) St Lawrence, (e) Superior) suitable for Asian carp spawning based on application of decision tree (see Figures 7 and 8, and Appendix 2) to data for 220 stream gauging stations. See Figure 8 for map of tributary locations. Suitability: 0 – not suitable; 1 – suitable; 2 – highly suitable.*

a) Erie

| | No. of Stations | | | |
|---|---|---|---|---|
| | Suitability | | | Maximum Suitability |
| **Tributary** | **0** | **1** | **2** | |
| Big Creek | 0 | 4 | 0 | 1 |
| Big Otter Creek | 2 | 4 | 0 | 1 |
| Canard River | 0 | 0 | 1 | 2 |
| Catfish Creek | 0 | 2 | 0 | 1 |
| Grand River | 1 | 2 | 7 | 2 |
| Kettle Creek | 0 | 2 | 1 | 2 |
| Little River | 0 | 1 | 0 | 1 |
| Lynn River | 1 | 0 | 0 | 0 |
| Nanticoke Creek | 0 | 0 | 1 | 2 |
| Ruscom River | 0 | 1 | 0 | 1 |
| Sturgeon Creek | 0 | 1 | 0 | 1 |
| Sydenham River | 1 | 1 | 1 | 2 |
| Thames River | 1 | 7 | 5 | 2 |
| Turkey Creek | 1 | 0 | 0 | 0 |

b) Huron

| | No. of Stations | | | |
|---|---|---|---|---|
| | Suitability | | | Maximum Suitability |
| **Tributary** | **0** | **1** | **2** | |
| Ausable River | 0 | 2 | 2 | 2 |
| Bayfield River | 0 | 1 | 2 | 2 |
| Beaver River | 1 | 0 | 0 | 0 |
| Bighead River | 0 | 1 | 0 | 1 |
| Copeland Creek | 0 | 1 | 0 | 1 |
| Cow Creek | 0 | 1 | 0 | 1 |
| French River | 0 | 2 | 3 | 2 |
| Garden River | 0 | 1 | 0 | 1 |
| Hog Creek | 0 | 1 | 0 | 1 |
| Lucknow River | 1 | 0 | 0 | 0 |
| Magnetawan River | 3 | 1 | 0 | 1 |
| Maitland River | 1 | 5 | 5 | 2 |
| Mississagi River | 1 | 0 | 0 | 0 |
| Moon River | 1 | 0 | 0 | 0 |
| North River | 1 | 1 | 0 | 1 |
| Nottawasaga River | 0 | 5 | 0 | 1 |
| Penetangore River | 0 | 1 | 0 | 1 |
| Pine River | 0 | 0 | 1 | 2 |
| Pretty River | 0 | 1 | 0 | 1 |
| Sauble River | 0 | 1 | 1 | 2 |
| Saugeen River | 8 | 0 | 0 | 0 |
| Serpent River | 0 | 4 | 1 | 2 |
| Severn River | 6 | 0 | 0 | 0 |
| Spanish River | 0 | 1 | 0 | 1 |
| Stokes River | 0 | 1 | 0 | 1 |
| Sturgeon River | 0 | 1 | 0 | 1 |
| Sydenham River | 1 | 0 | 0 | 0 |
| Wanapitei River | 0 | 2 | 0 | 1 |
| Wye River | 1 | 0 | 0 | 0 |

## c) Ontario

| | No. of Stations | | | |
|---|---|---|---|---|
| | Suitability | | | Maximum Suitability |
| **Tributary** | **0** | **1** | **2** | |
| Ancaster Creek | 1 | 0 | 0 | 0 |
| Black Creek | 1 | 0 | 0 | 0 |
| Bloomfield Creek | 0 | 1 | 0 | 1 |
| Bowmanville Creek | 0 | 1 | 0 | 1 |
| Bronte Creek | 1 | 1 | 0 | 1 |
| Cobourg Brook | 1 | 0 | 0 | 0 |
| Collins Creek | 0 | 1 | 0 | 1 |
| Credit River | 2 | 5 | 2 | 2 |
| Don River | 3 | 0 | 0 | 0 |
| Duffins Creek | 2 | 2 | 1 | 2 |
| Etobicoke Creek | 0 | 1 | 1 | 2 |
| Farewell Creek | 1 | 0 | 0 | 0 |
| Four Mile River | 1 | 0 | 0 | 0 |
| Fourteen Mile Creek | 1 | 0 | 0 | 0 |
| Ganaraska River | 0 | 2 | 1 | 2 |
| Grindstone Creek | 2 | 0 | 0 | 0 |
| Harmony Creek | 1 | 0 | 0 | 0 |
| Highland Creek | 0 | 1 | 0 | 1 |
| Humber River | 6 | 0 | 0 | 0 |
| Little Cataraqui Creek | 1 | 0 | 0 | 0 |
| Mayhew Creek | 1 | 0 | 0 | 0 |
| Millhaven Creek | 1 | 1 | 0 | 1 |
| Mimico Creek | 0 | 1 | 0 | 1 |
| Moira River | 2 | 0 | 0 | 0 |
| Napanee River | 1 | 0 | 0 | 0 |
| Oshawa Creek | 1 | 0 | 0 | 0 |
| Oswego Creek | 0 | 1 | 0 | 1 |
| Redhill Creek | 2 | 0 | 0 | 0 |
| Rouge River | 0 | 1 | 2 | 2 |
| Salmon River | 2 | 0 | 0 | 0 |
| Shelter Valley Creek | 1 | 0 | 0 | 0 |
| Sixteen Mile Creek | 0 | 0 | 2 | 2 |
| Spencer Creek | 2 | 0 | 0 | 0 |
| Stoney Creek | 1 | 0 | 0 | 0 |
| Trent River | 0 | 1 | 1 | 2 |
| Twenty Mile Creek | 1 | 0 | 0 | 0 |
| Welland River | 0 | 1 | 0 | 1 |
| West Duffins Creek | 0 | 1 | 0 | 1 |
| Wilmot Creek | 1 | 0 | 0 | 0 |
| Wilton Creek | 0 | 1 | 0 | 1 |

d) St Lawrence

| | No. of Stations | | | |
|---|---|---|---|---|
| | Suitability | | | Maximum Suitability |
| **Tributary** | **0** | **1** | **2** | |
| Butlers Creek | 0 | 1 | 0 | 1 |
| Raisin River | 0 | 1 | 0 | 1 |
| Riviere Beaudette | 0 | 0 | 1 | 2 |
| Riviere Delisle | 0 | 2 | 0 | 1 |

e) Superior

| | No. of Stations | | | |
|---|---|---|---|---|
| | Suitability | | | Maximum Suitability |
| **Tributary** | **0** | **1** | **2** | |
| Batchawana River | 6 | 0 | 0 | 0 |
| Big Carp River | 1 | 0 | 0 | 0 |
| Current River | 2 | 0 | 0 | 0 |
| Dog River | 1 | 0 | 0 | 0 |
| Goulais River | 1 | 0 | 0 | 0 |
| Gravel River | 0 | 1 | 0 | 1 |
| Little Pic River | 0 | 0 | 1 | 2 |
| McIntyre River | 2 | 1 | 0 | 1 |
| Mission River | 2 | 0 | 0 | 0 |
| Pic River | 1 | 1 | 0 | 1 |
| Pukaskwa River | 0 | 1 | 0 | 1 |
| Steel River | 0 | 1 | 0 | 1 |

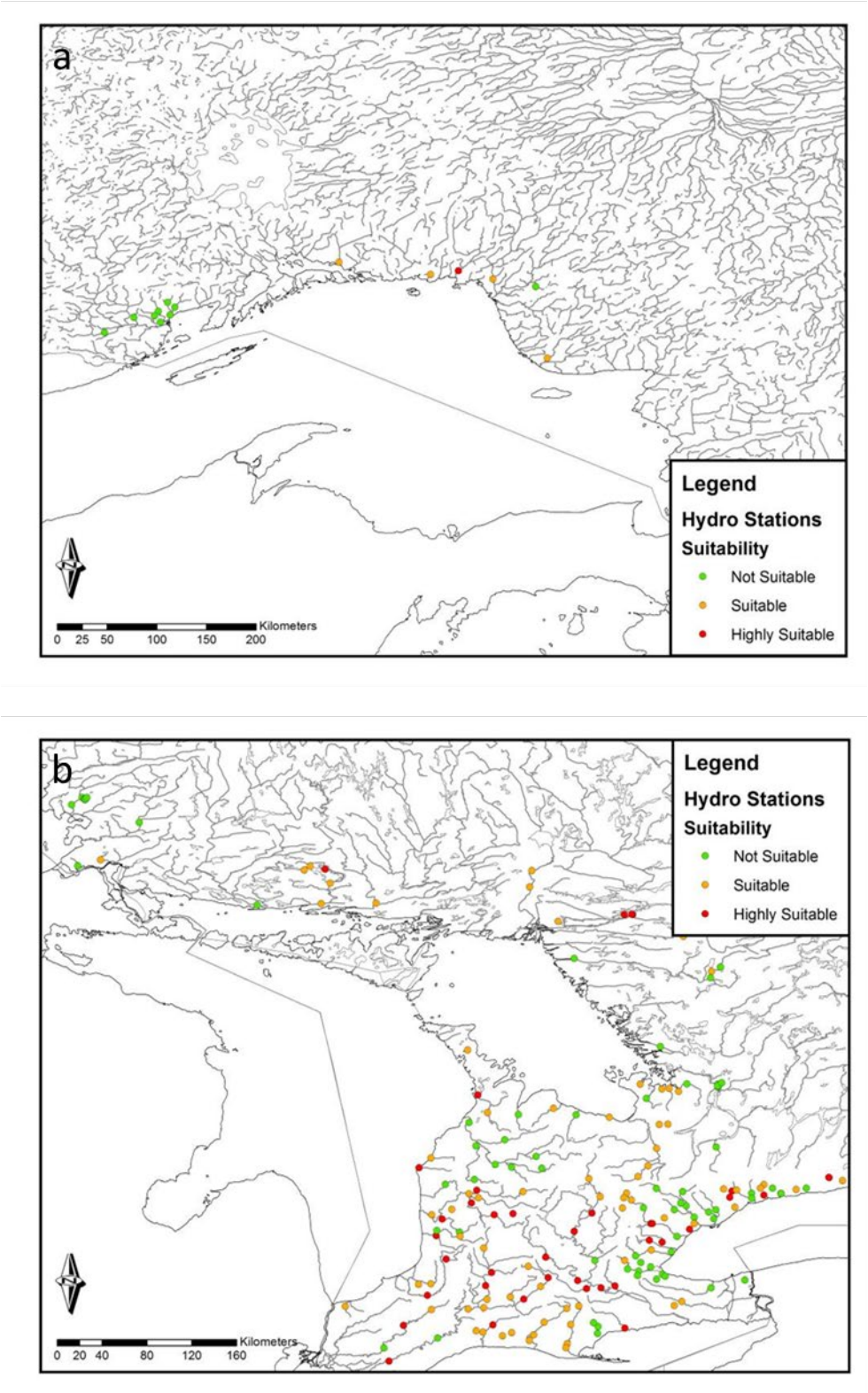


*Figure 7. Suitability of tributaries for Asian carp spawning at 222 stream gauging stations in the Canadian Great Lakes basin: a) Superior; b) Huron; c) Erie; d) Ontario.*

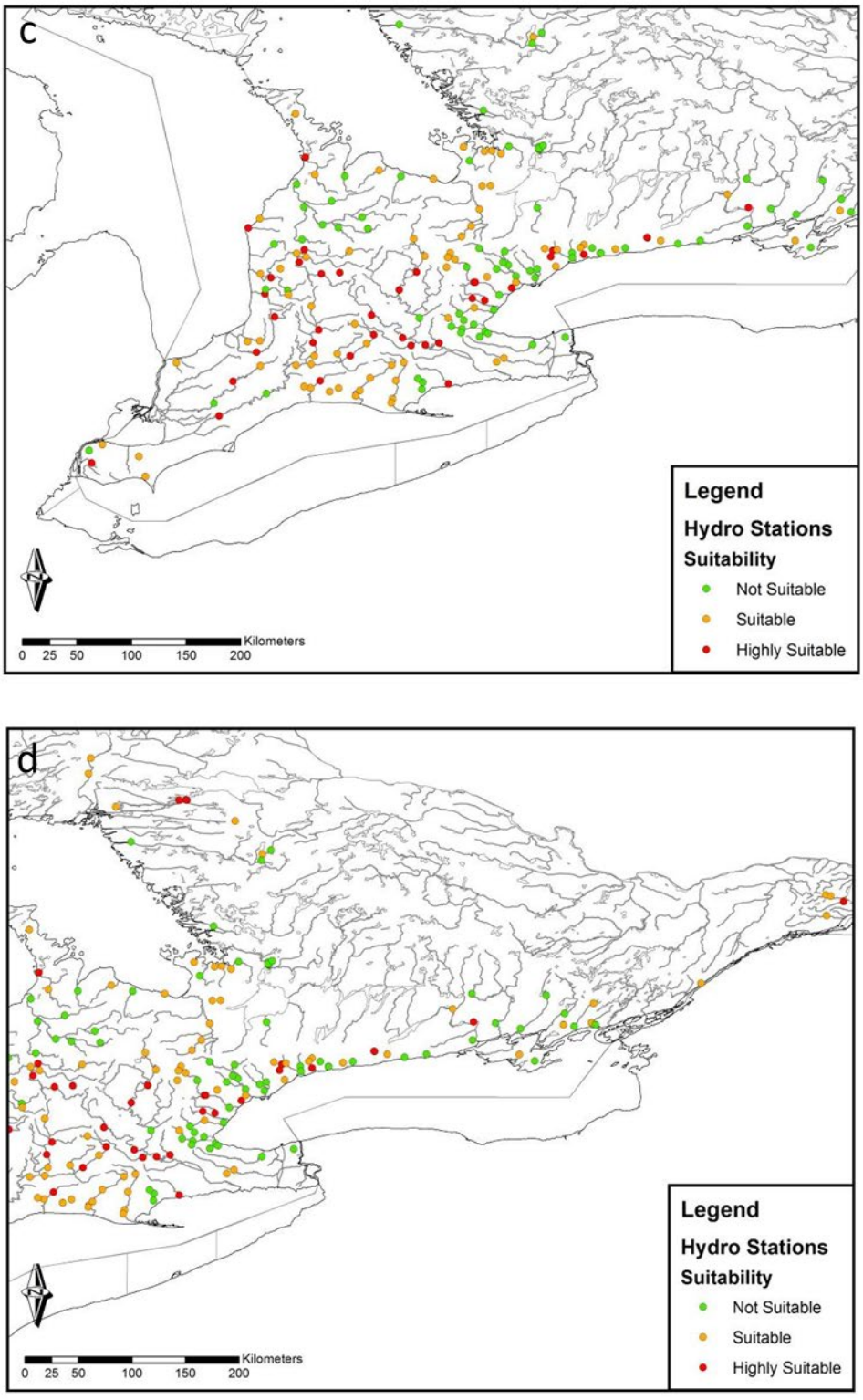


*Figure 7. continued*

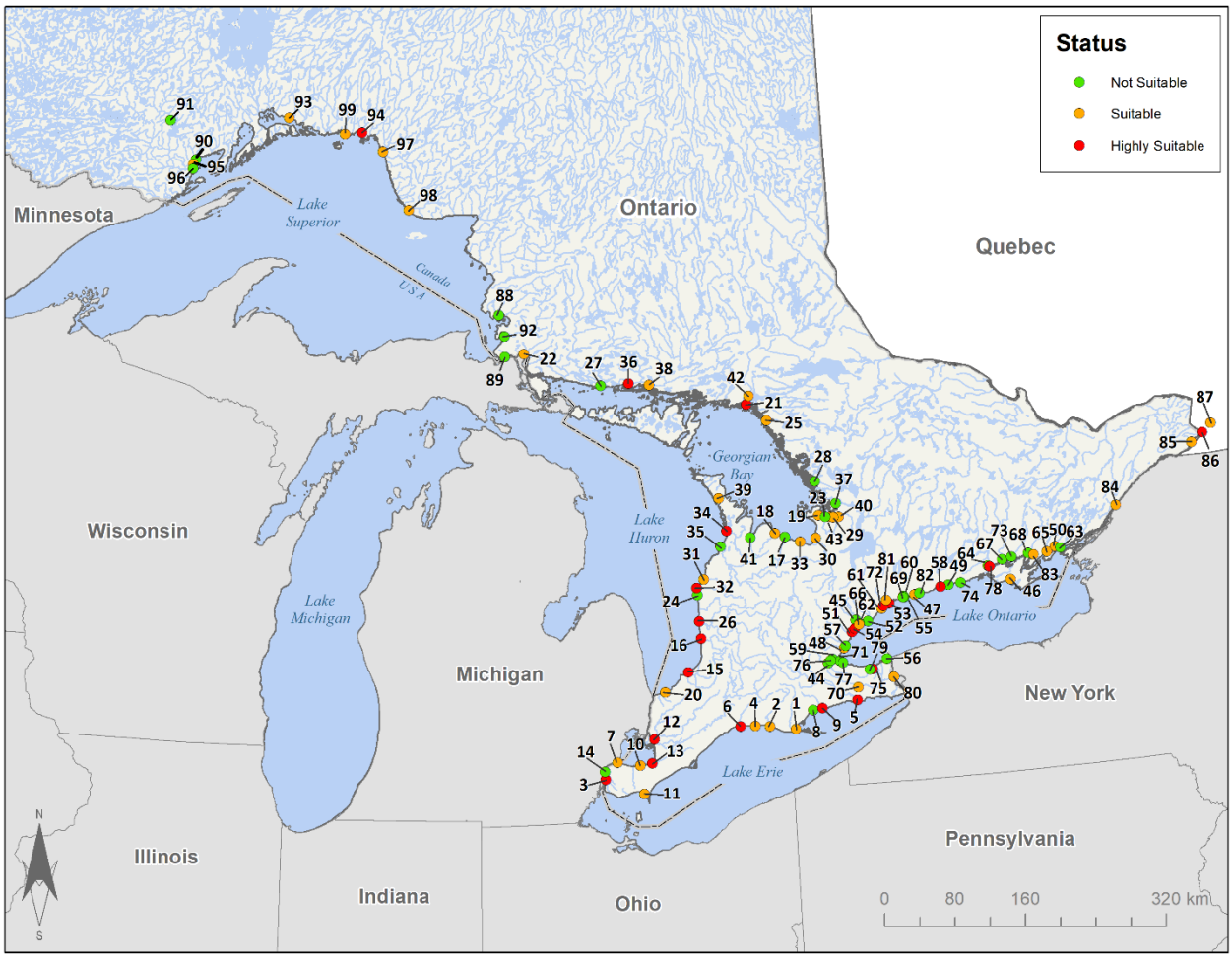


*Figure 8. Mouth coordinates of tributaries in the Canadian Great Lakes basin suitable for Asian carp spawning. Suitability: 0 – not suitable; 1 – suitable; 2 – highly suitable. Tributary names are found in Appendix 3.*

*Table 3. Summary of tributaries in the Canadian Great Lakes basin suitable for Asian carp spawning based on Table 2. Suitability: 0 – not suitable; 1 – suitable; 2 – highly suitable.*

| Basin | No. of Tributaries | Suitability | | |
|---|---|---|---|---|
| | | 0 | 1 | 2 |
| Erie | 14 | 2 | 6 | 6 |
| Huron | 29 | 8 | 14 | 7 |
| Ontario | 40 | 22 | 12 | 6 |
| St. Lawrence | 4 | 0 | 3 | 1 |
| Superior | 12 | 6 | 5 | 1 |

*Table 4. Reasons why tributaries in Canadian Great Lakes basin are not suitable for Asian carp spawning by basin based on Appendix 2.*

| Basin | No. of Stations | | |
|---|---|---|---|
| | Tributary Too Short | No Flow Spike | Flow Spike Too Late |
| Erie | 4 | 3 | 0 |
| Huron | 22 | 4 | 0 |
| Ontario | 40 | 1 | 0 |
| Superior | 3 | 7 | 1 |

Although the 100 km analysis included all tributaries in Ontario, the more detailed analysis indicated that much less than 100 km of stream length was required when temperature and flow conditions were optimal, as also found by Heer et al. (2019, 2020a,b). Suitable spawning streams were as short as 10.4 km and highly suitable spawning streams were as short as 30.2 km. The models used in this report and in Kocovsky et al. (2012) rely on linear velocity measurements at few locations and are, thus, coarse drift models. They did not consider shear velocity, lateral velocity, turbulence diffusion, and water density related to temperature, which may influence egg settling velocities and travel times and, hence, distance to hatch (Garcia et al. 2015). Murphy and Jackson (2013) incorporated shear velocity into a model of Asian carp spawning suitability and concluded that all four of the tributaries assessed (two in Lake Michigan: the Milwaukee and St. Joseph rivers and two in Lake Erie: the Maumee and Sandusky rivers) are suitable for bigheaded carp spawning and that river reaches as short as 25 km may allow bigheaded carp eggs sufficient time to develop to hatching. Garcia et al. (2013) developed a fluvial egg drift model of Silver Carp spawning suitability that incorporated flow velocity, shear dispersion, and turbulent diffusion. The model was evaluated using experimental data from China and applied to data for the Sandusky River and indicated that the river would be suitable for Silver Carp spawning. Heer et al. (2020b) concluded that the Sandusky River was suitable for Grass Carp spawning using a complex 3-D hydrodynamic model, validated by actual hydrodynamic and spawning data, to account for shear velocity, lateral velocity, turbulence diffusion, and dead zones. All models for the Sandusky River concluded that it is suitable for Asian carp spawning, which is consistent with the conclusion that Grass Carp have successfully spawned and recruited in the Sandusky River (Chapman et al. 2013, Embke et al. 2016). Heer et al. (2020a) applied their 3-D hydrodynamic model to the Don River and concluded that Asian carp eggs could develop successfully if spawned at least 25 km upstream and that close to 100% hatching success would be achieved if spawned 40 km upstream.

As temperature and flow data were sufficient to assess only a subset of the tributaries in the Canadian Great Lakes, the spawning suitability of many tributaries remains unknown. More detailed temperature and flow data may be available at more local levels (e.g. conservation authorities) and should be used to examine suitability and finer spatial and temporal, including inter-annual variation, scales (e.g. Heer et al. 2019).

Each tributary identified in this study as being suitable for Asian carp spawning should be examined more closely to confirm that no barriers exist between the mouth and the shortest distance required for spawning as identified in the Appendix 2. Potential spawning sites should also be identified. Predictions for these tributaries could be further refined by modeling with

more detailed data on flow velocity, shear dispersion, and turbulent diffusion, as done by Garcia et al. (2013), Murphy and Jackson (2013), and Heer et al. (2020a,b).

Spawning is unlikely dependent upon temperature and flow alone, but also dependent on habitat variables such as minimum stream width and other factors. As our understanding of Asian carp spawning increases with increasing North American research (e.g., Chapman and Hoff 2011) and additional data become available, models predicting spawning success should be refined for the tributaries identified in this study and for the others for which data are currently lacking.

In summary, 41 tributaries in the Canadian Great Lakes basin were identified as unimpounded from their mouth at the Great Lakes to at least 100 km upstream. Sixteen of these tributaries were in the Lake Superior basin, 14 in the Huron basin, five in the Erie basin, and eight in the Ontario basin. Based on the methods of Kocovsky et al. (2012), spawning conditions were determined to be suitable or highly suitable in 12 of 14 Erie tributaries with sufficient gauging data, 21 of 29 Huron tributaries, 18 of 40 Ontario tributaries, all four St. Lawrence tributaries in Ontario, and six of 12 Superior tributaries.

## ACKNOWLEDGMENTS

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## APPENDIX 1. TRIBUTARY SUITABILITY PLOTS

Plots used to assess, on a biweekly basis, suitability of tributaries in the Great Lakes basin for Asian carp spawning. Data are plotted for 220 gauging stations that had sufficient data to interpret suitability (See Table 2 and Appendix 2). Analysis was done only for stations with a minimum of five years of records. The water velocity of 0.7 m/s, is often identified as minimum flow required to trigger spawning.

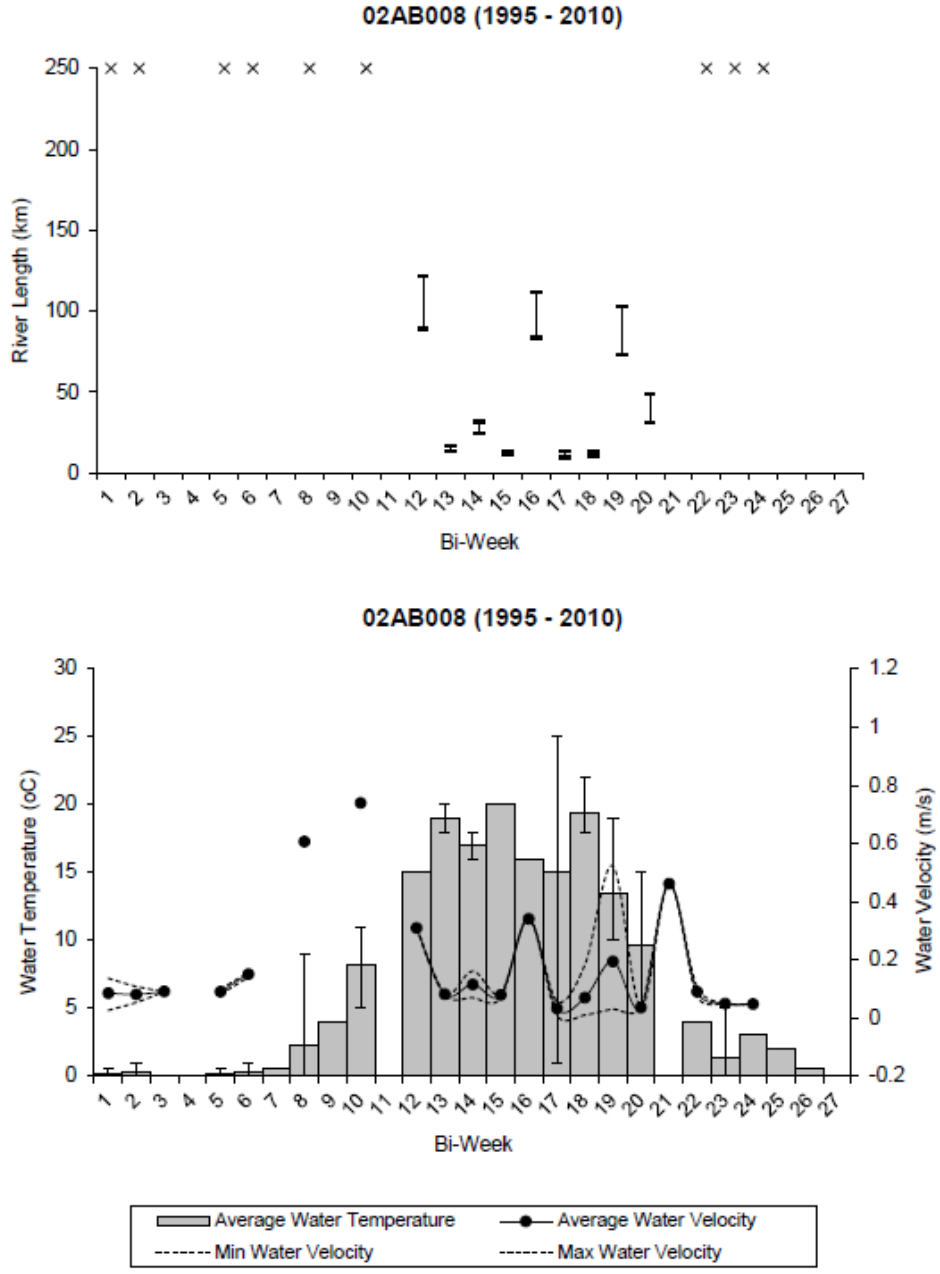


*Figure A1-1. Gauging station 02AB008 data from 1995–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

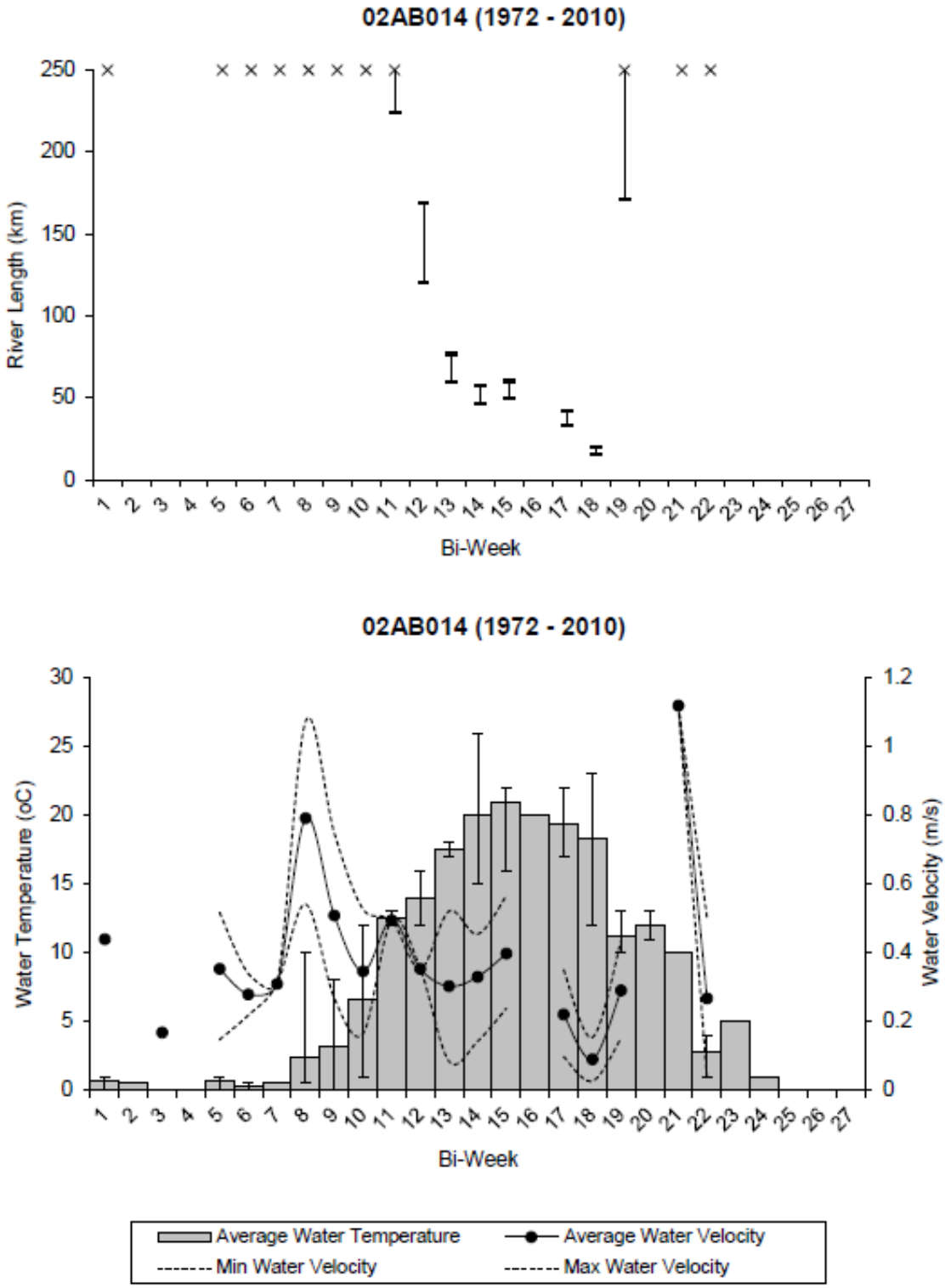


*Figure A1-2. Gauging station 02AB014 data from 1972–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

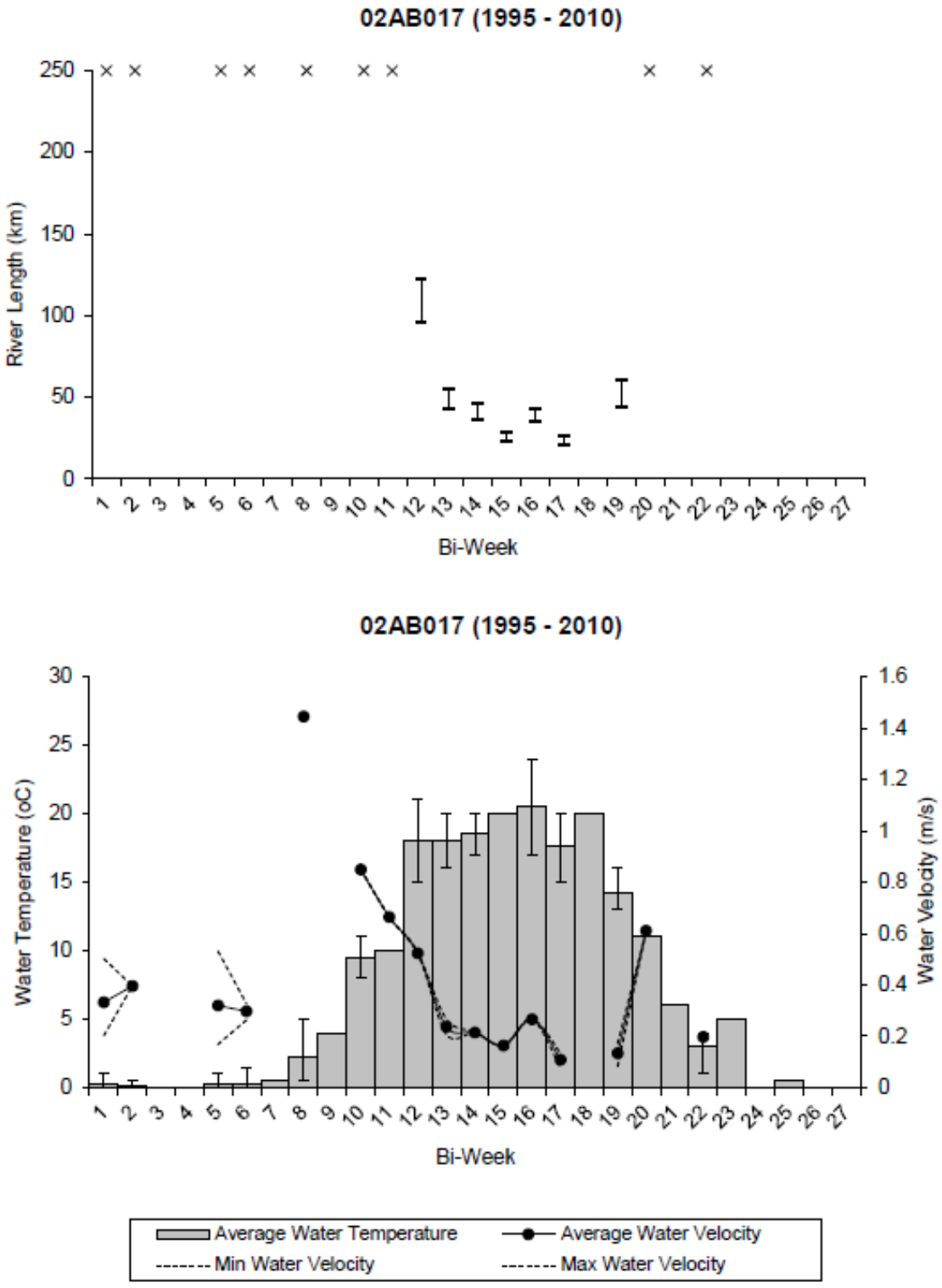


*Figure A1-3. Gauging station 02AB017 data from 1995–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

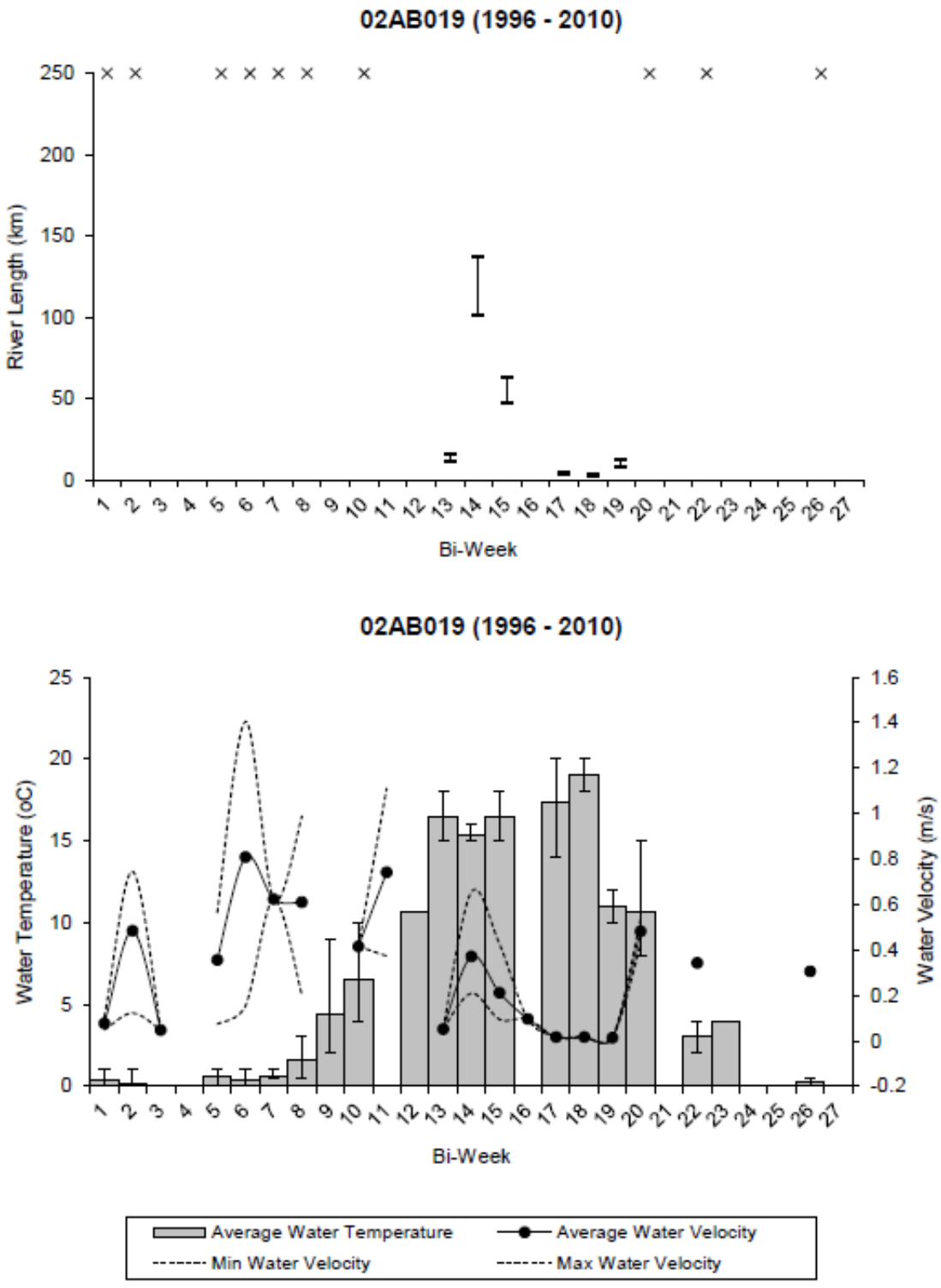


*Figure A1-4. Gauging station 02AB019 data from 1996–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

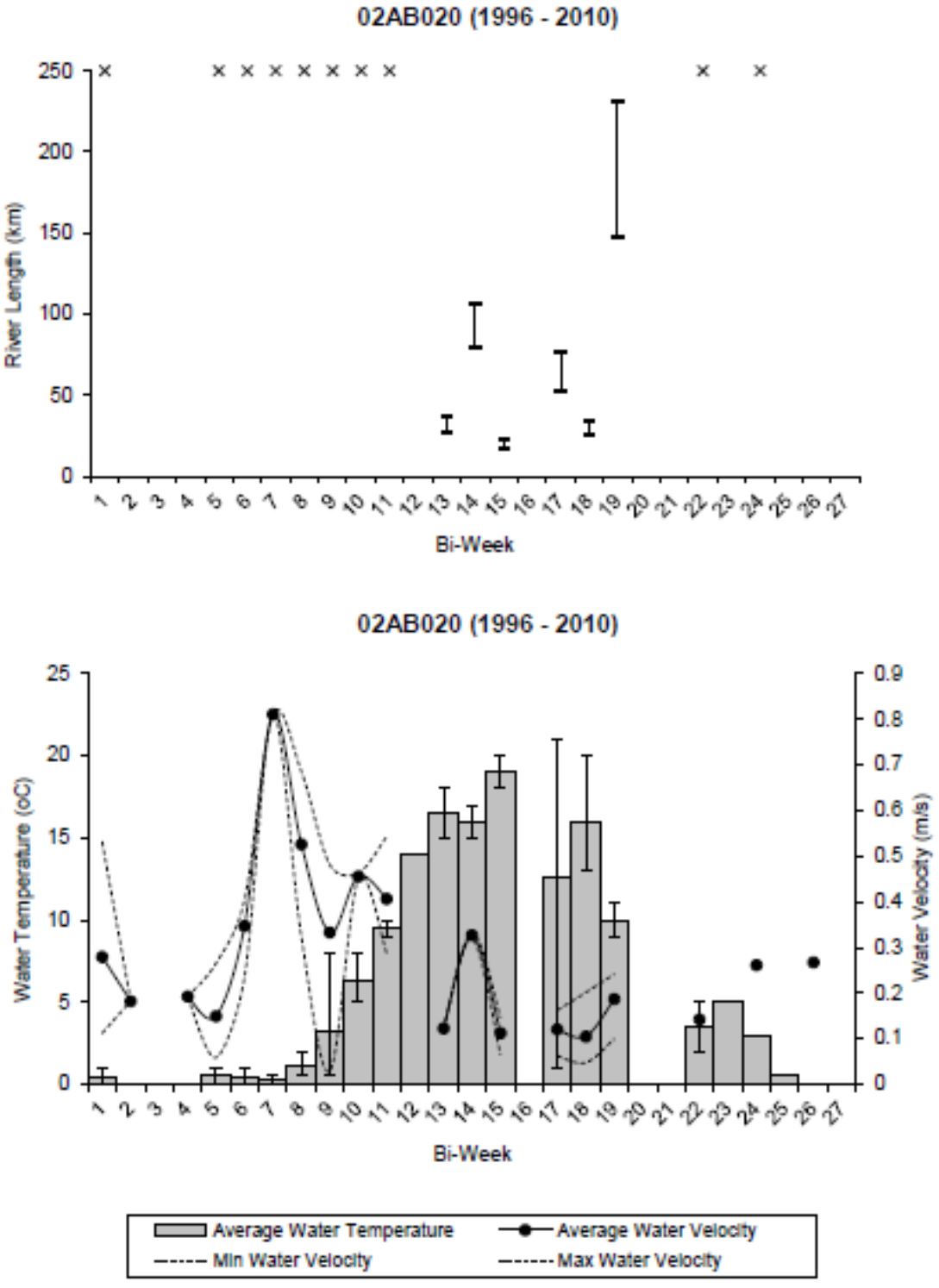


*Figure A1-5. Gauging station 02AB020 data from 1996–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

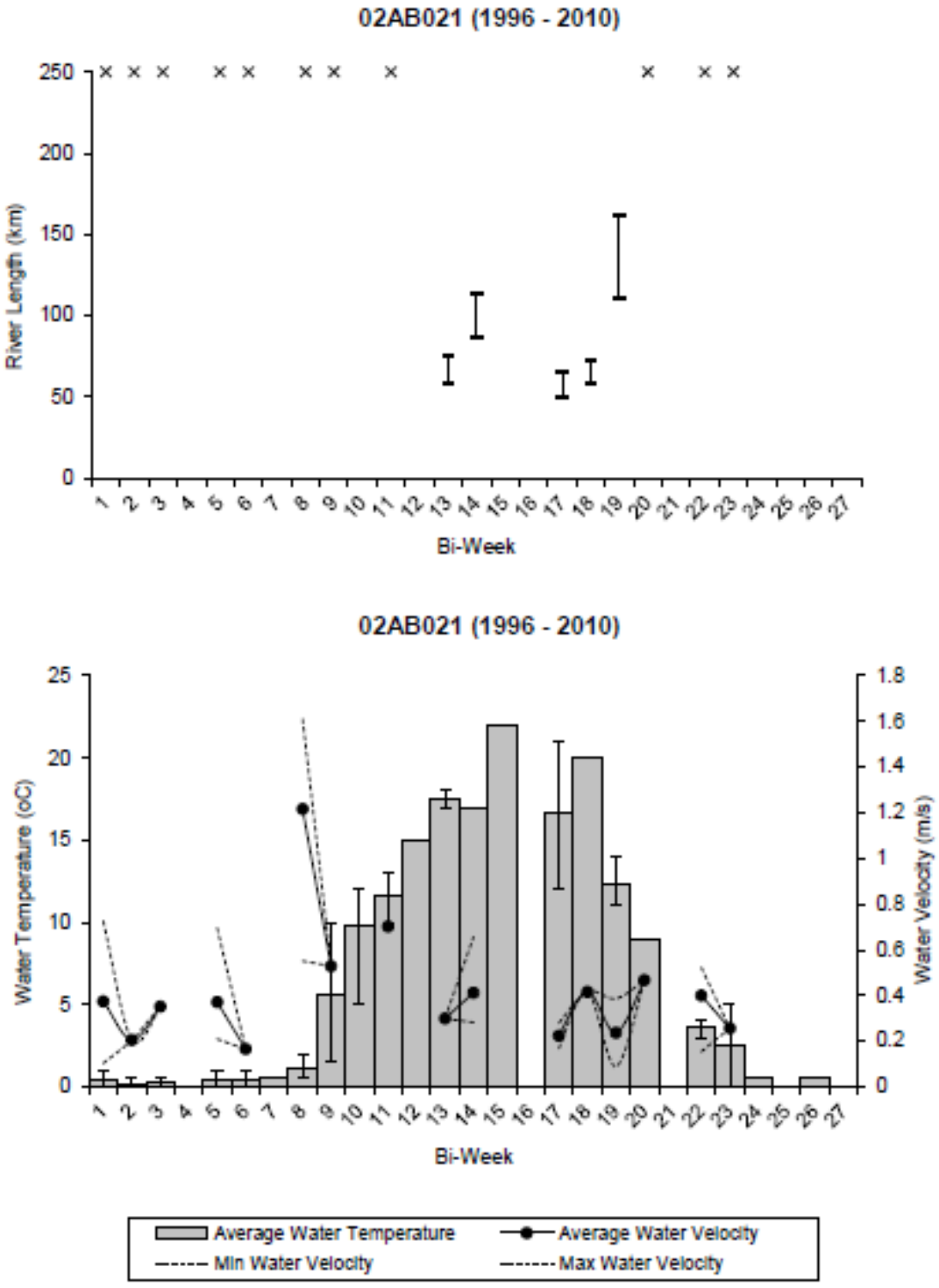


*Figure A1-6. Gauging station 02AB021 data from 1996–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

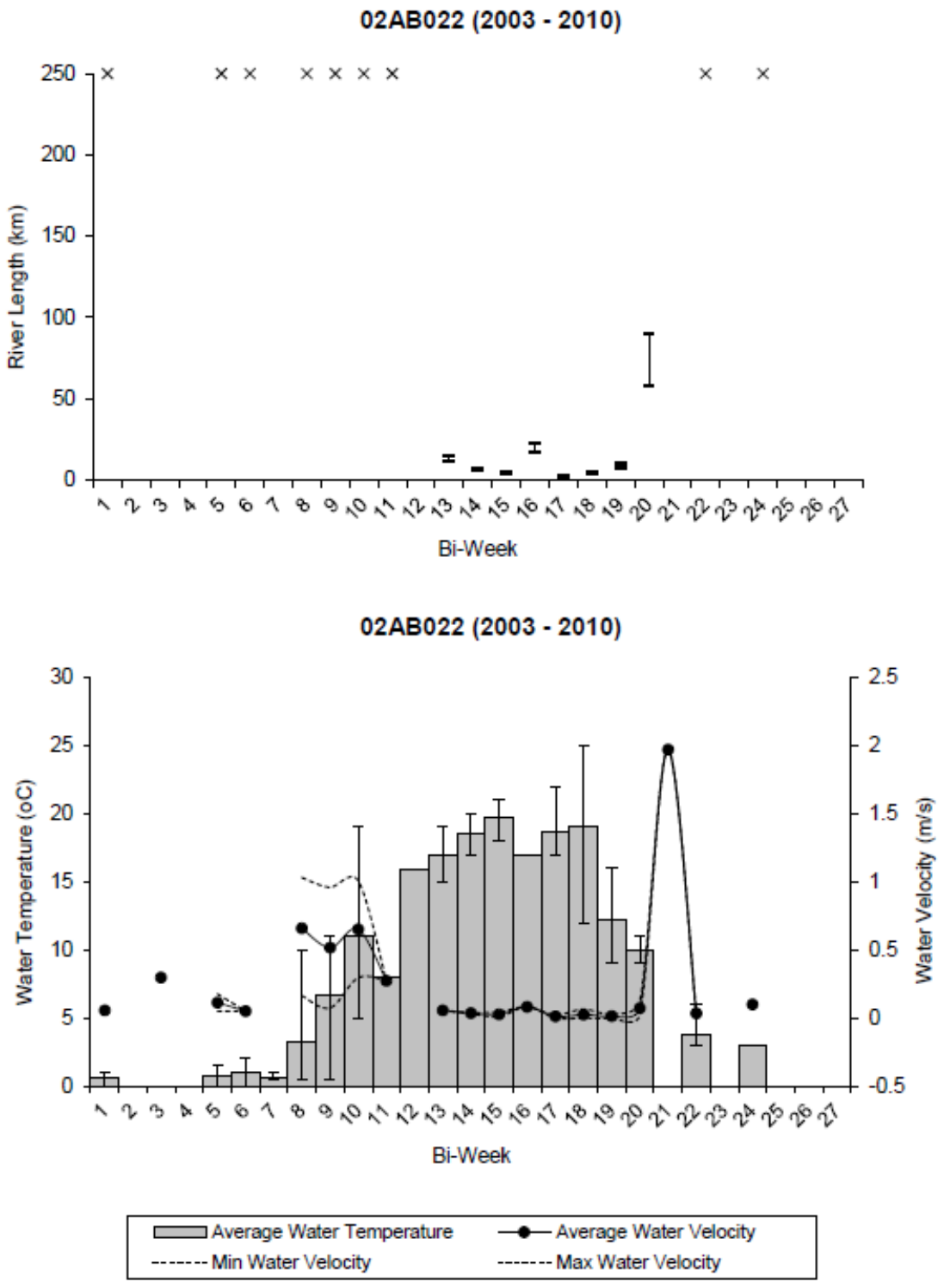


*Figure A1-7. Gauging station 02AB022 data from 2003–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

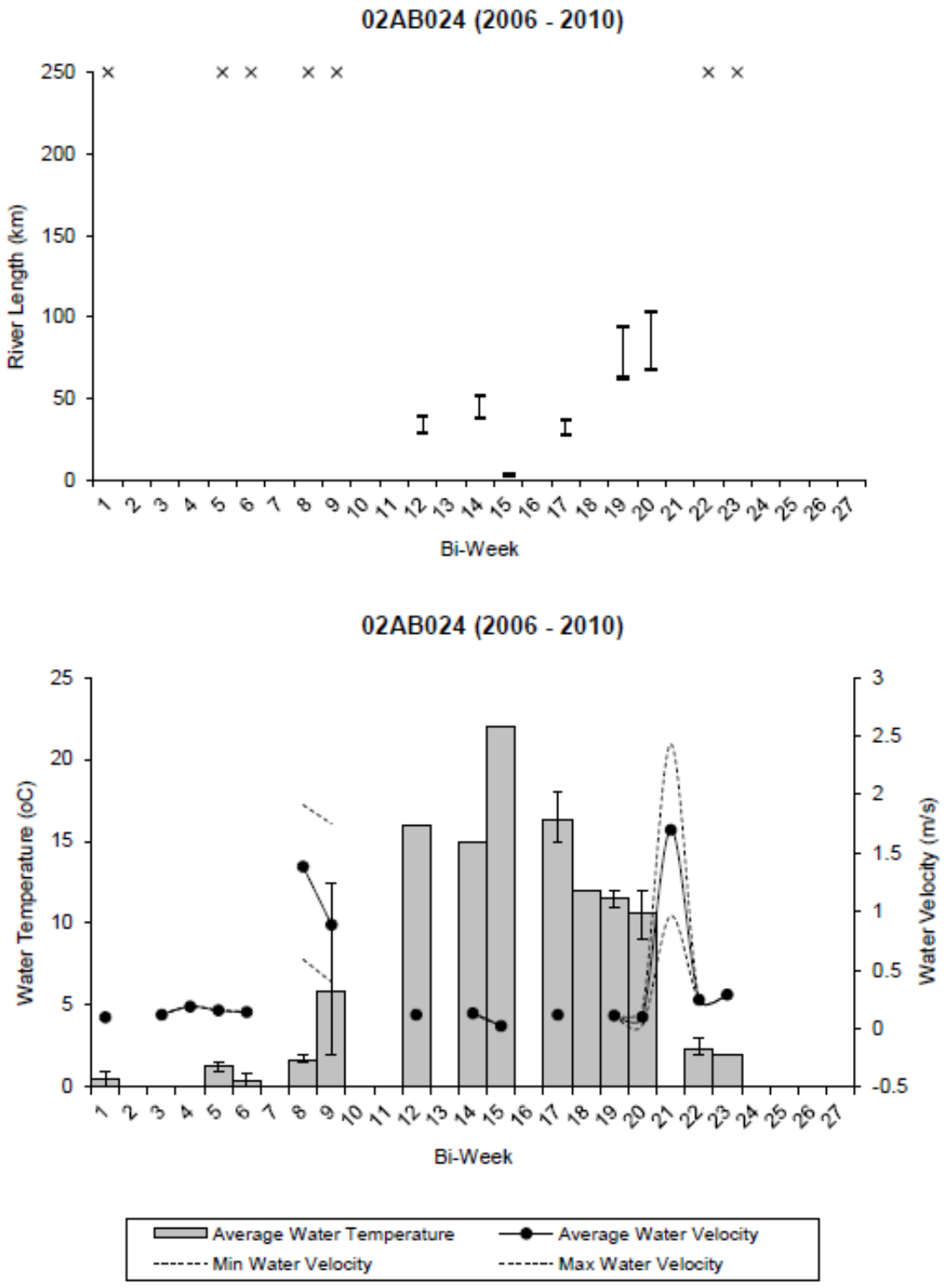


*Figure A1-8. Gauging station 02AB024 data from 2006–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

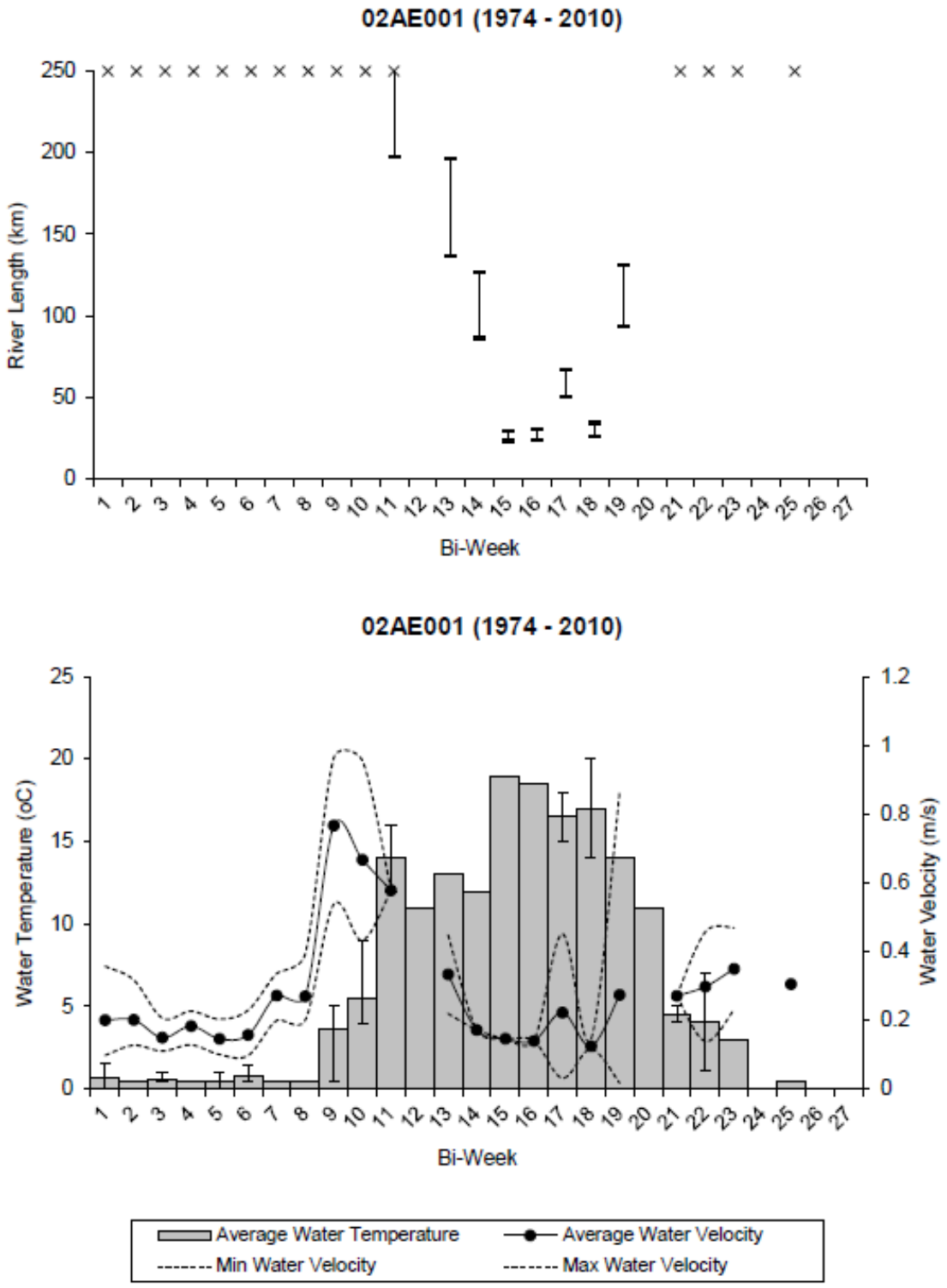


*Figure A1-9. Gauging station 02AE001 data from 1974–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

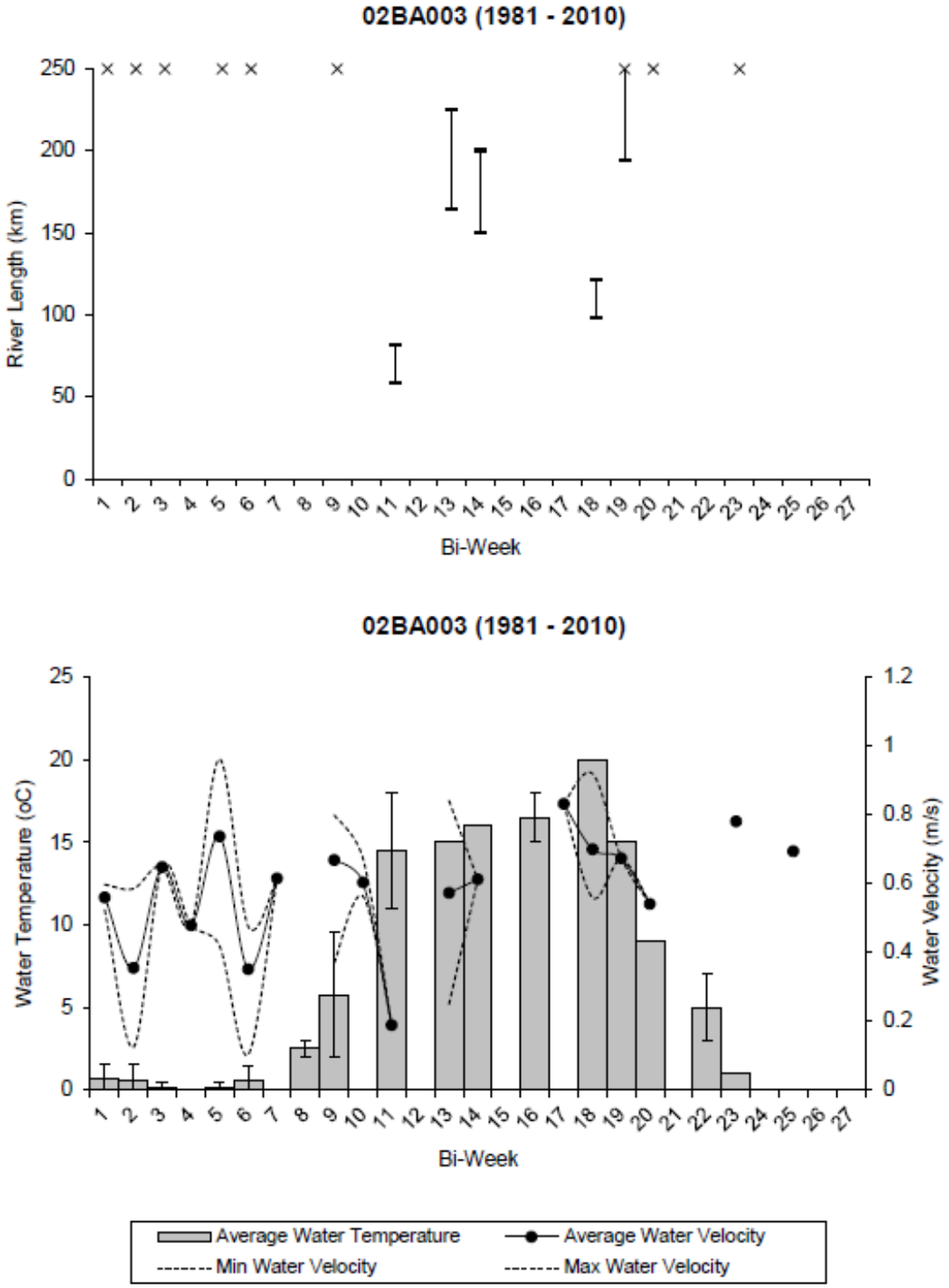


*Figure A1-10. Gauging station 02BA003 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

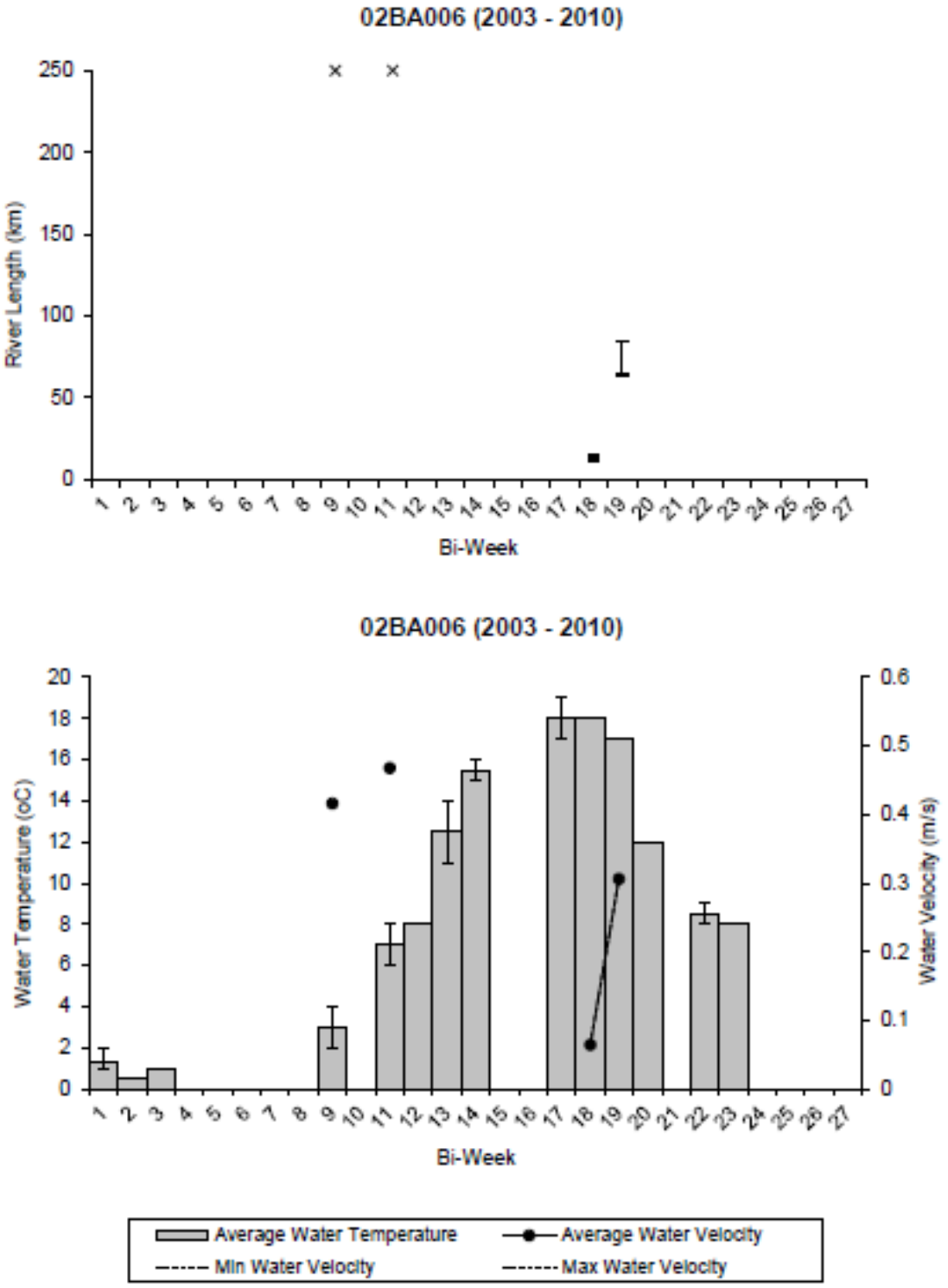


*Figure A1-11. Gauging station 02BA006 data from 2003–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

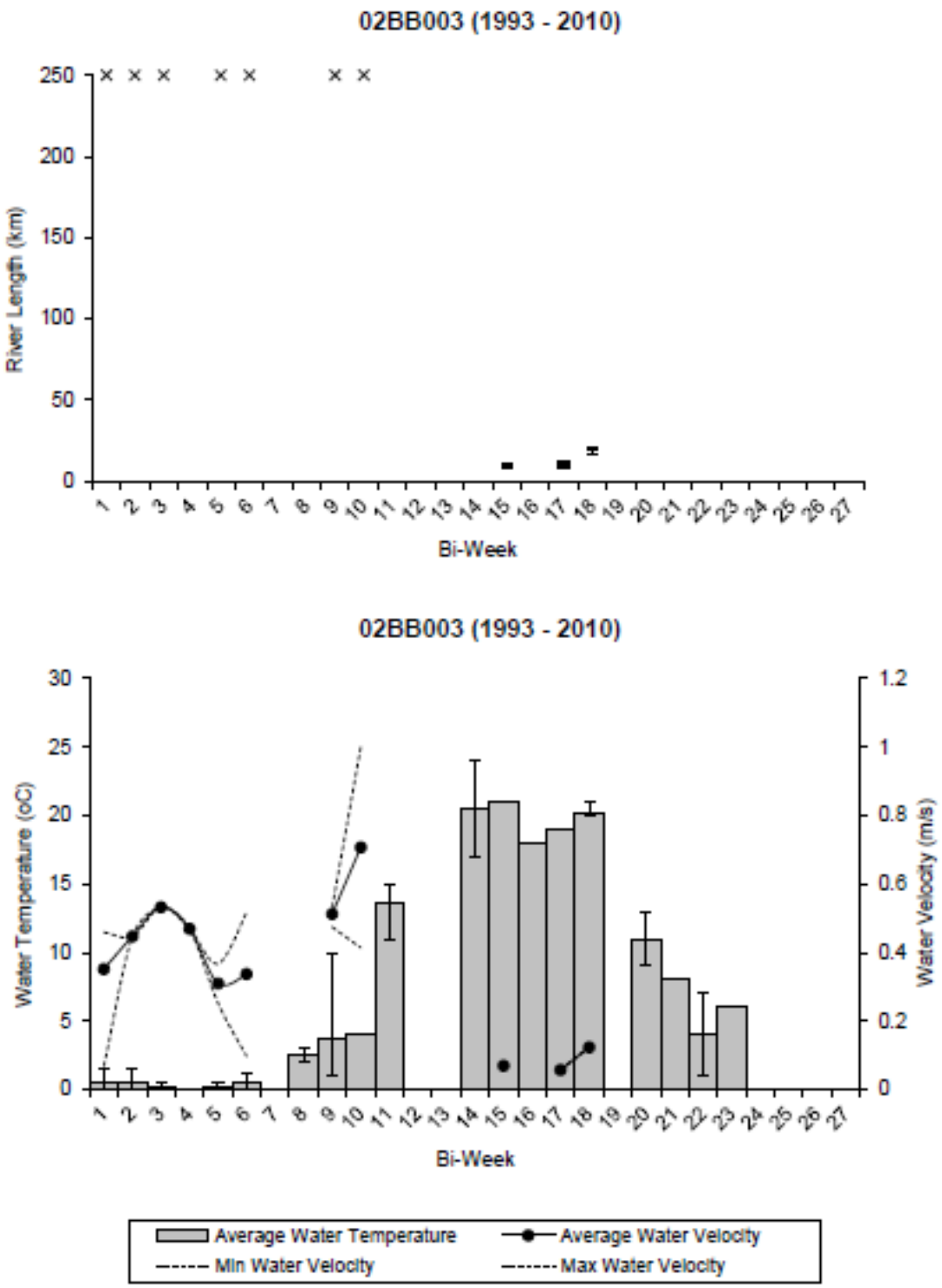


*Figure A1-12. Gauging station 02BB003 data from 1993–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

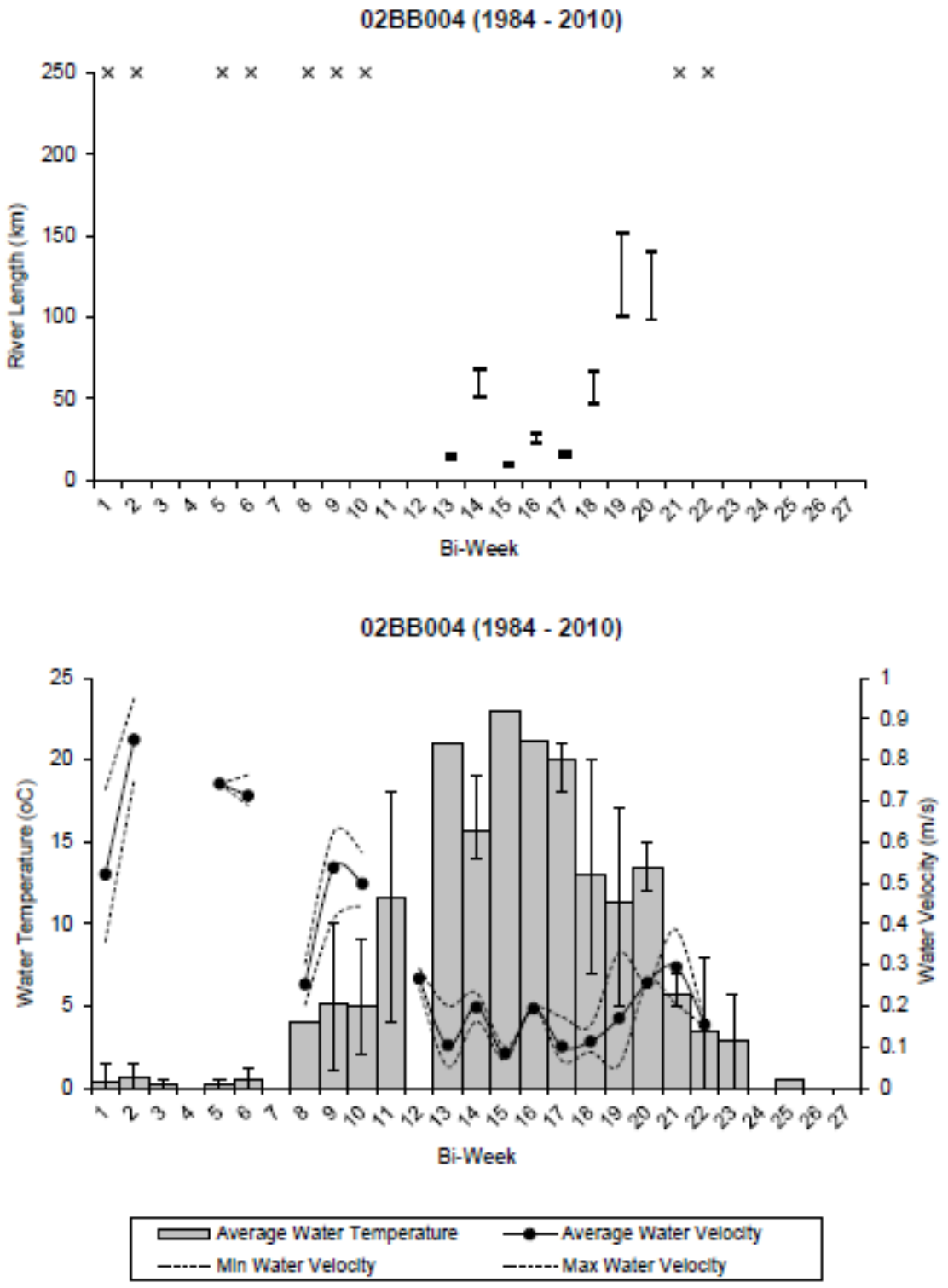


*Figure A1-13. Gauging station 02BB004 data from 1984–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

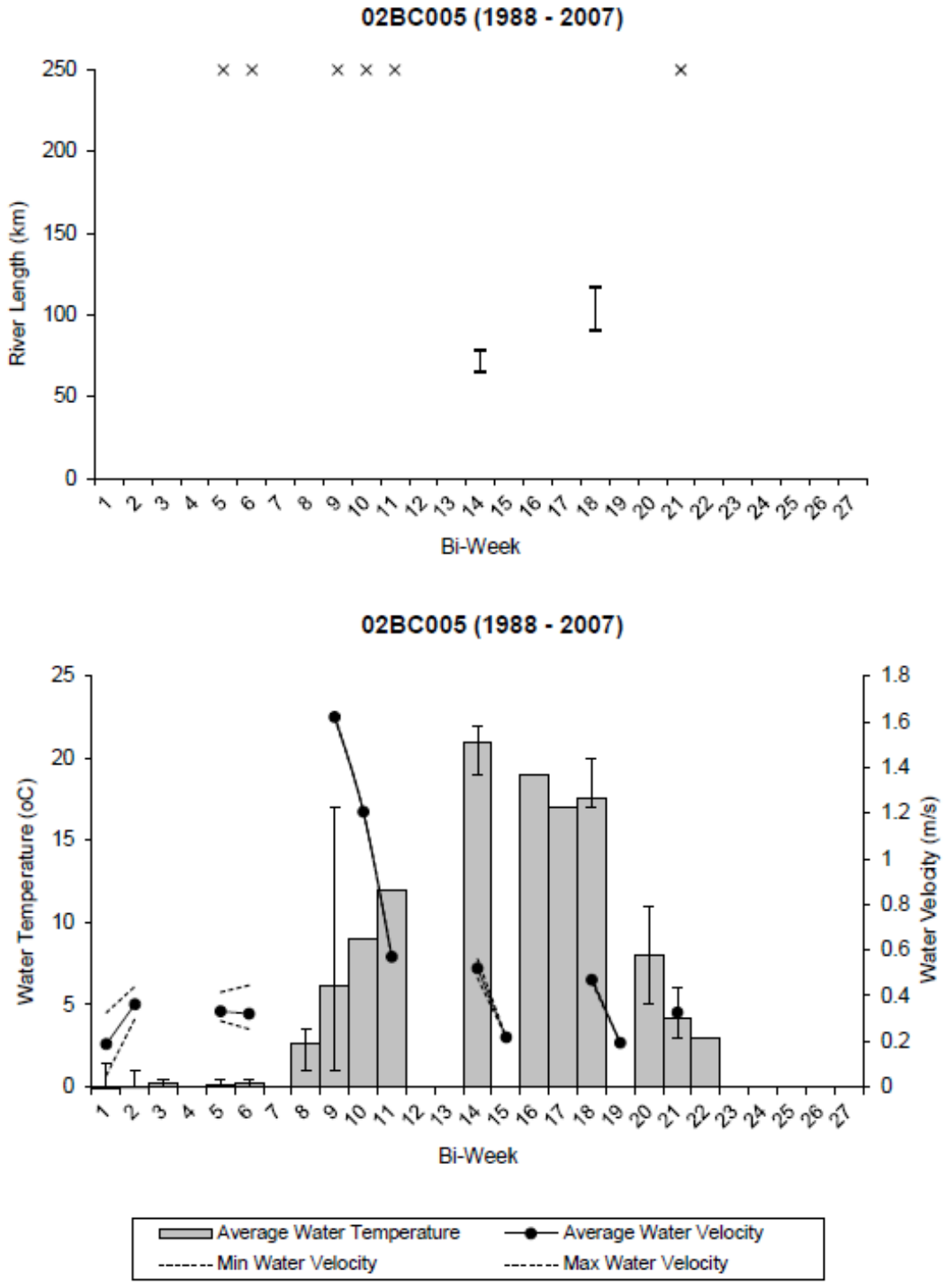


*Figure A1-14. Gauging station 02BC005 data from 1998–2007. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

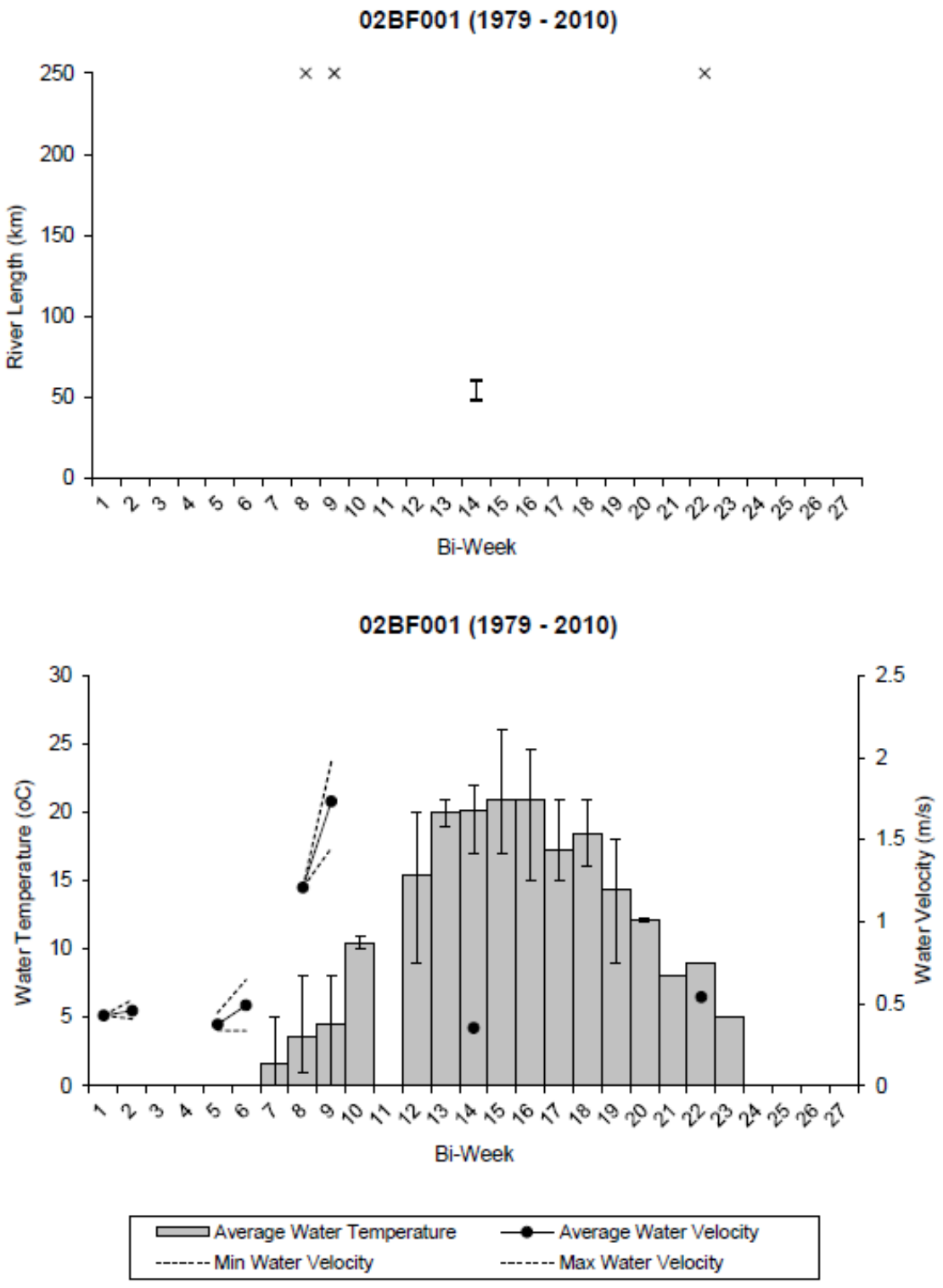


*Figure A1-15. Gauging station 02BF001 data from 1979–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

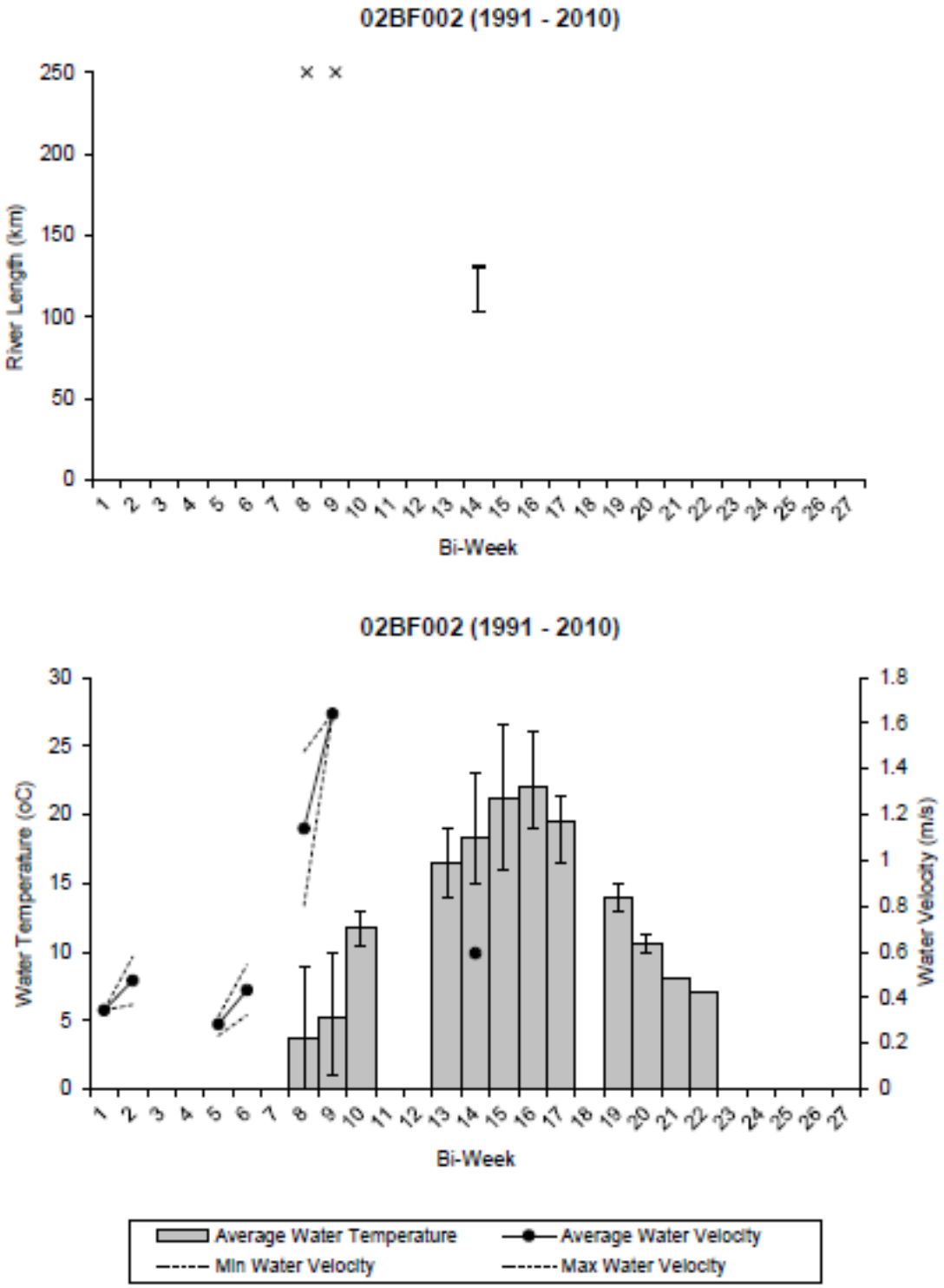


*Figure A1-16. Gauging station 02BF002 data from 1991–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

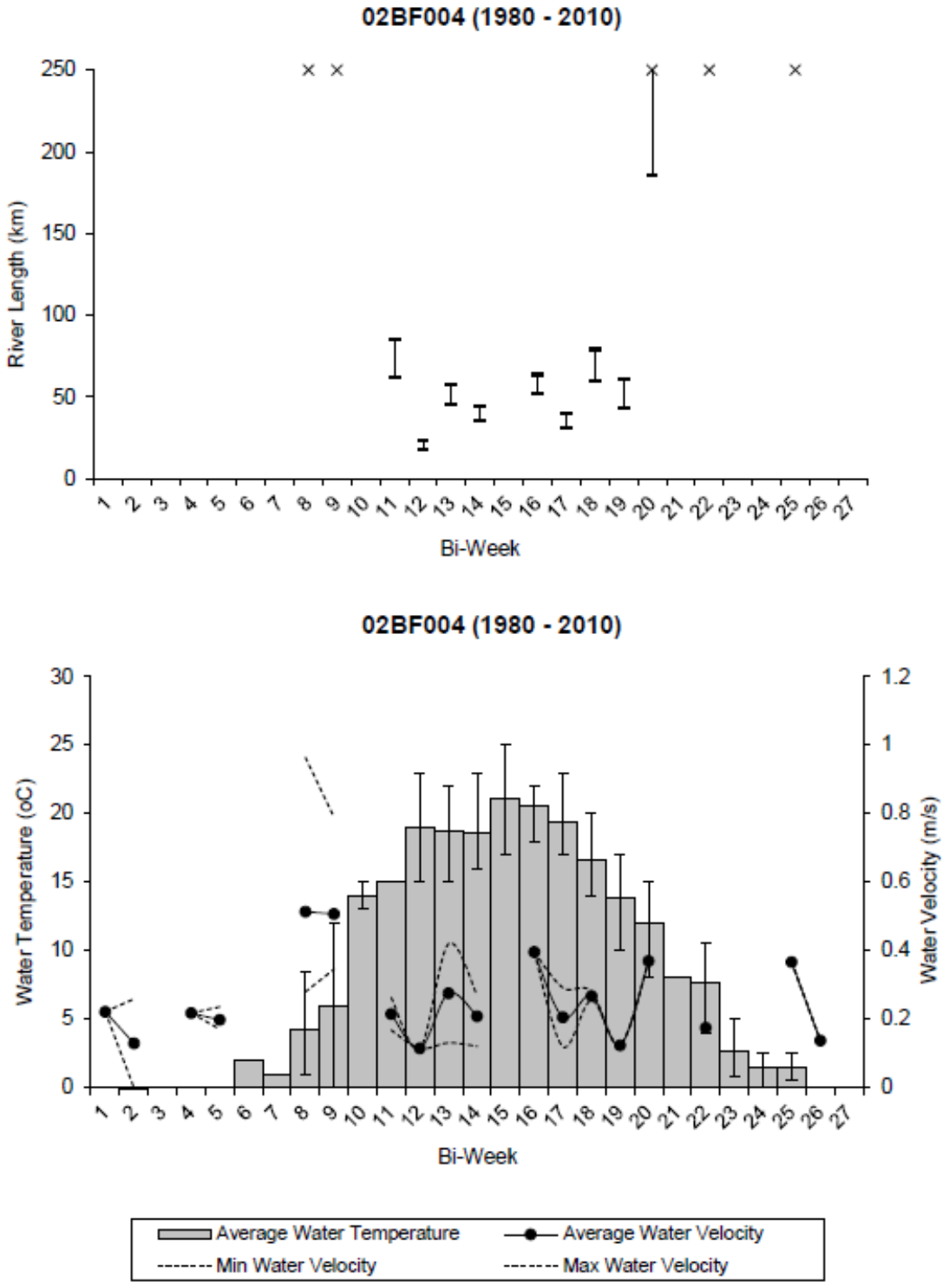


*Figure A1-17. Gauging station 02BF004 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

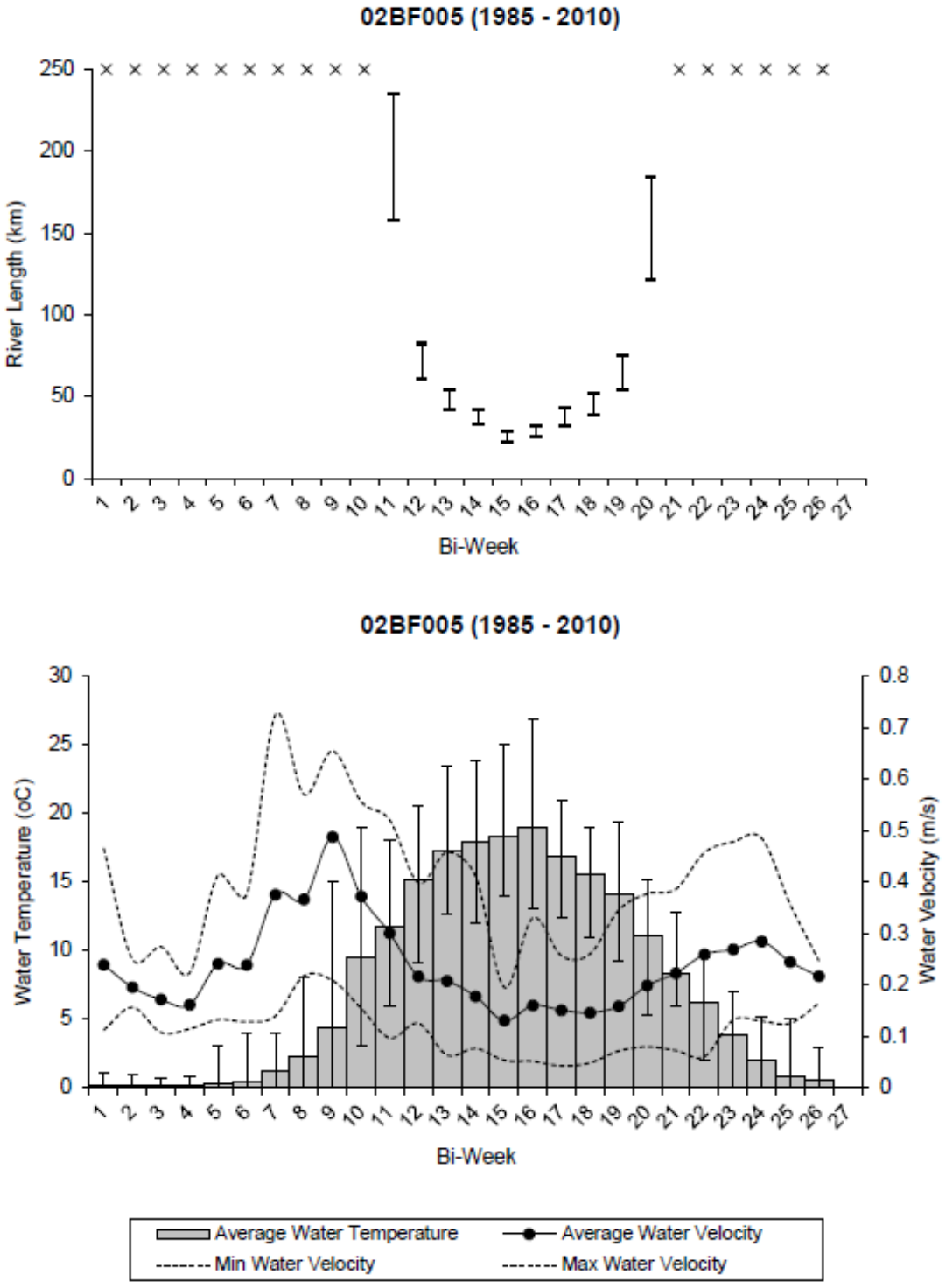


*Figure A1-18. Gauging station 02BF005 data from 1985–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

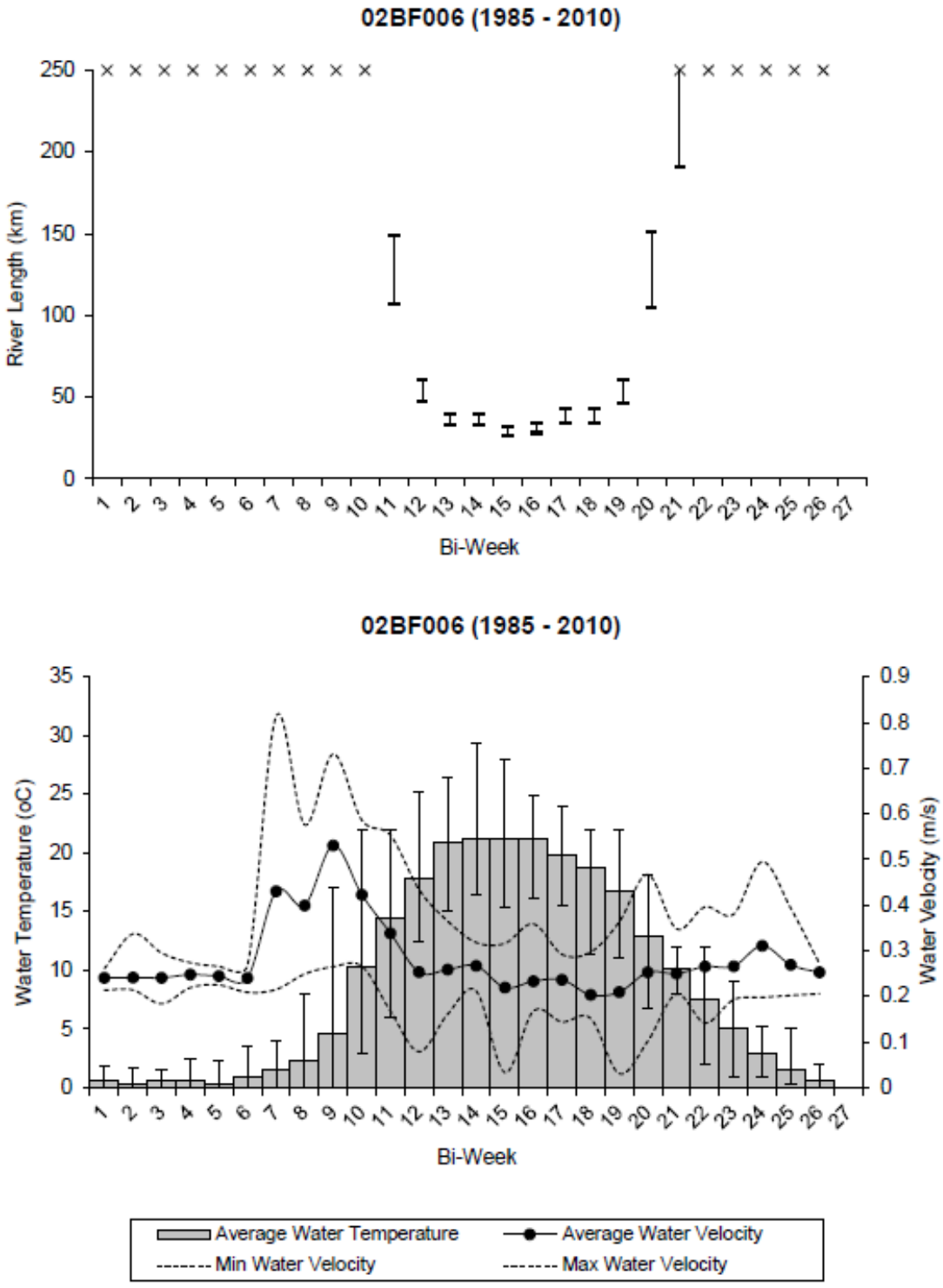


*Figure A1-19. Gauging station 02BF006 data from 1985–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

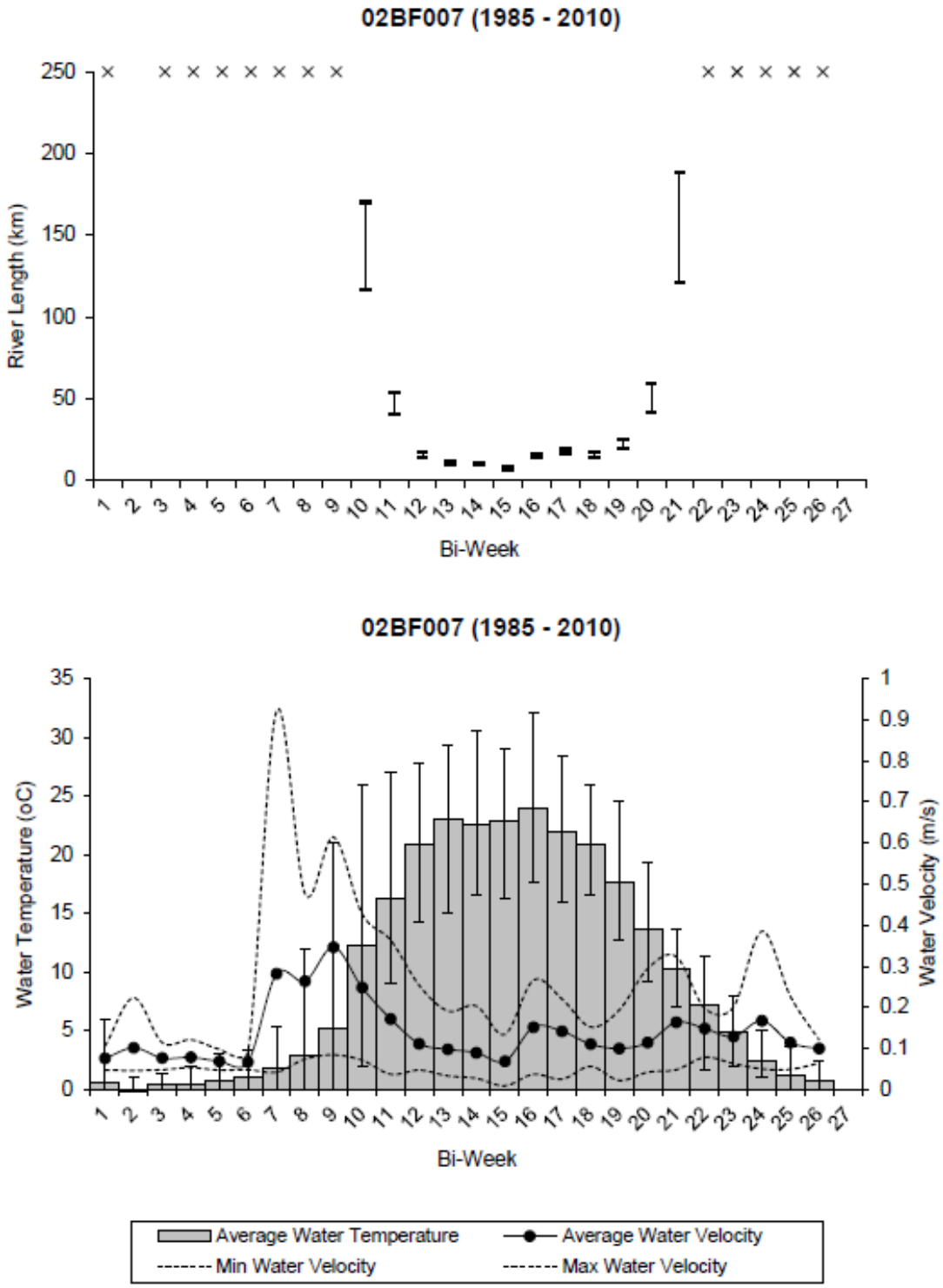


*Figure A1-20. Gauging station 02BF007 data from 1985–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

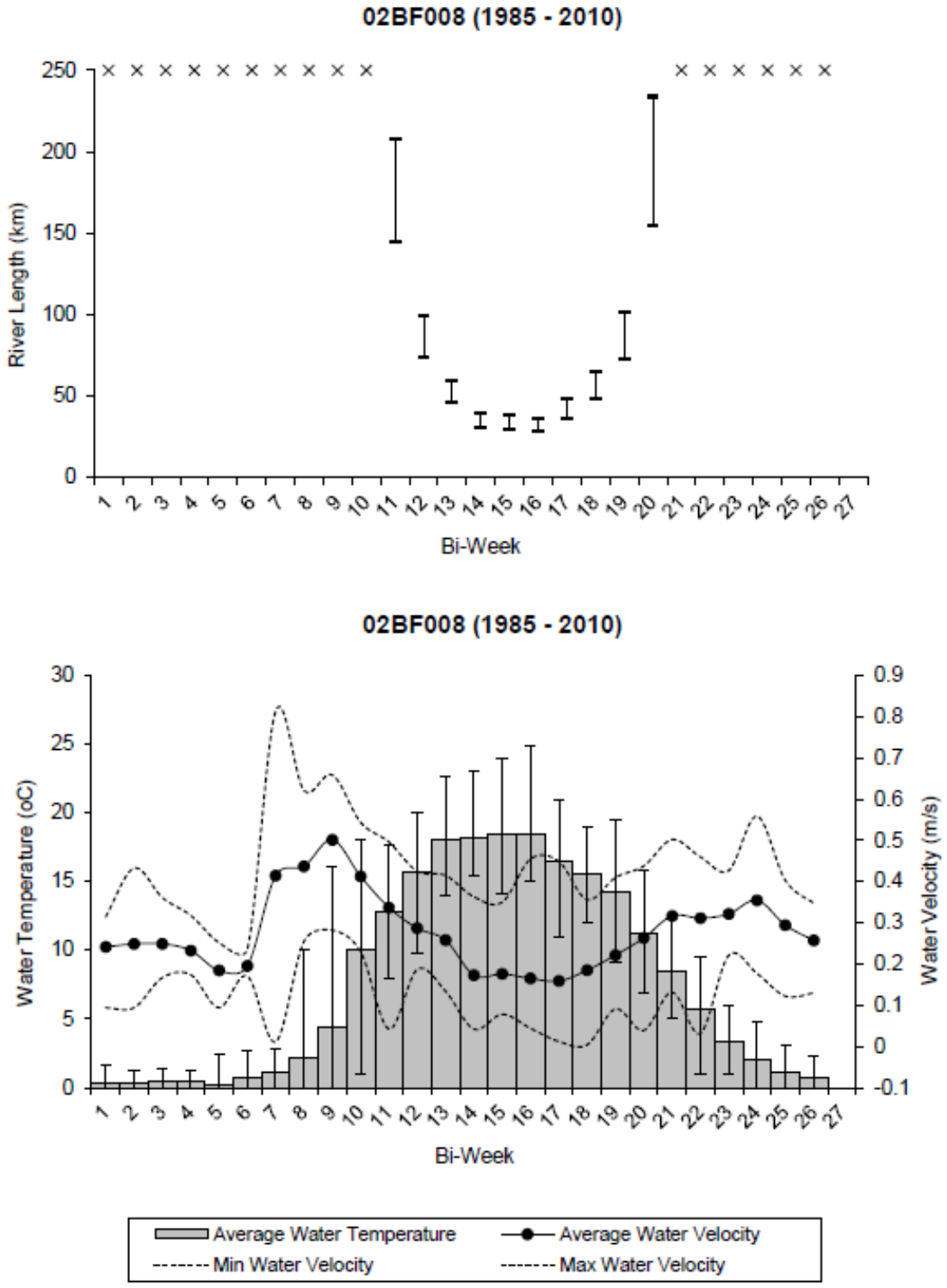


*Figure A1-21. Gauging station 02BF008 data from 1985–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

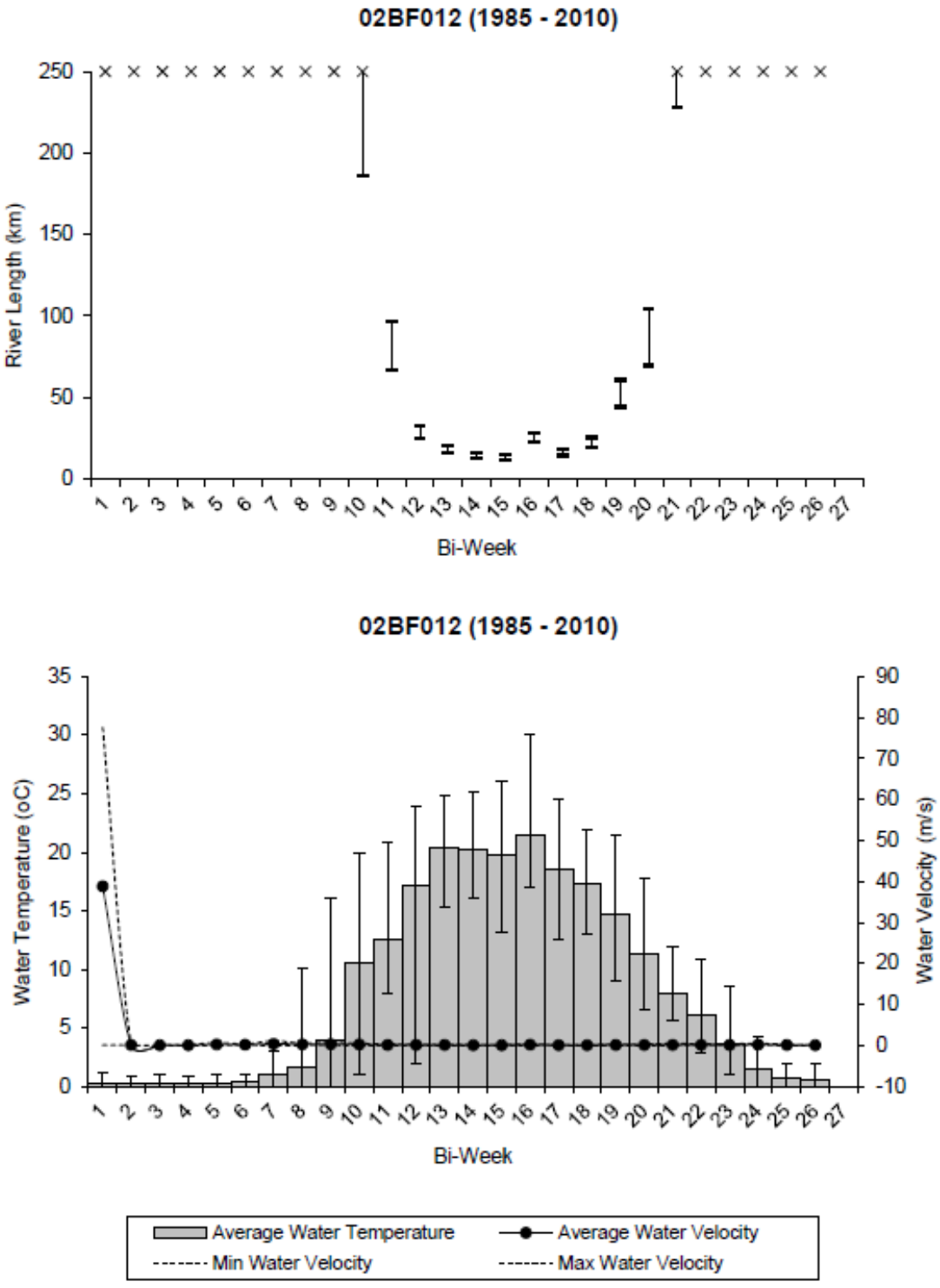


*Figure A1-22. Gauging station 02BF012 data from 1985–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

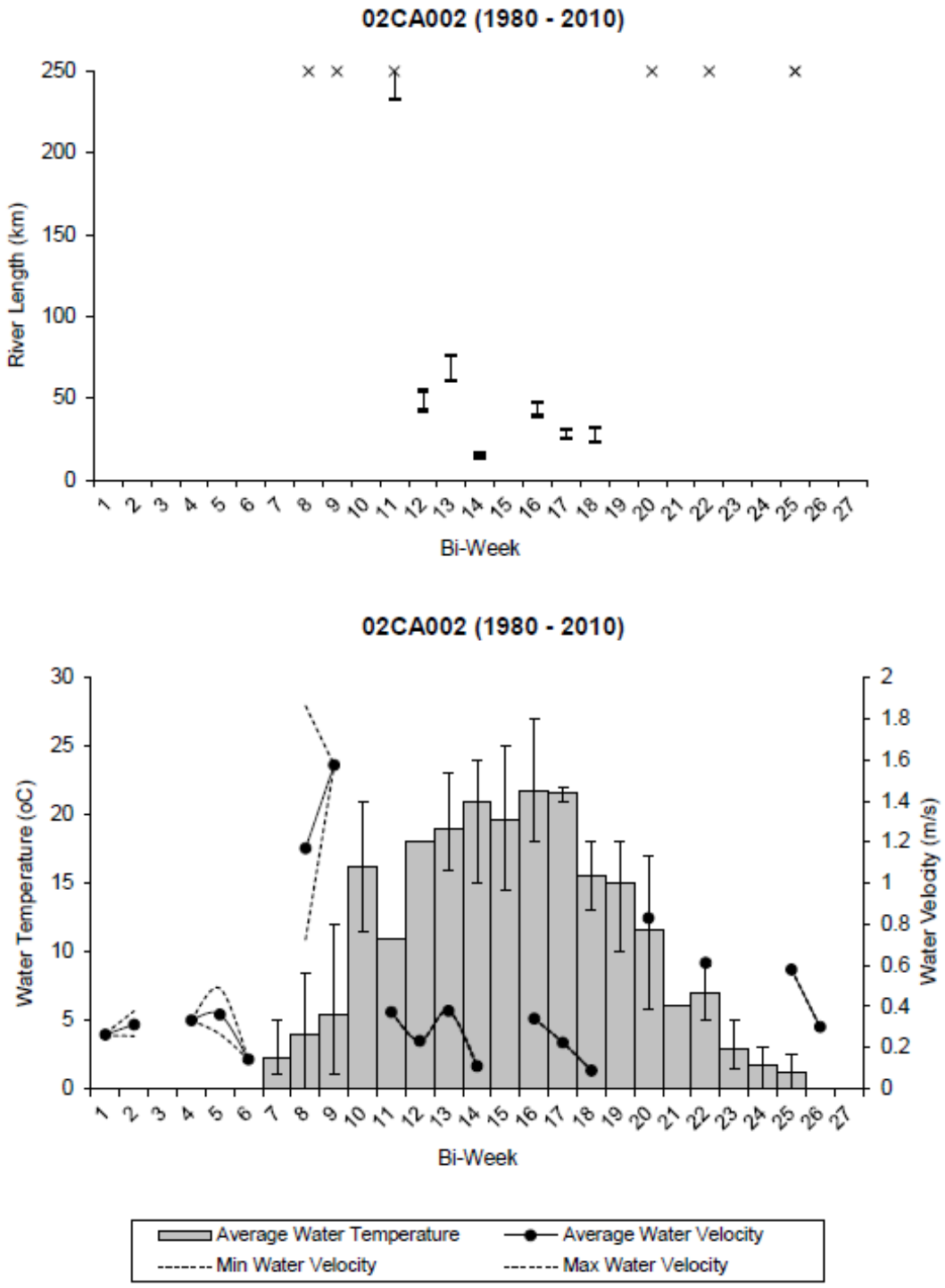


*Figure A1-23. Gauging station 02CA002 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

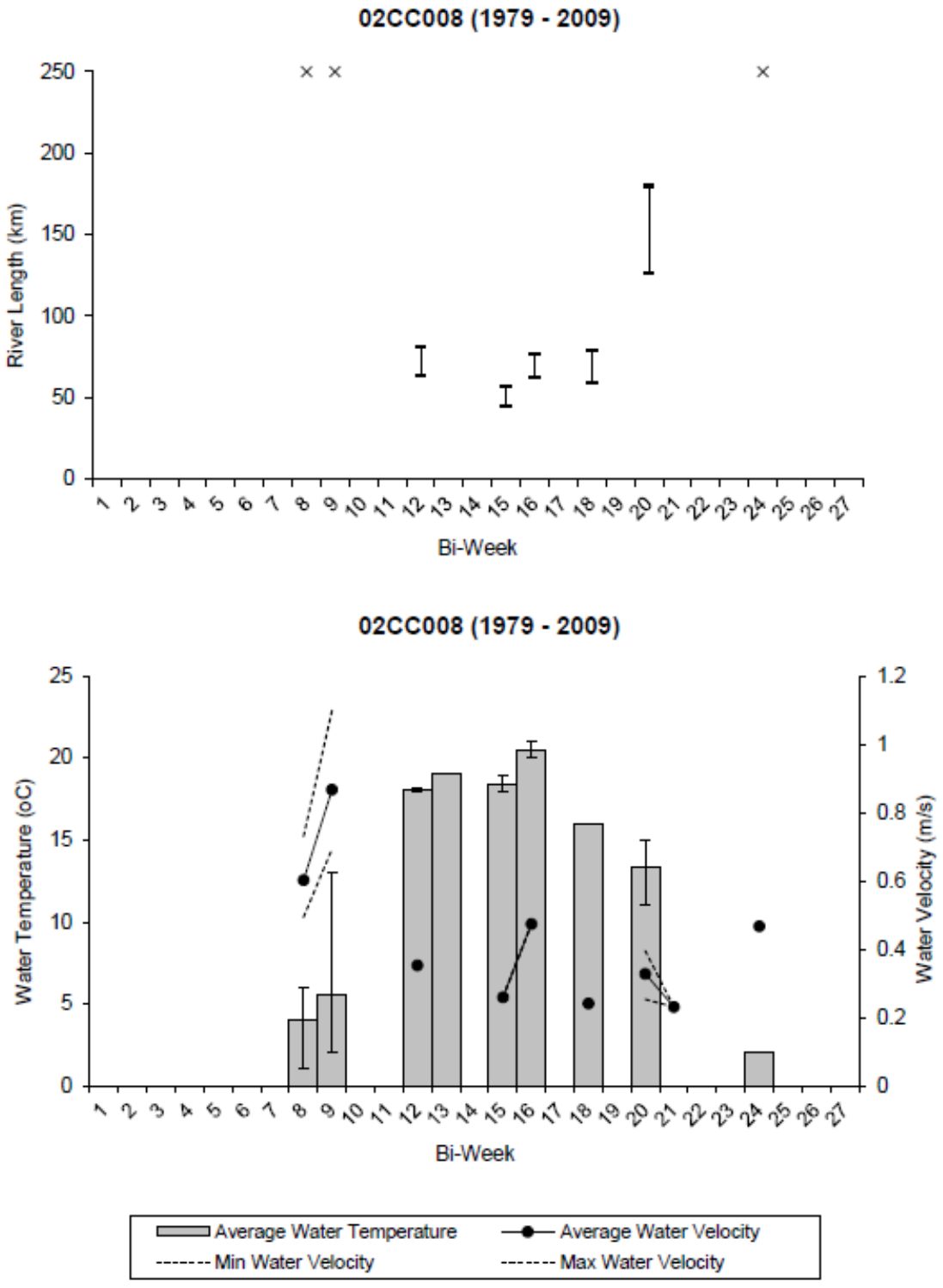


*Figure A1-24. Gauging station 02CC008 data from 1979–2009. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

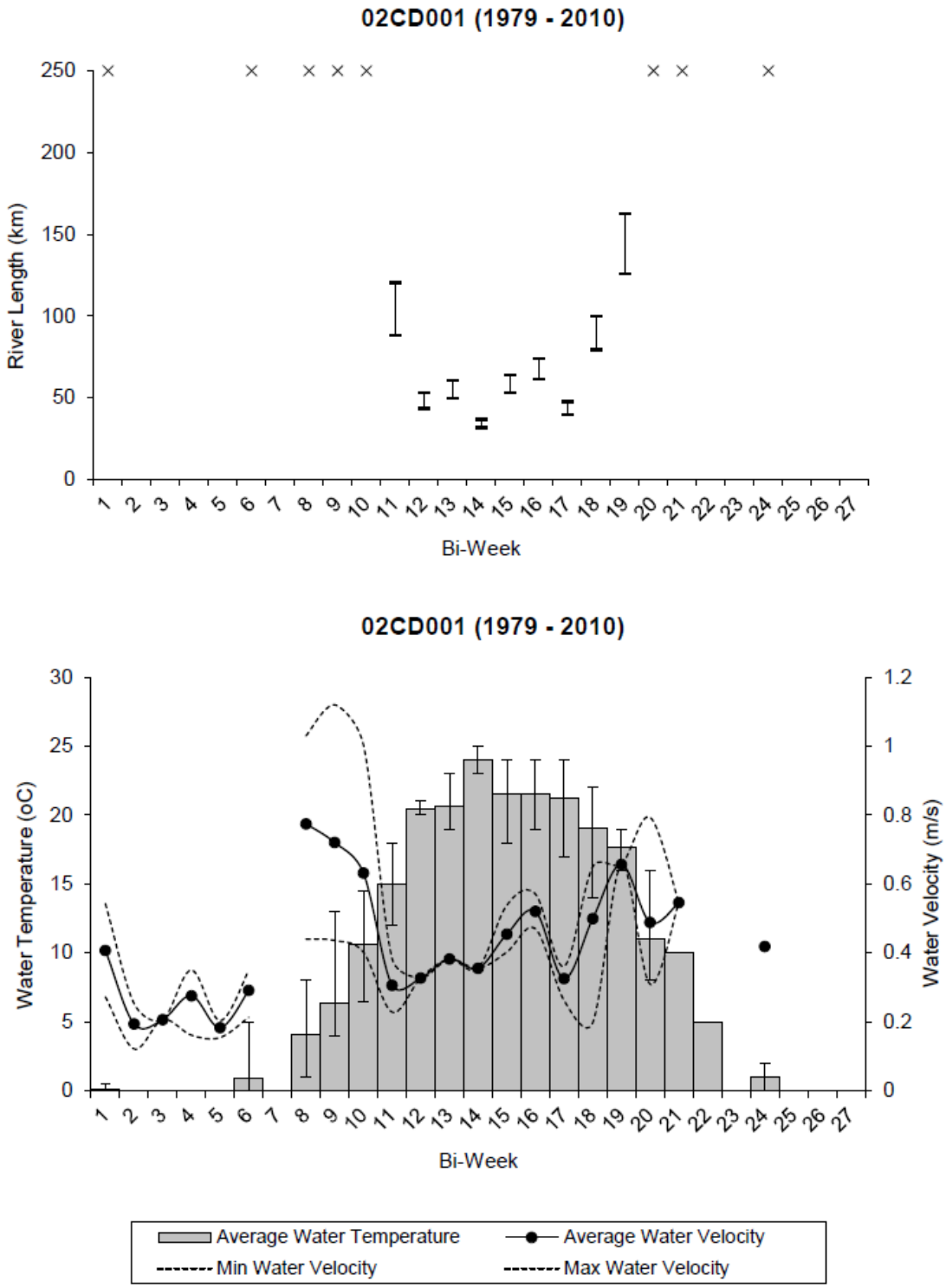


*Figure A1-25 Gauging station 02CD001 data from 1979–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

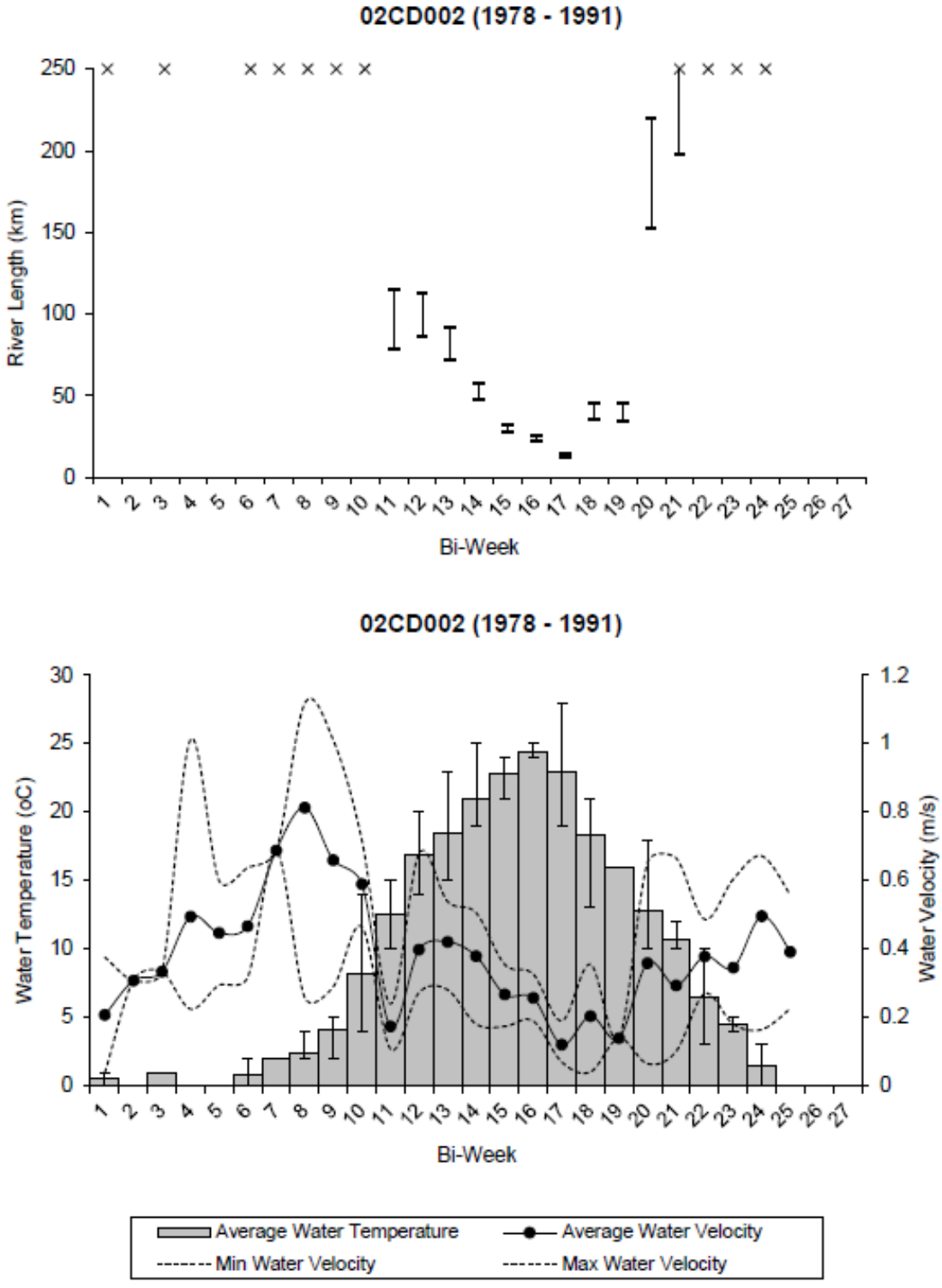


*Figure A1-26. Gauging station 02CD002 data from 1978–1991. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

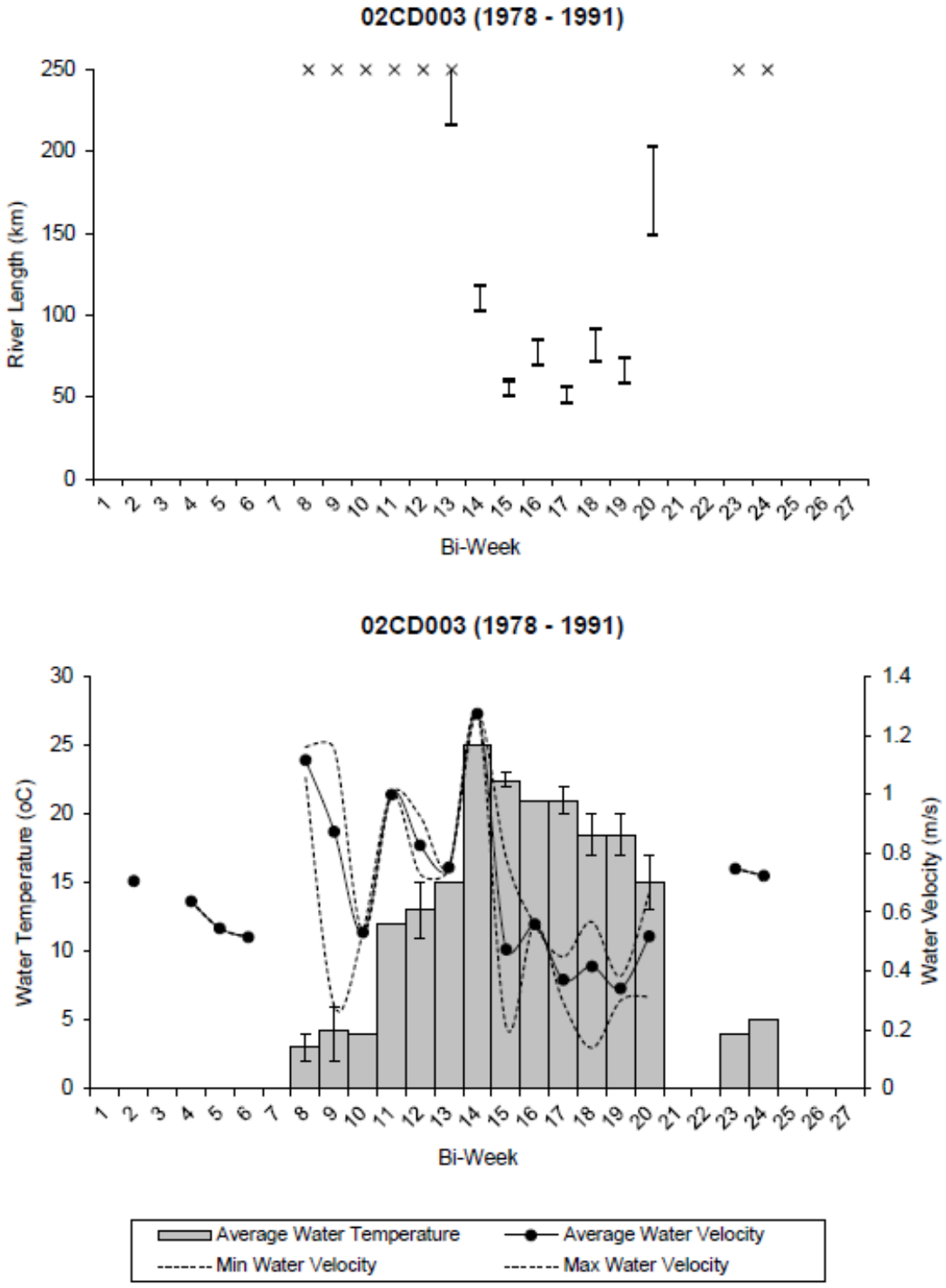


*Figure A1-27 Gauging station 02CD003 data from 1978–1991. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

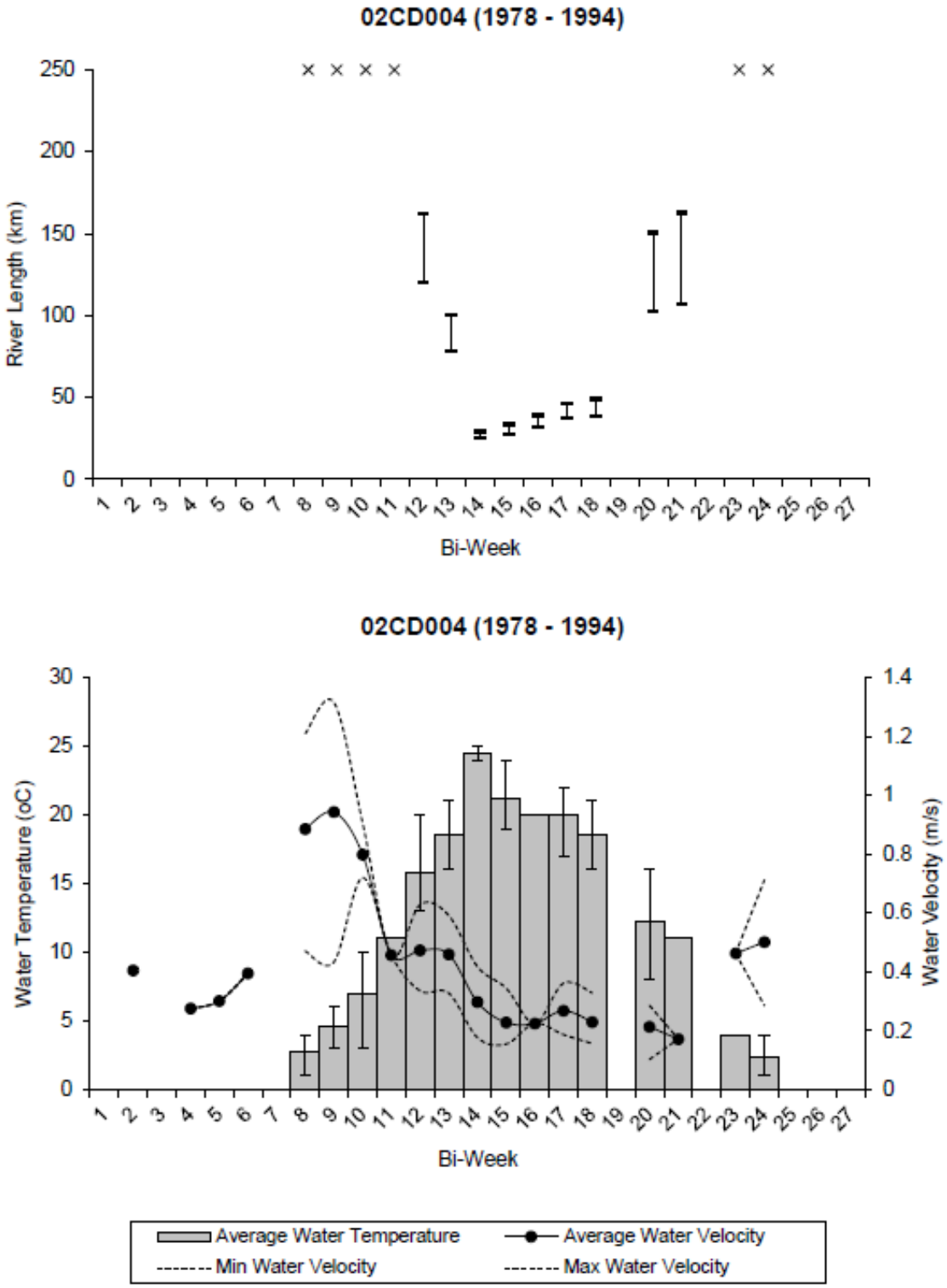


*Figure A1-28. Gauging station 02CD004 data from 1978–1994. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

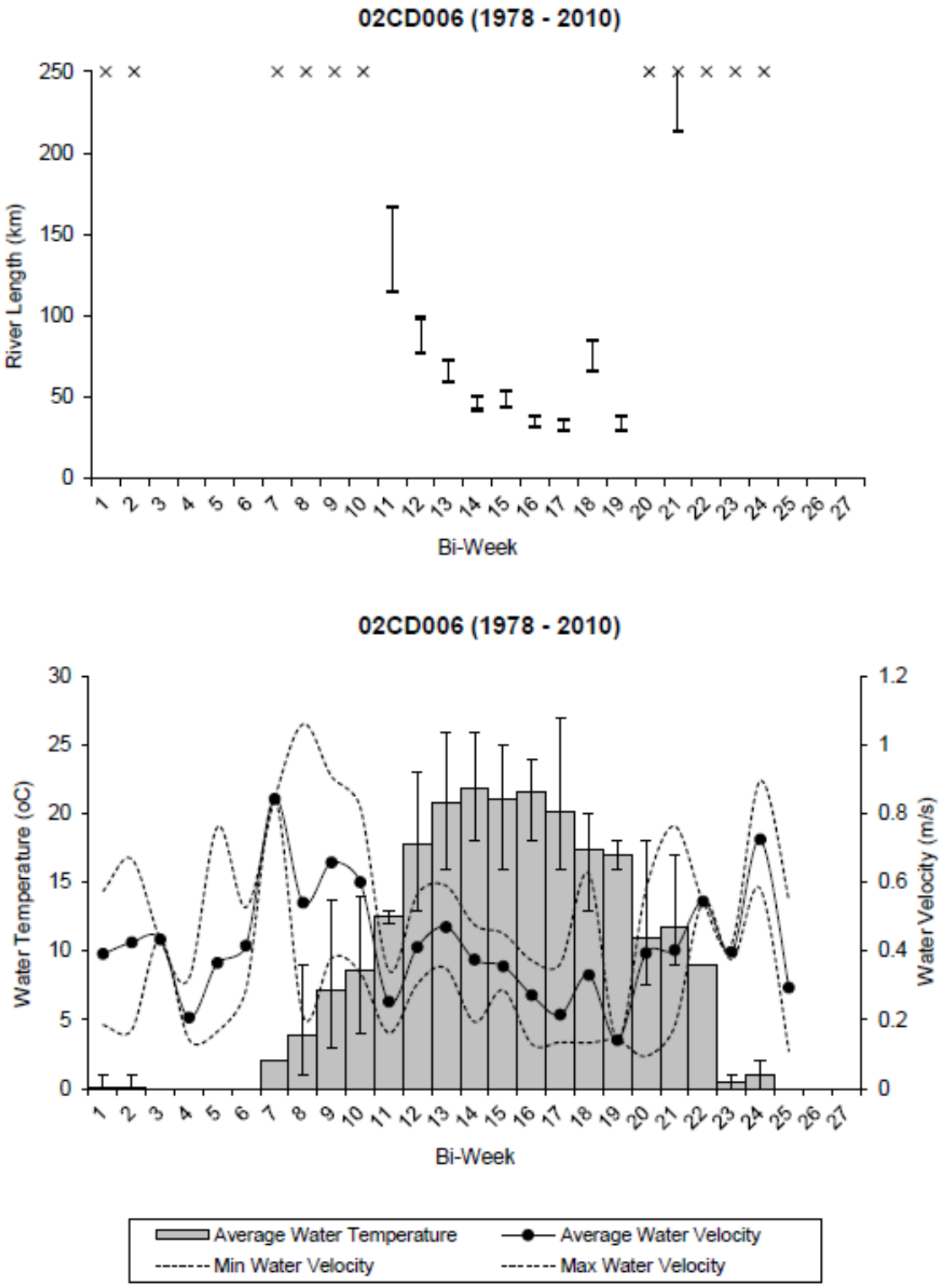


*Figure A1-29. Gauging station 02CD006 data from 1978–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

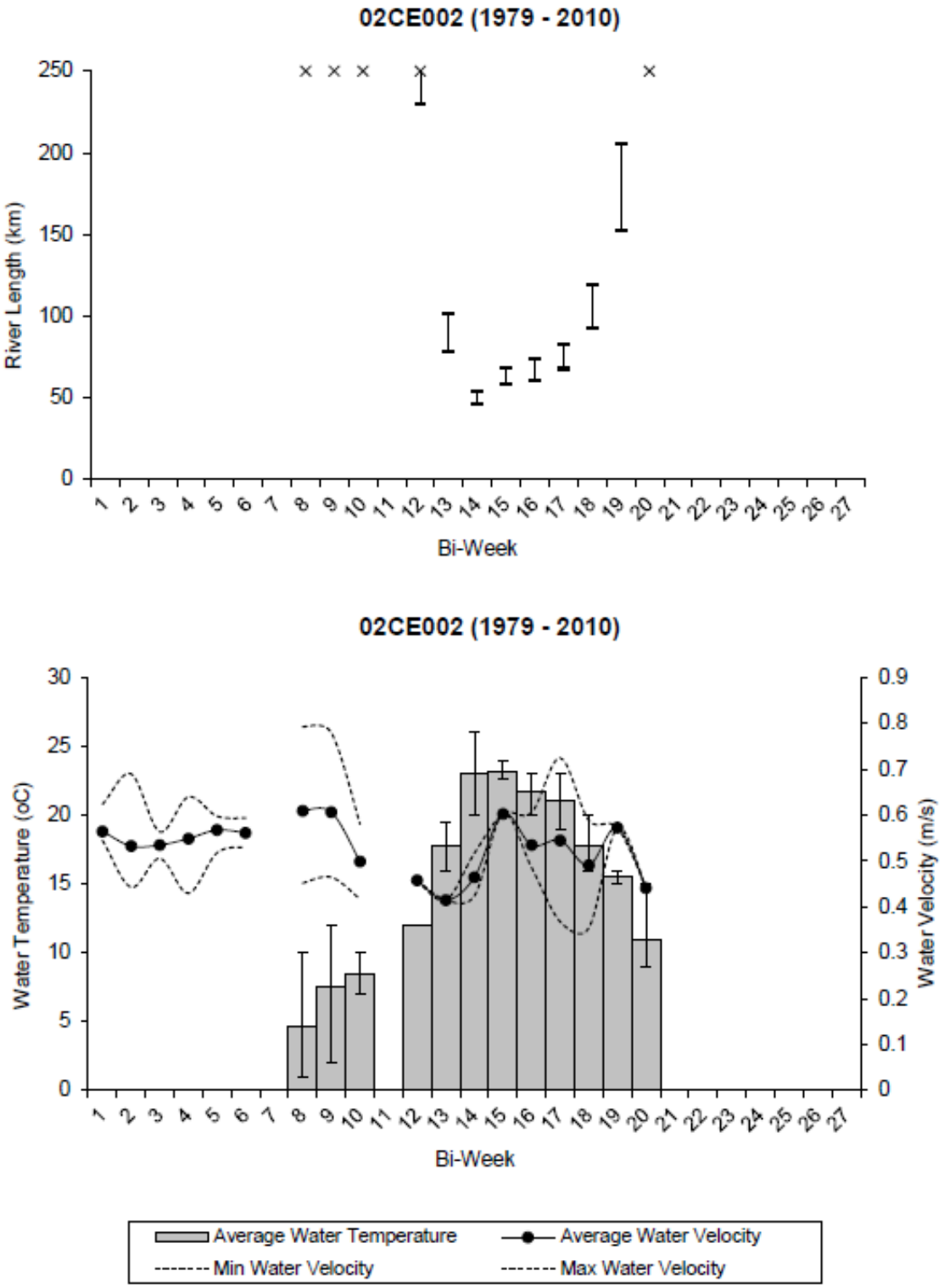


*Figure A1-30. Gauging station 02CE002 data from 1979–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

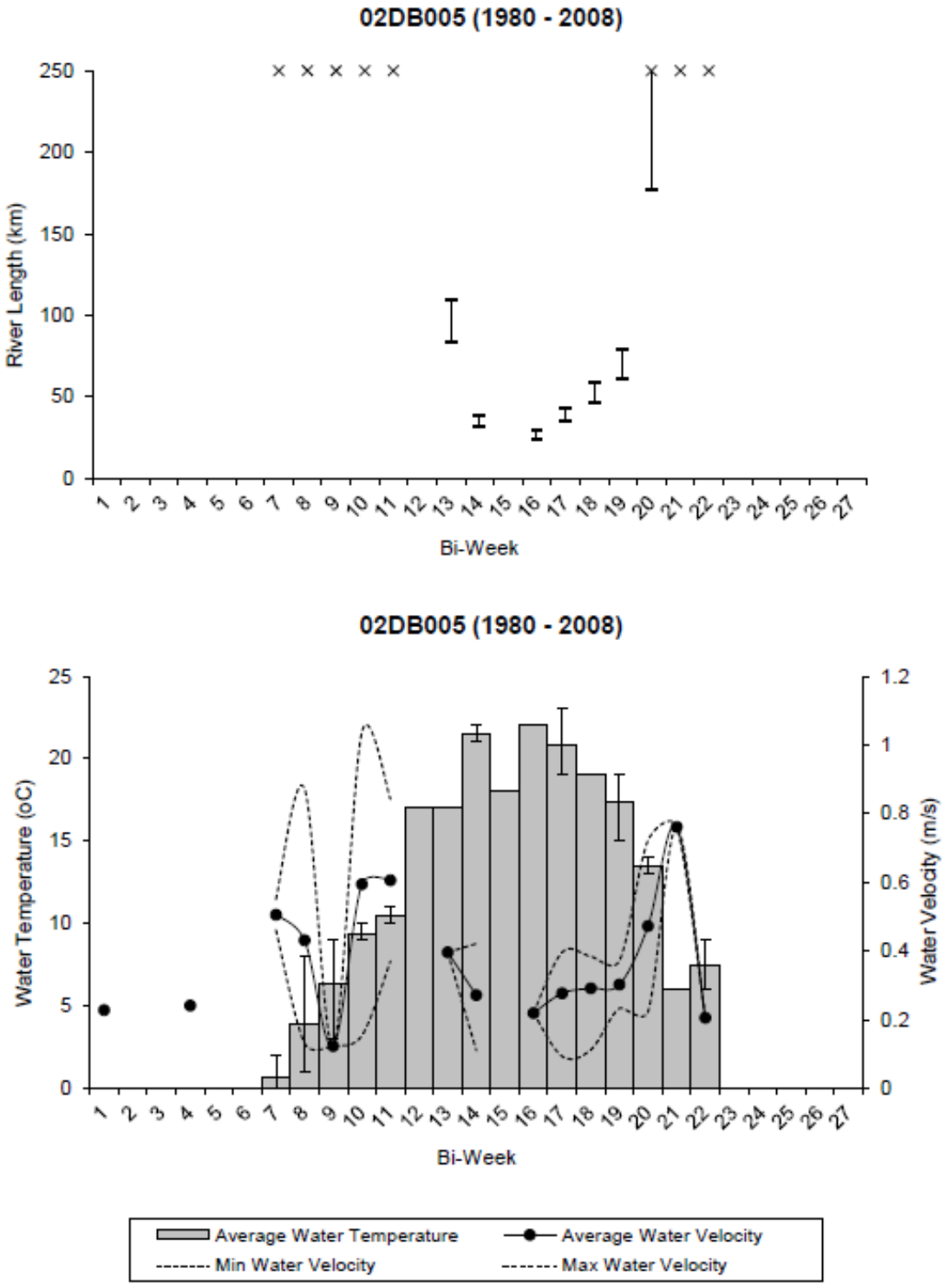


*Figure A1-31. Gauging station 02DB005 data from 1980–2008. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

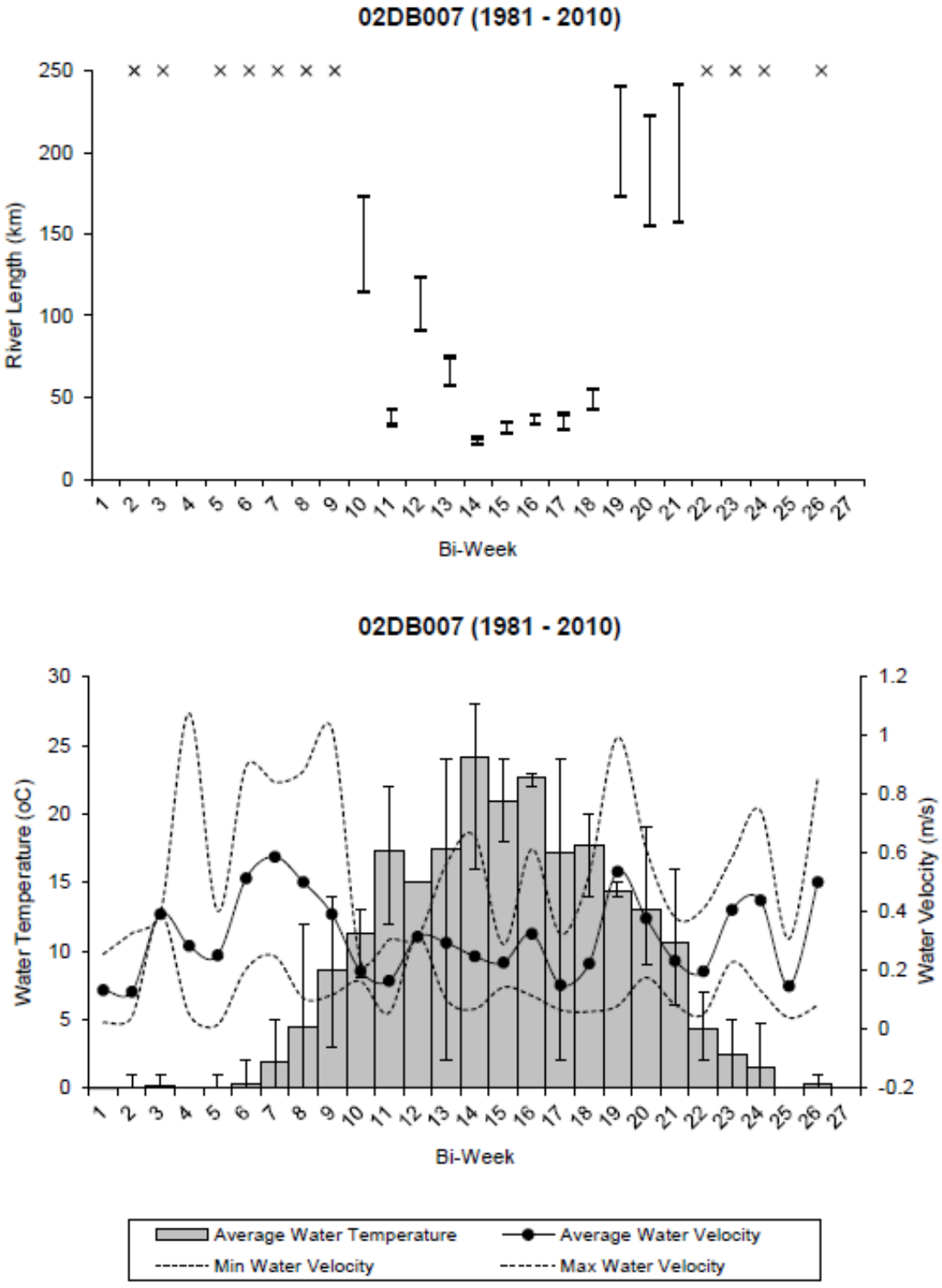


*Figure A1-32. Gauging station 02DB007 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

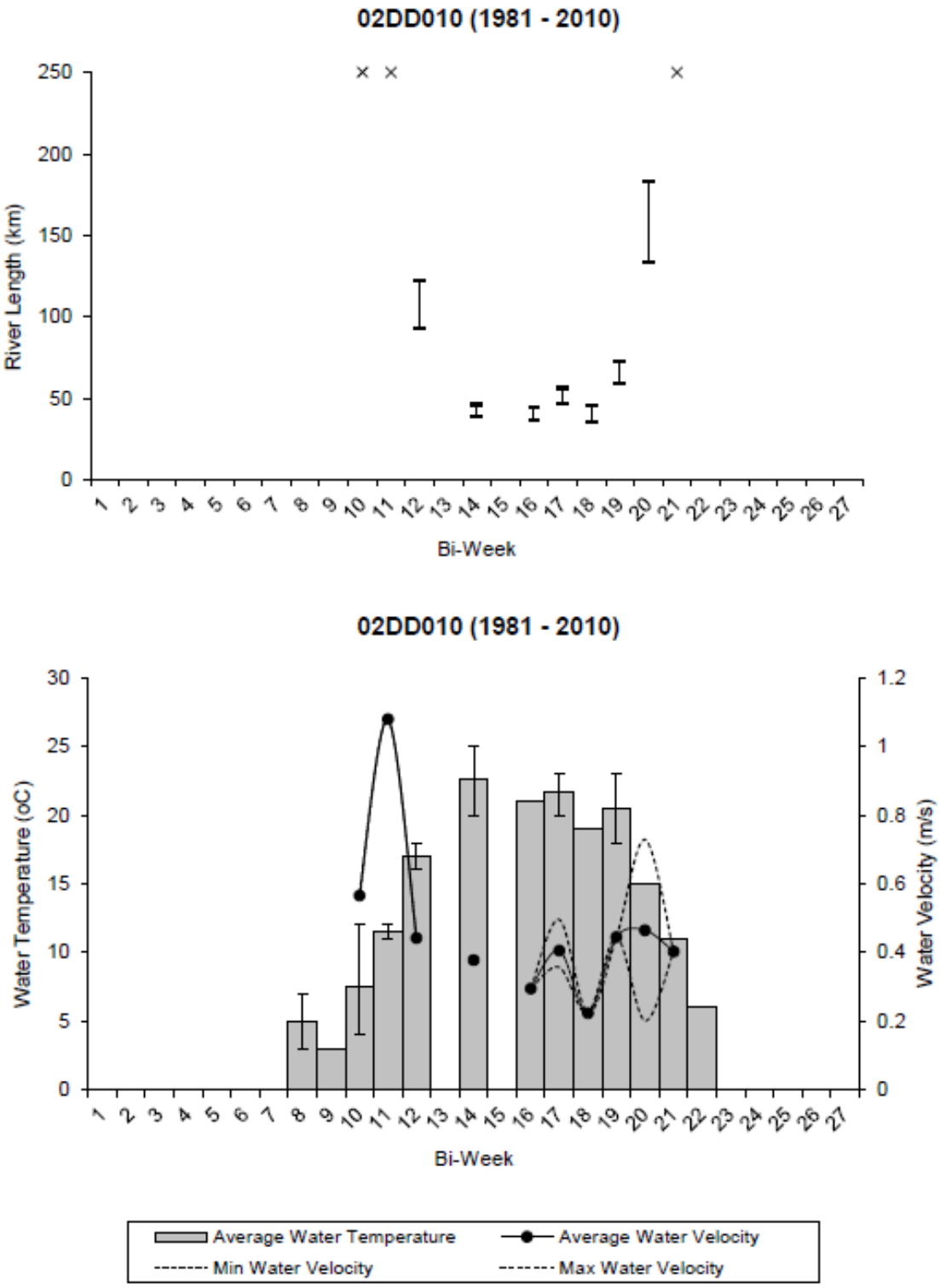


*Figure A1-33. Gauging station 02DD010 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

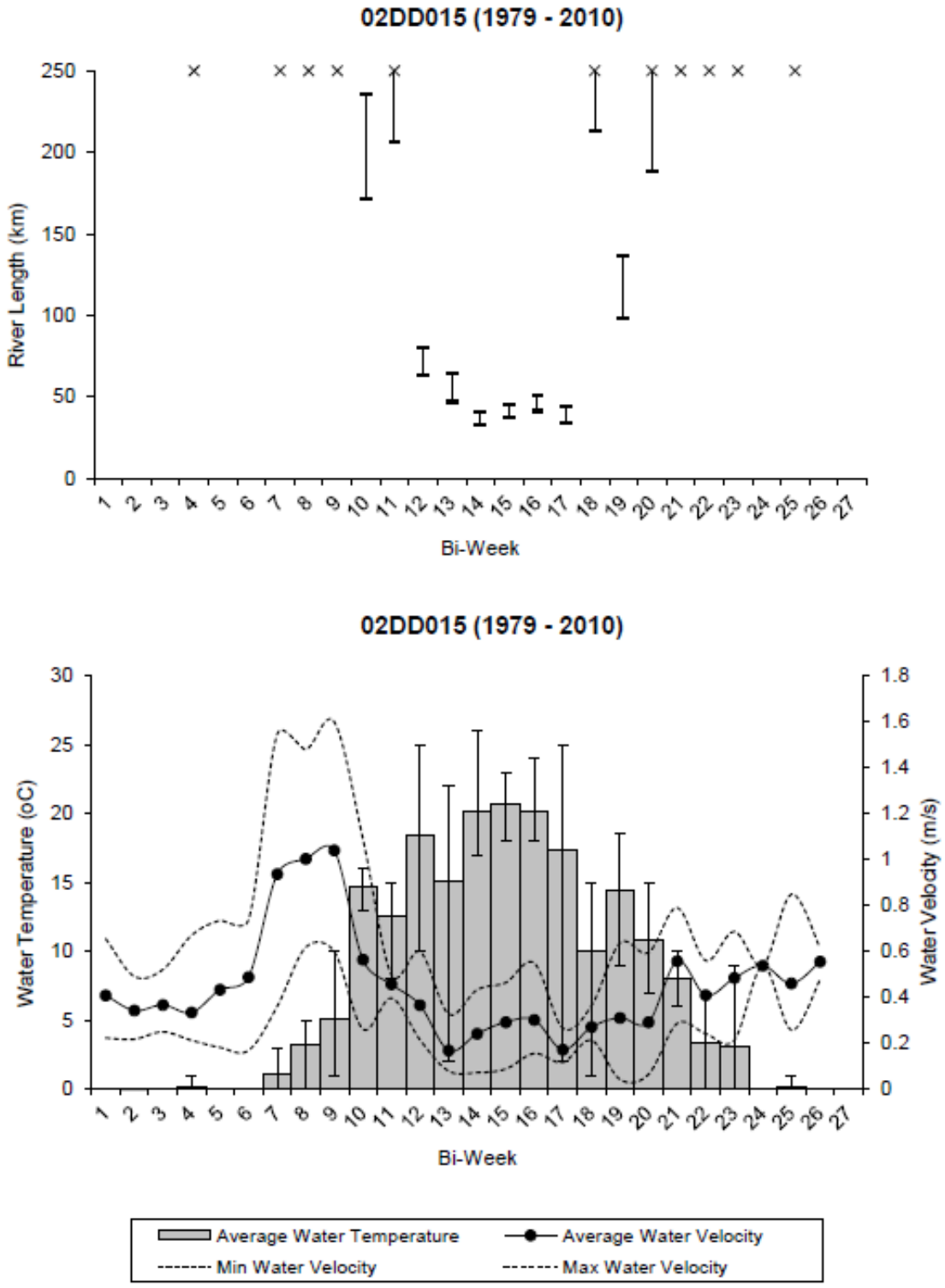


*Figure A1-34. Gauging station 02DD015 data from 1979–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

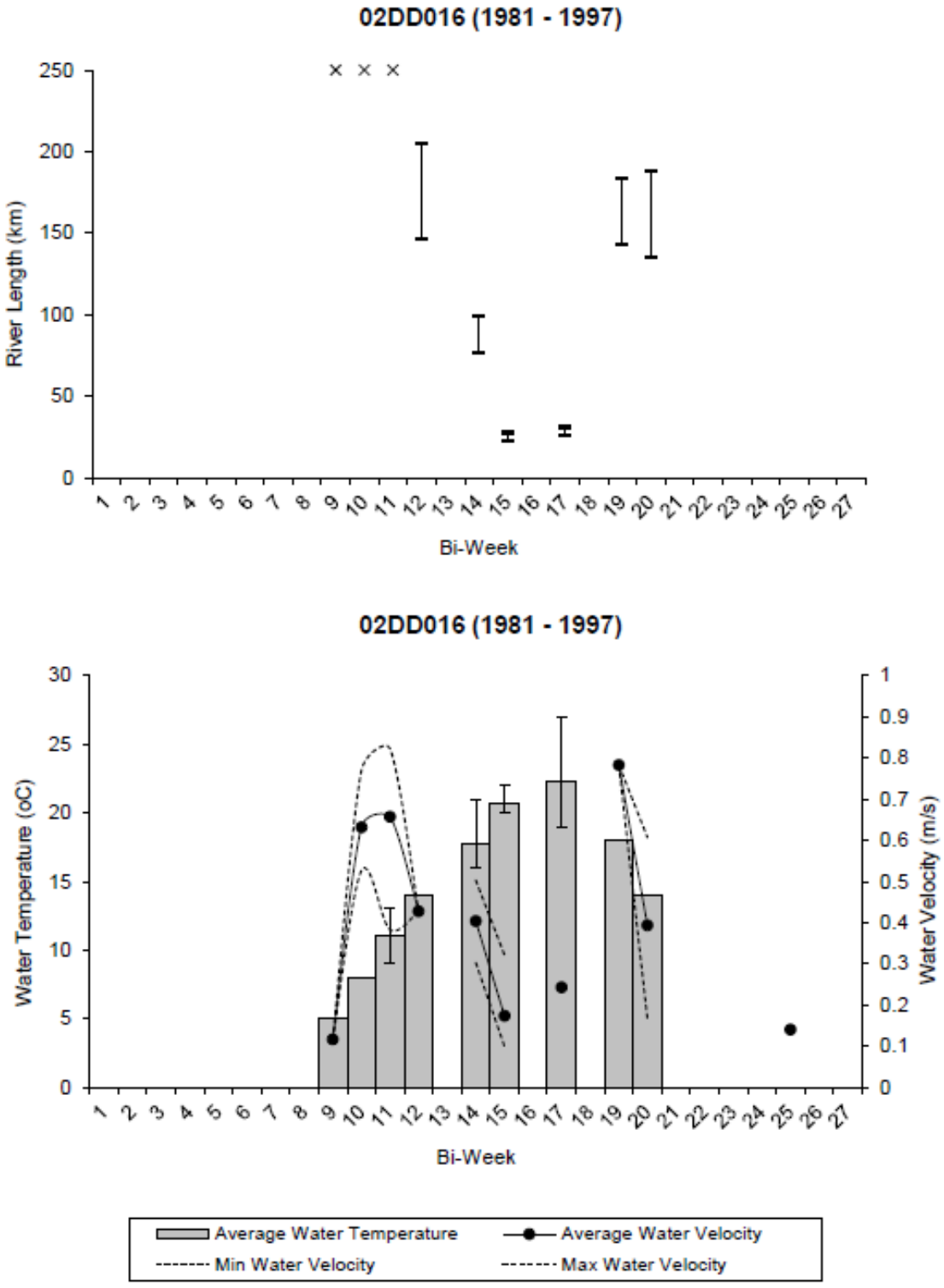


*Figure A1-35. Gauging station 02DD016 data from 1981–1997. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

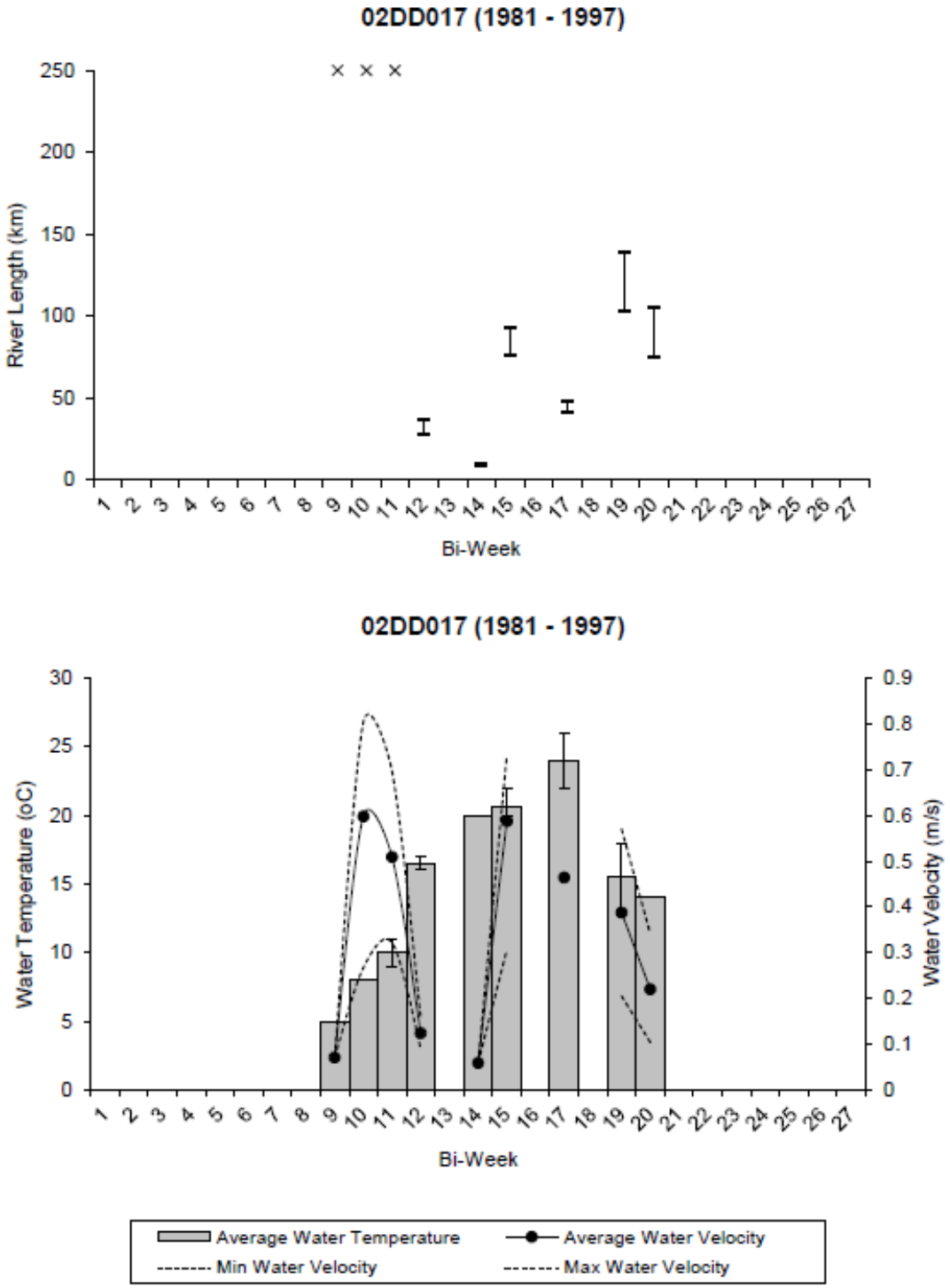


*Figure A1-36. Gauging station 02DD017 data from 1981–1997. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

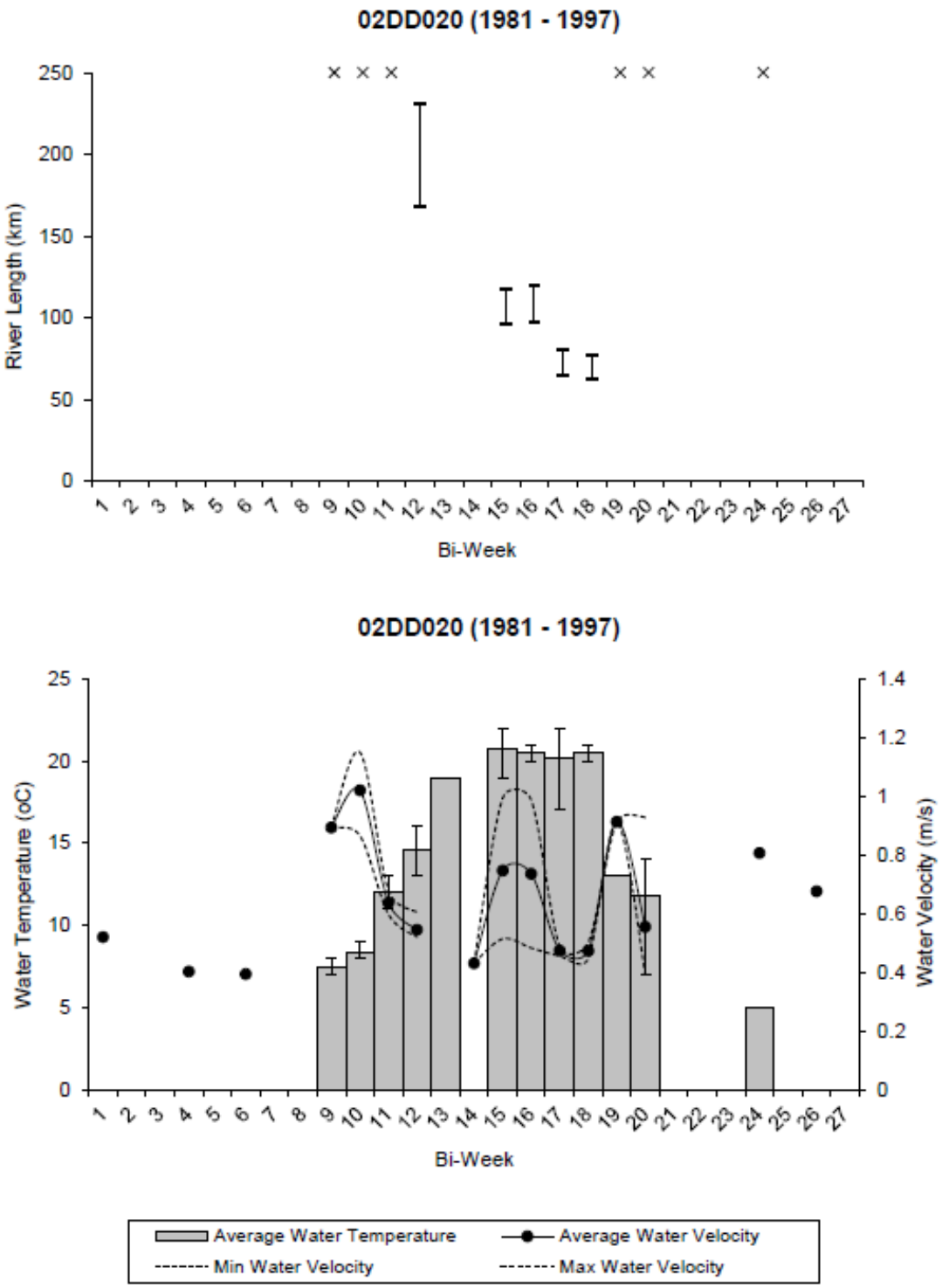


*Figure A1-37. Gauging station 02DD020 data from 1981–1997. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

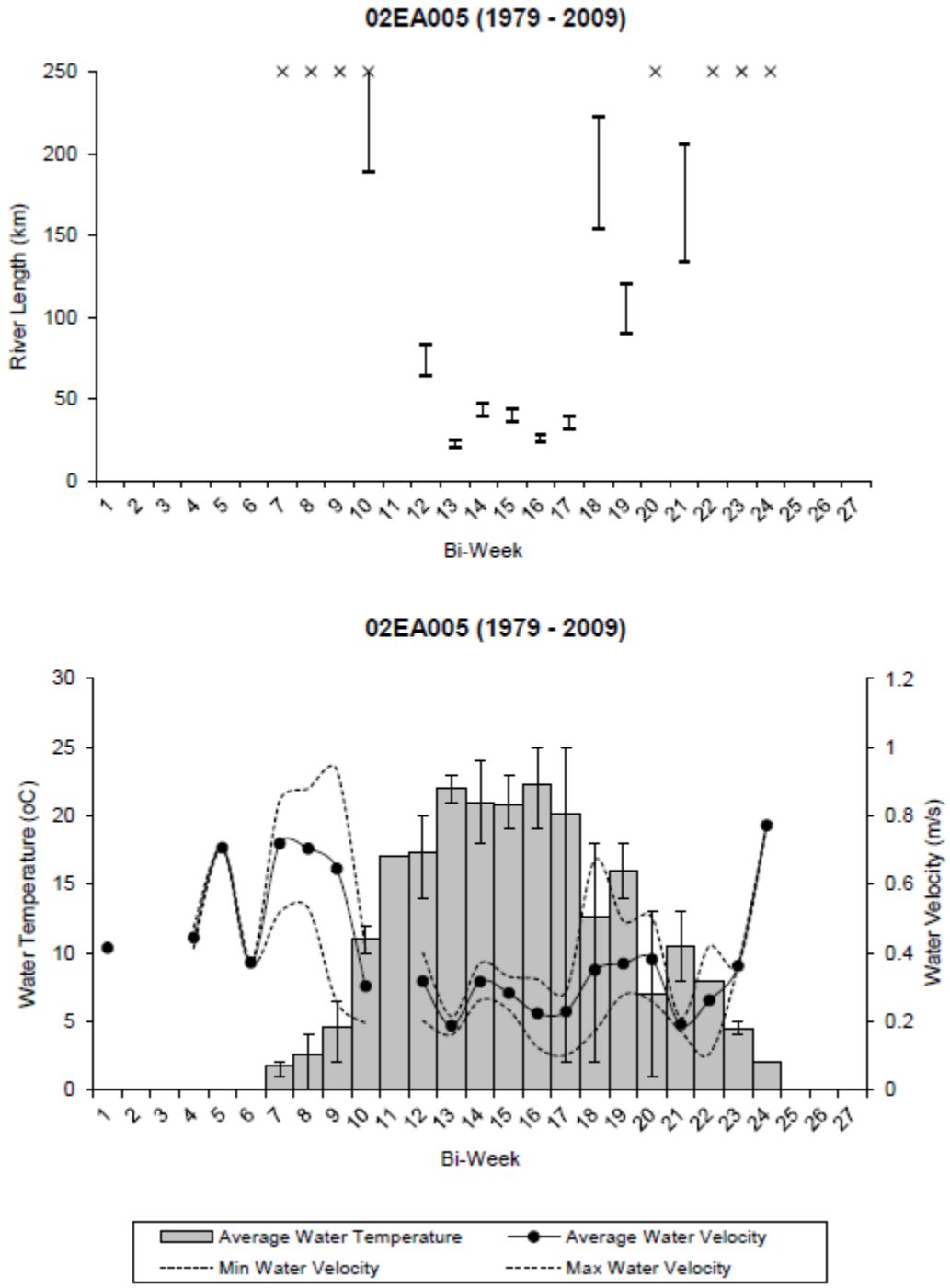


*Figure A1-38. Gauging station 02EA005 data from 1979–2009. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

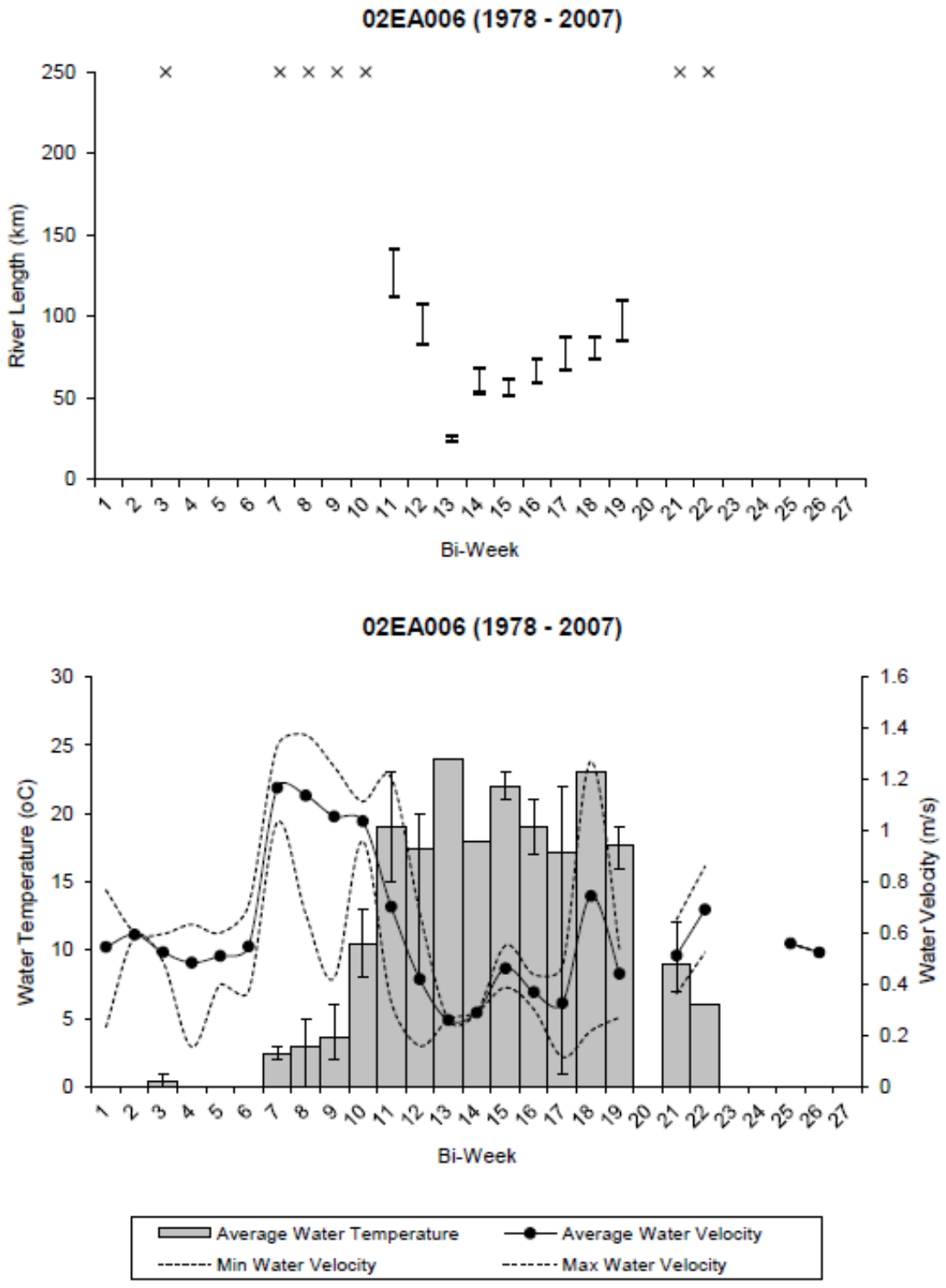


*Figure A1-39. Gauging station 02EA006 data from 1978–2007. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

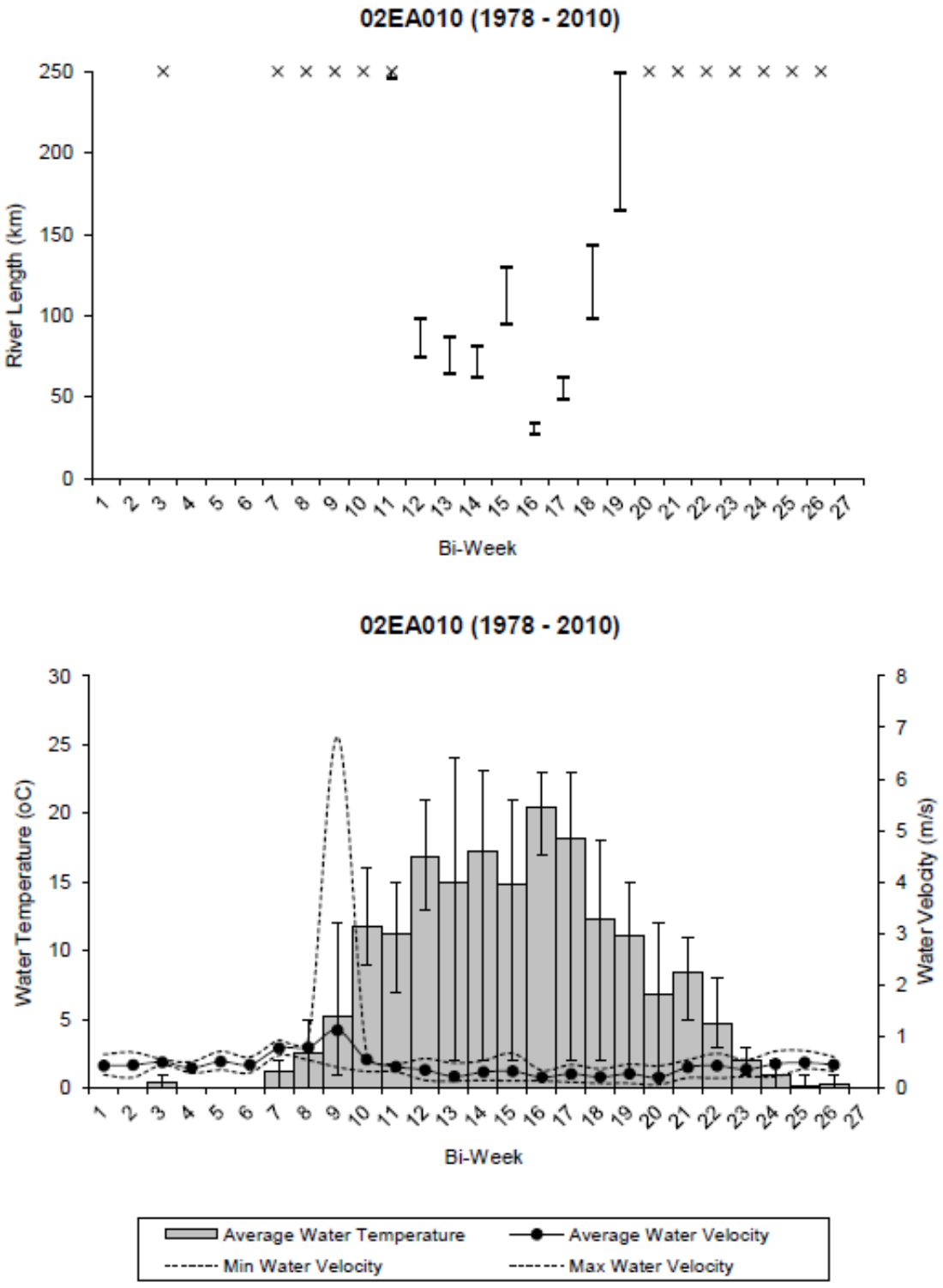


*Figure A1-40. Gauging station 02EA010 data from 1978–2007. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

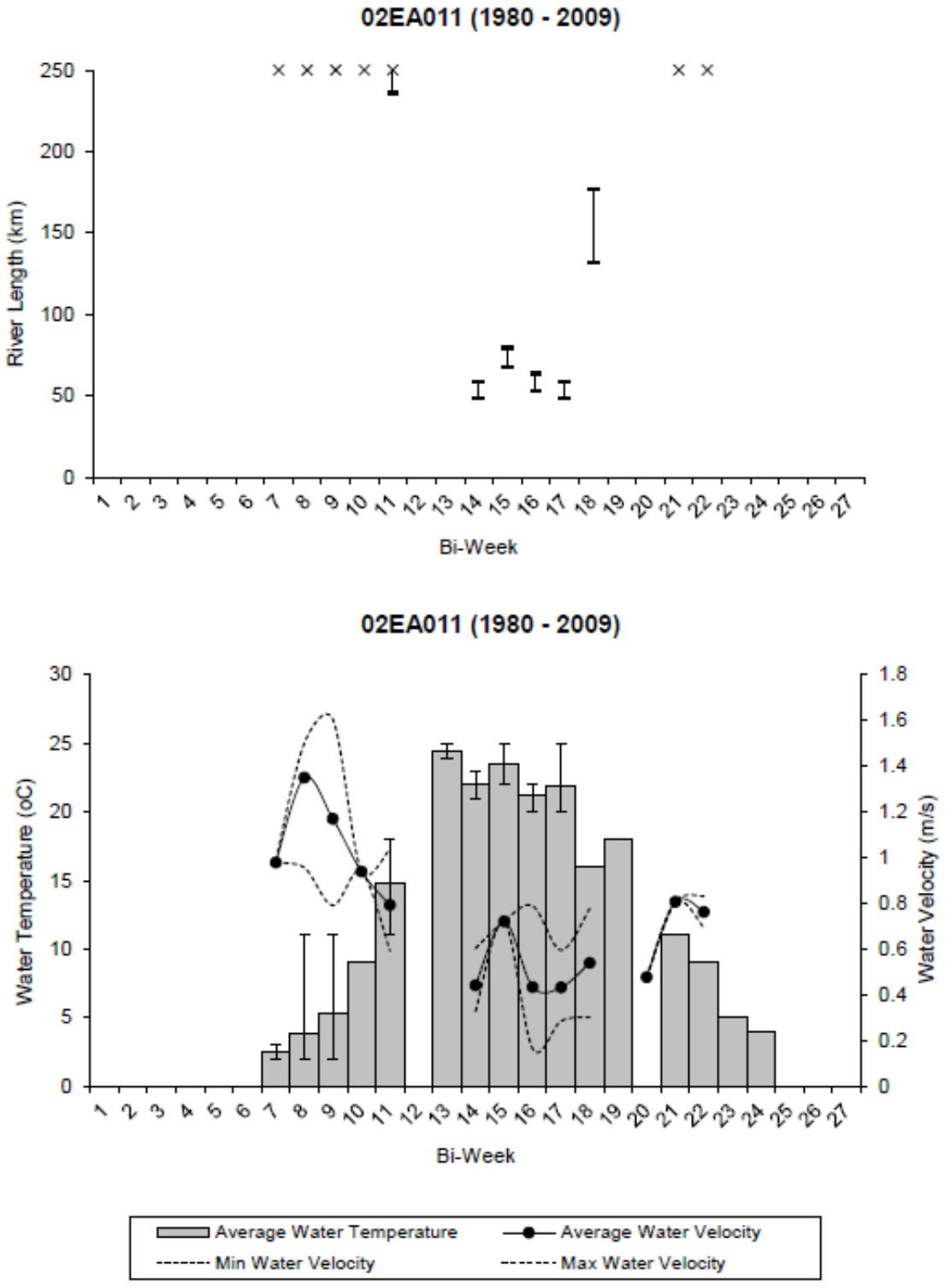


*Figure A1-41. Gauging station 02EA011 data from 1980–2009. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

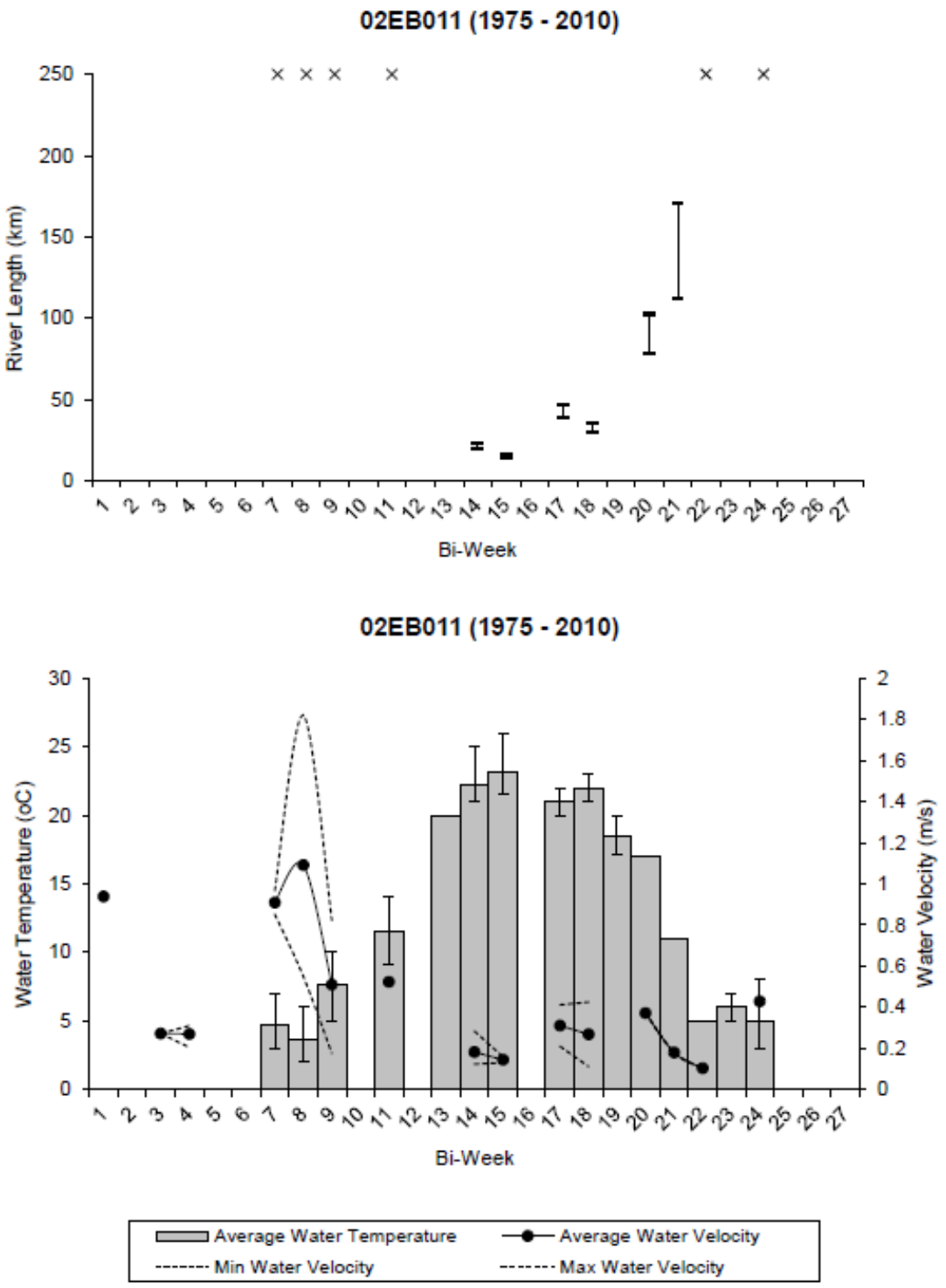


*Figure A1-42. Gauging station 02EB011 data from 1975–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

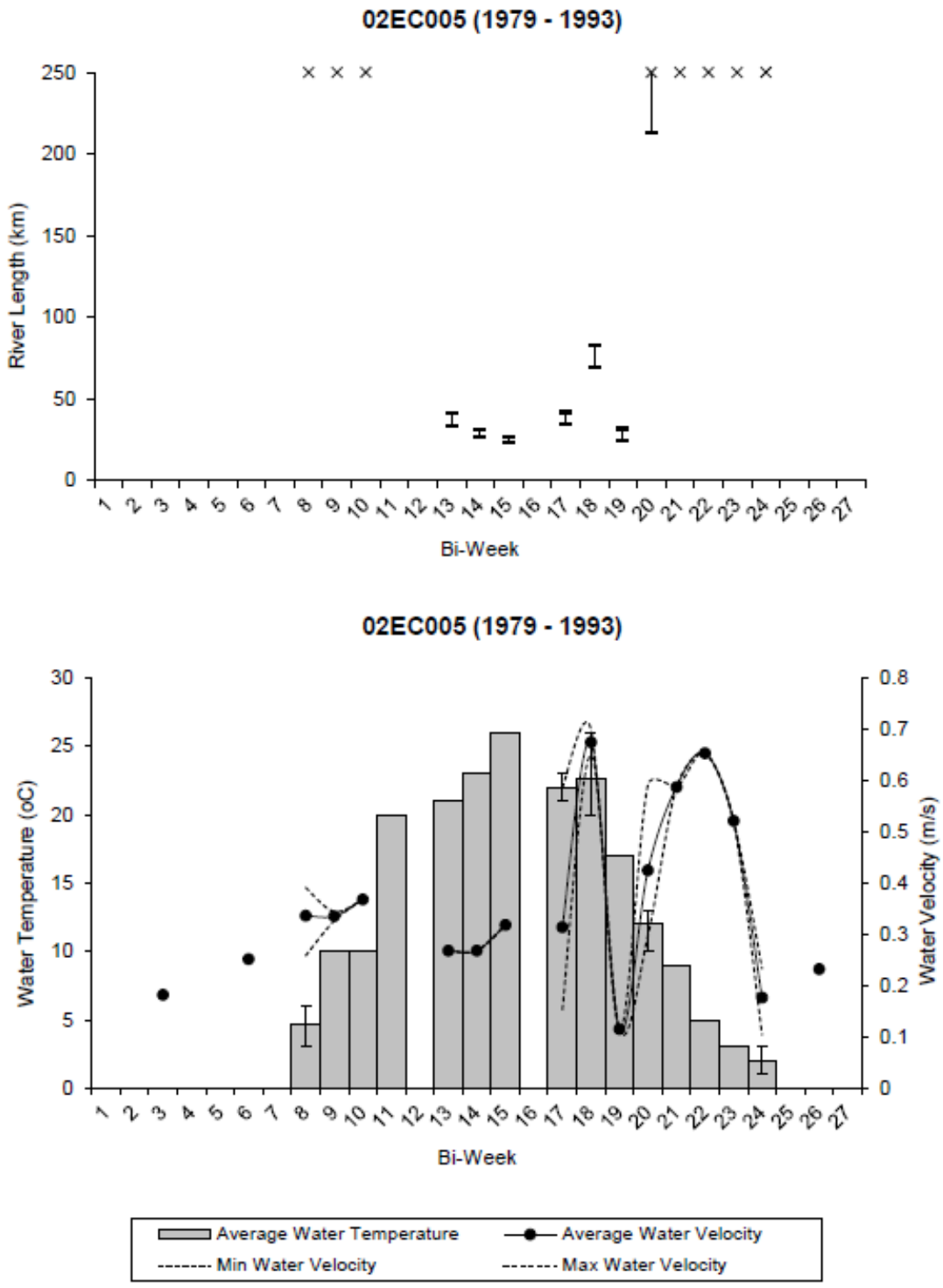


*Figure A1-43. Gauging station 02EC005 data from 1979–1993. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

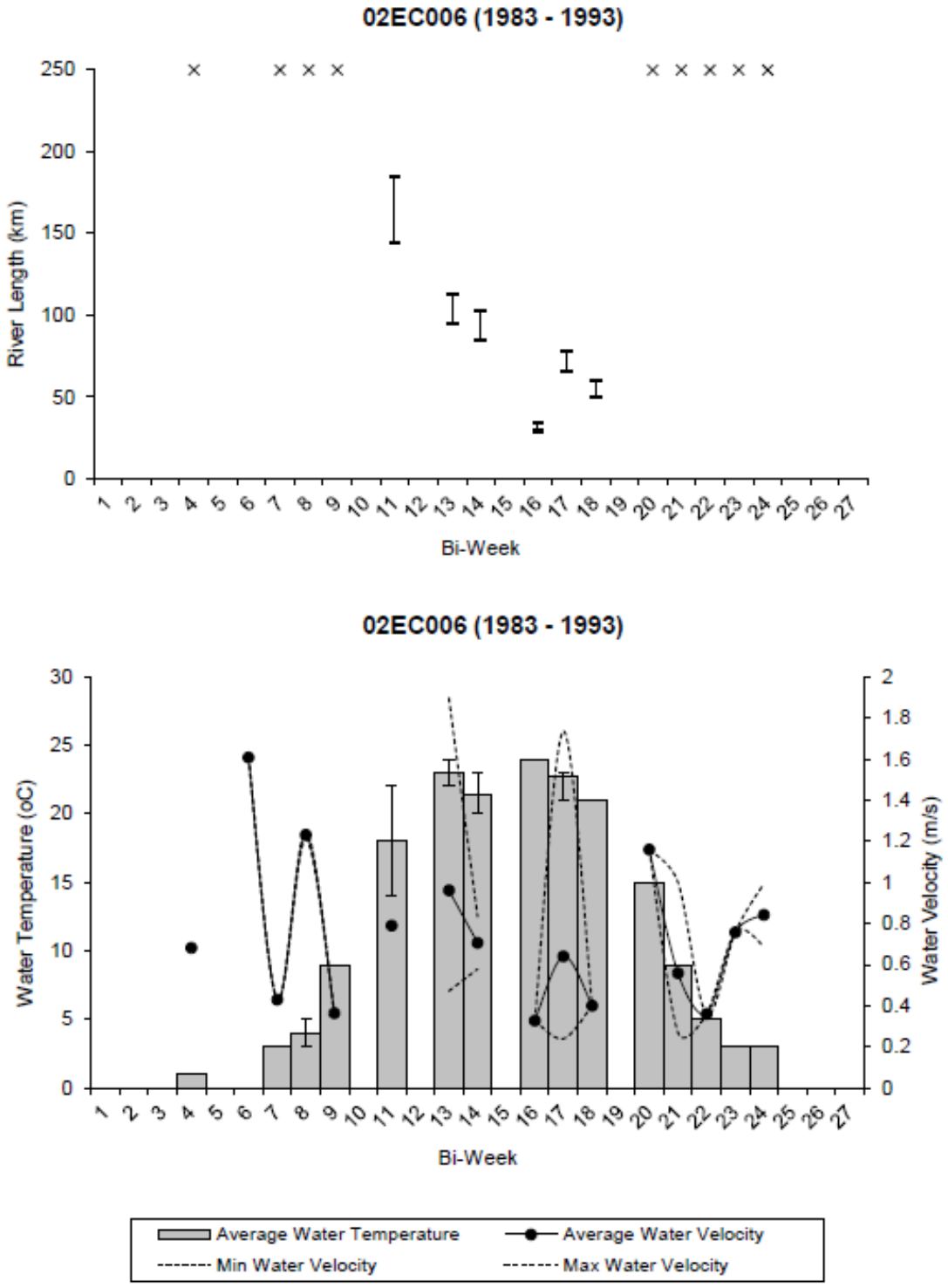


*Figure A1-44. Gauging station 02EC006 data from 1983–1993. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

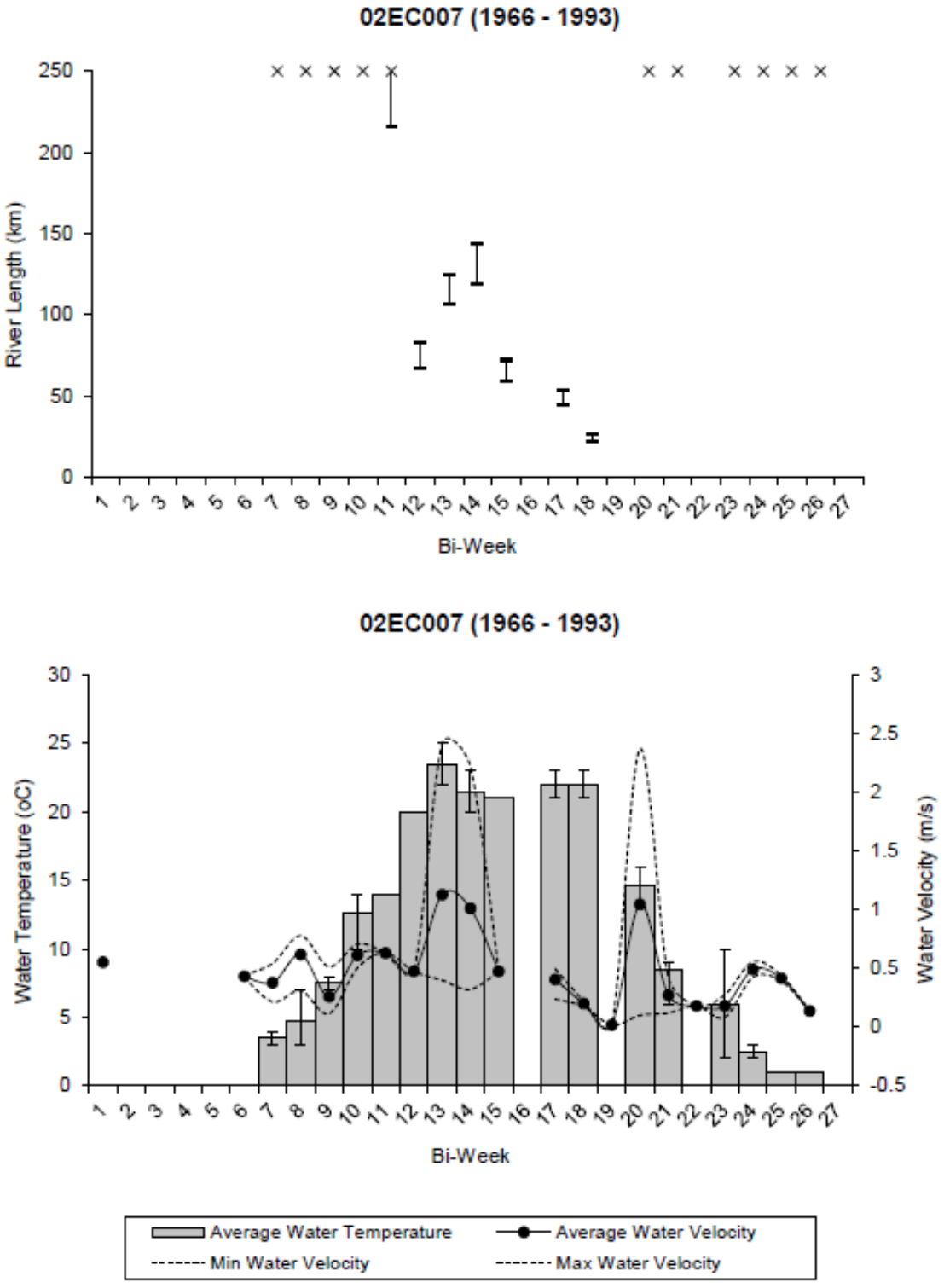


*Figure A1-45. Gauging station 02EC007 data from 1966–1993. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

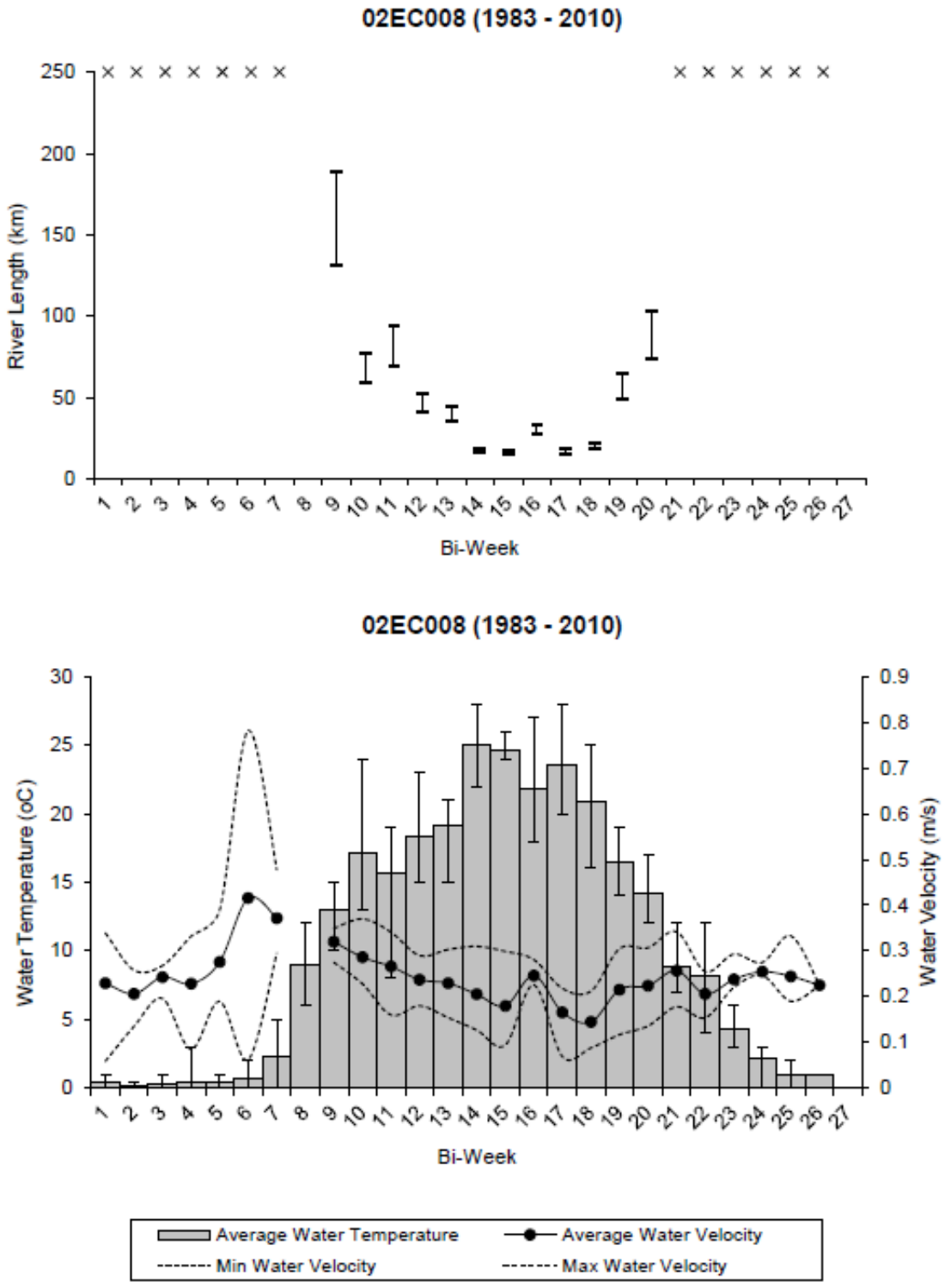


*Figure A1-46. Gauging station 02EC008 data from 1983–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

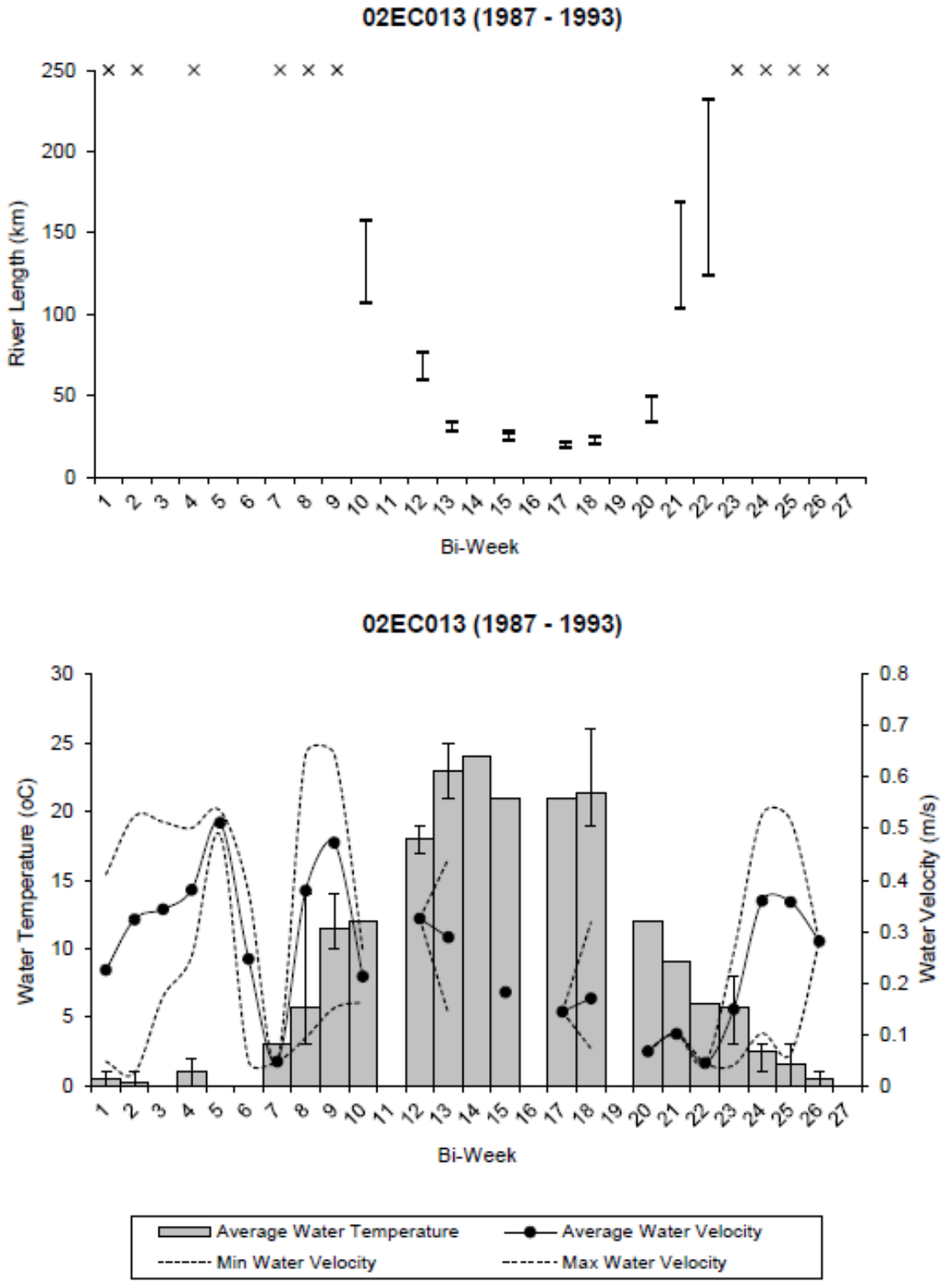


*Figure A1-47. Gauging station 02EC013 data from 1987–1993. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

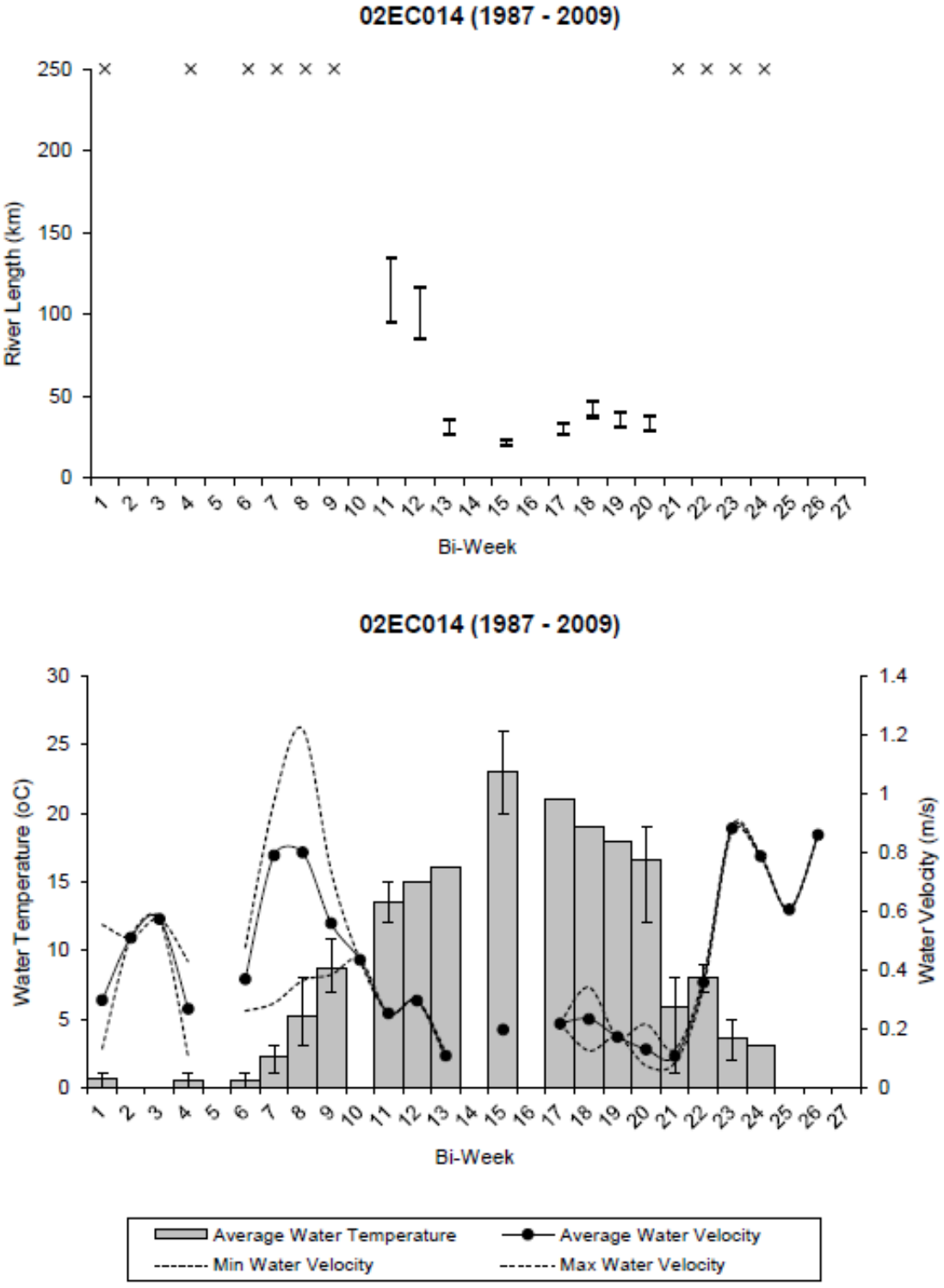


*Figure A1-48. Gauging station 02EC014 data from 1987–2009. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

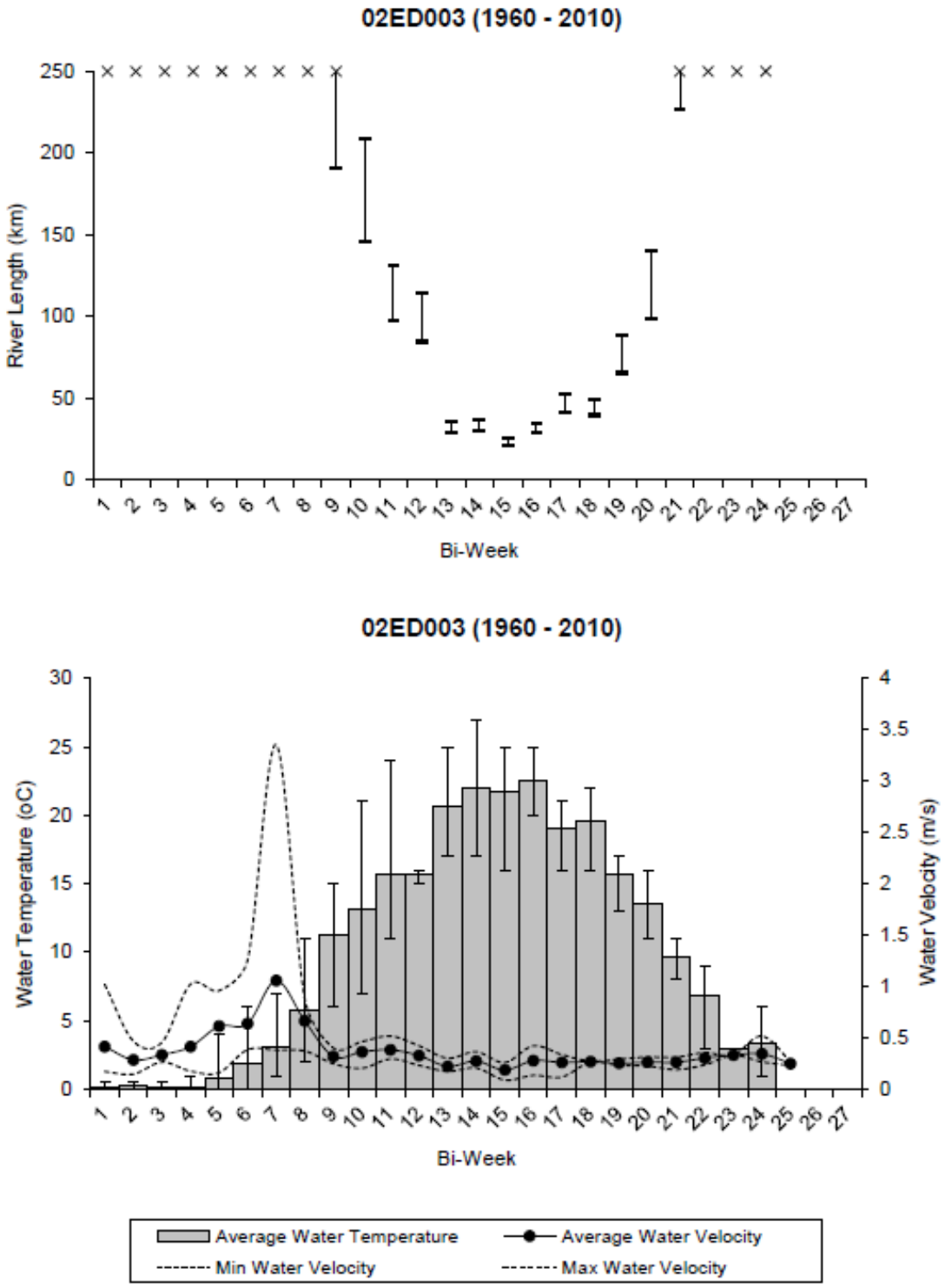


*Figure A1-49. Gauging station 02ED003 data from 1960–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

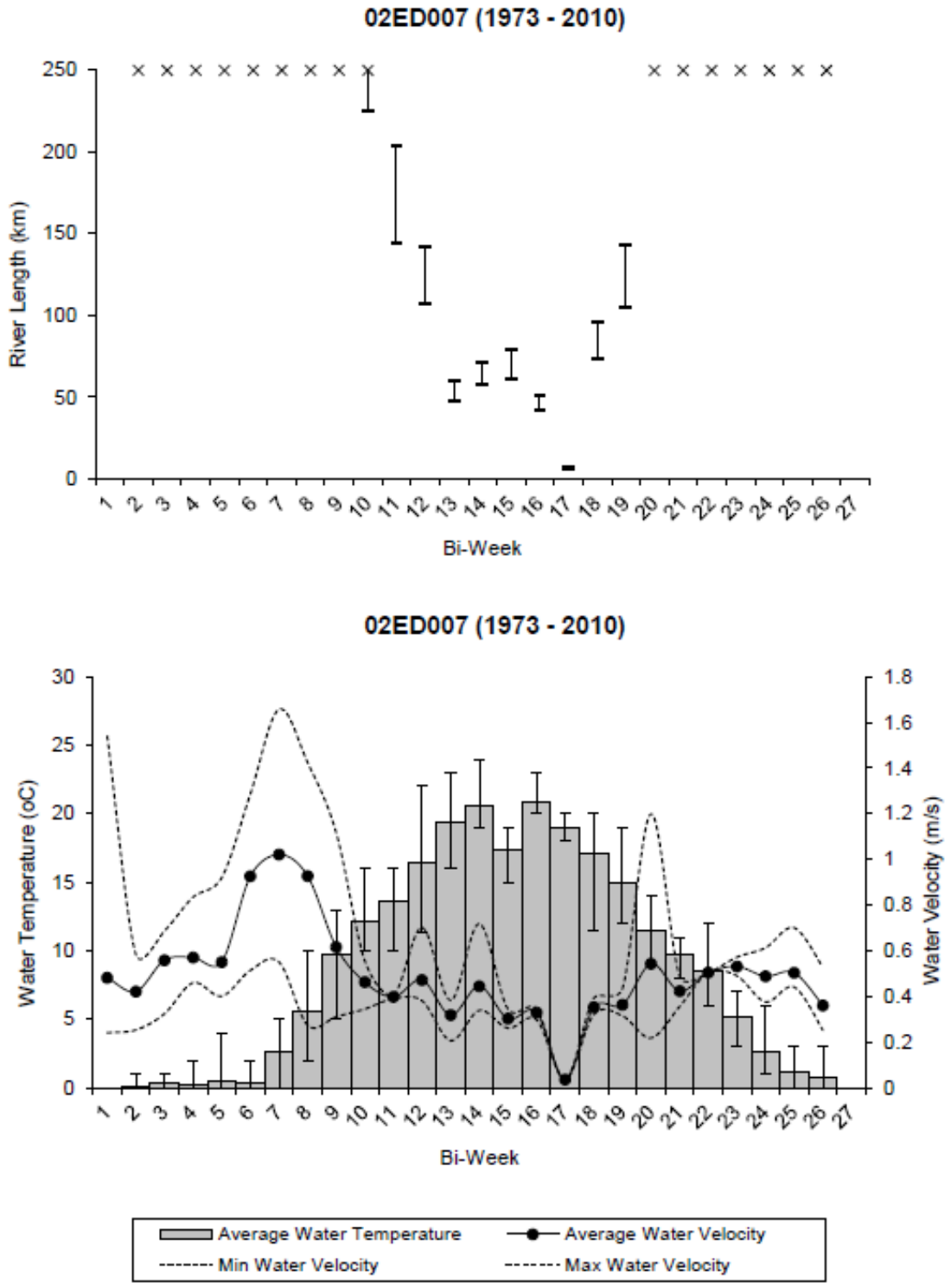


*Figure A1-50. Gauging station 02ED007 data from 1973–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

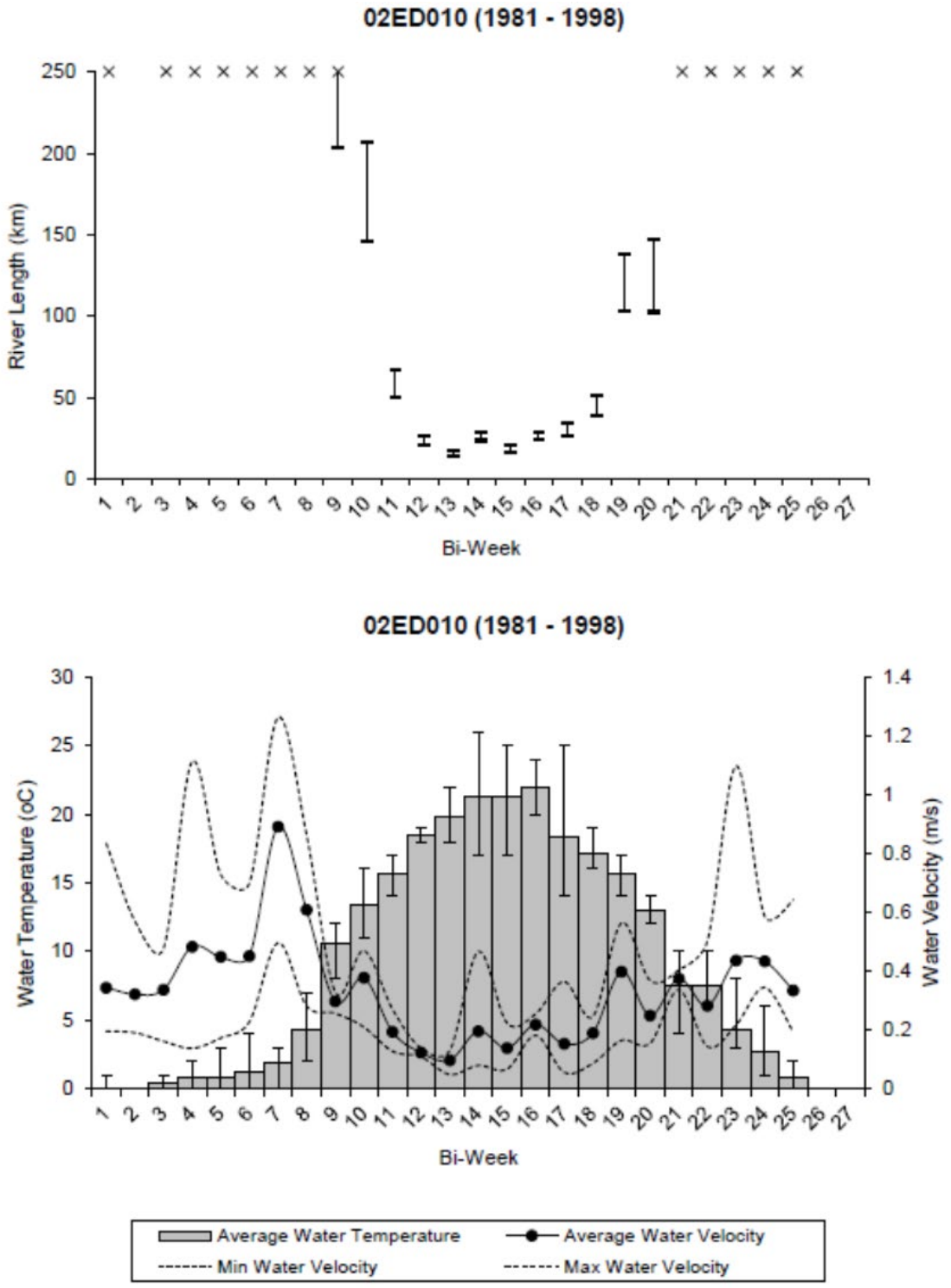


*Figure A1-51. Gauging station 02ED010 data from 1981–1998. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

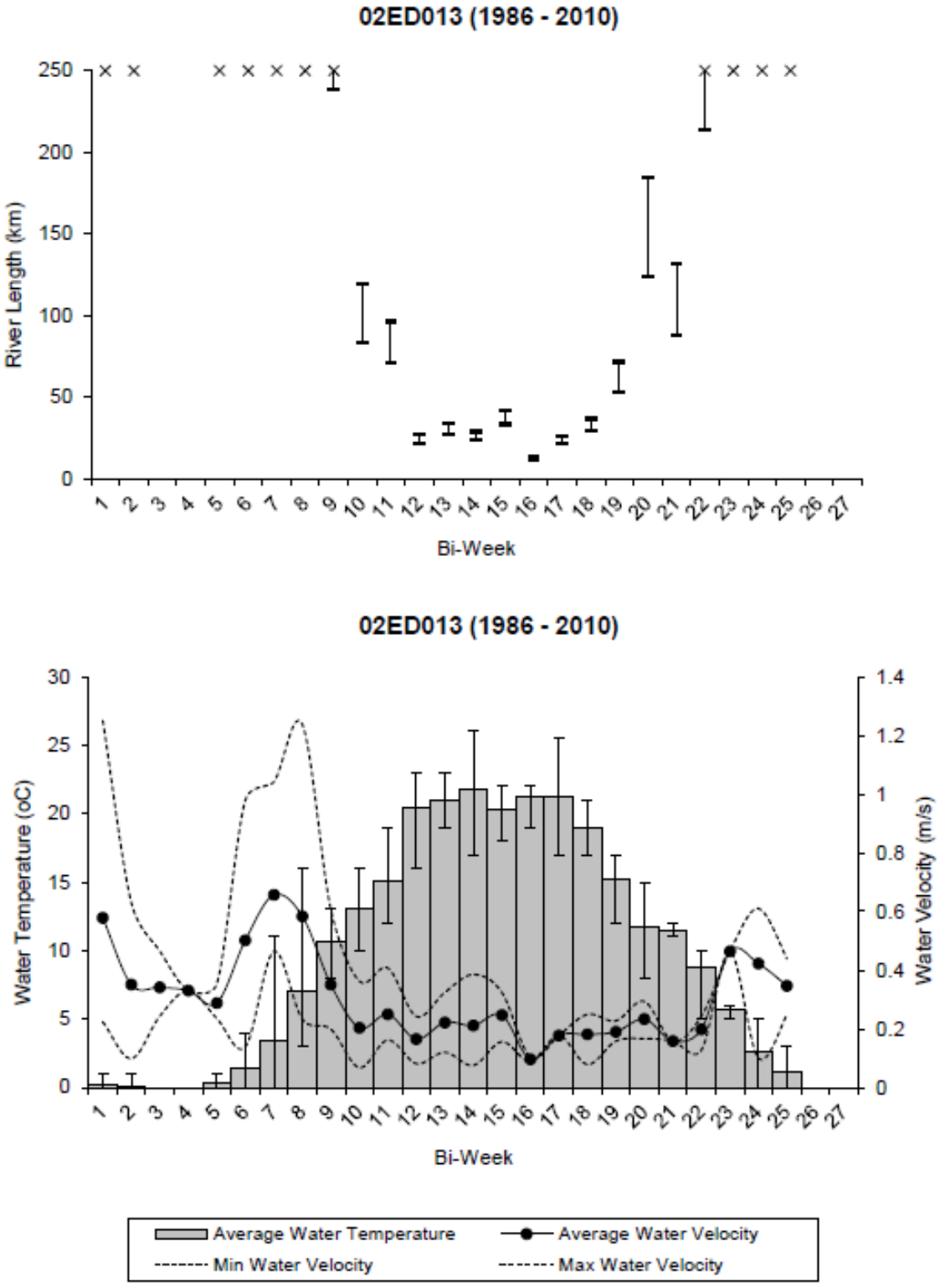


*Figure A1-52. Gauging station 02ED013 data from 1986–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

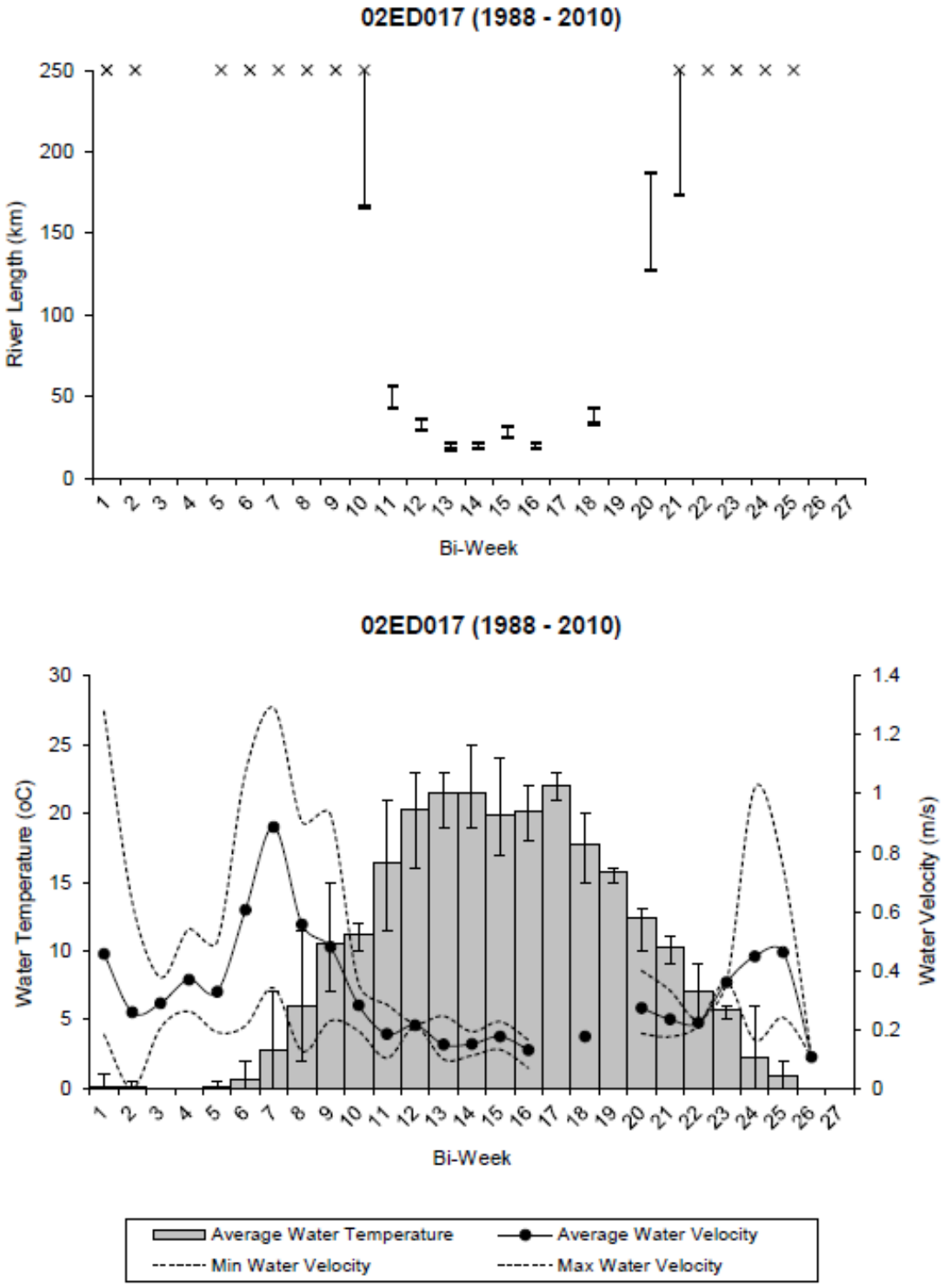


*Figure A1-53. Gauging station 02ED017 data from 1988–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

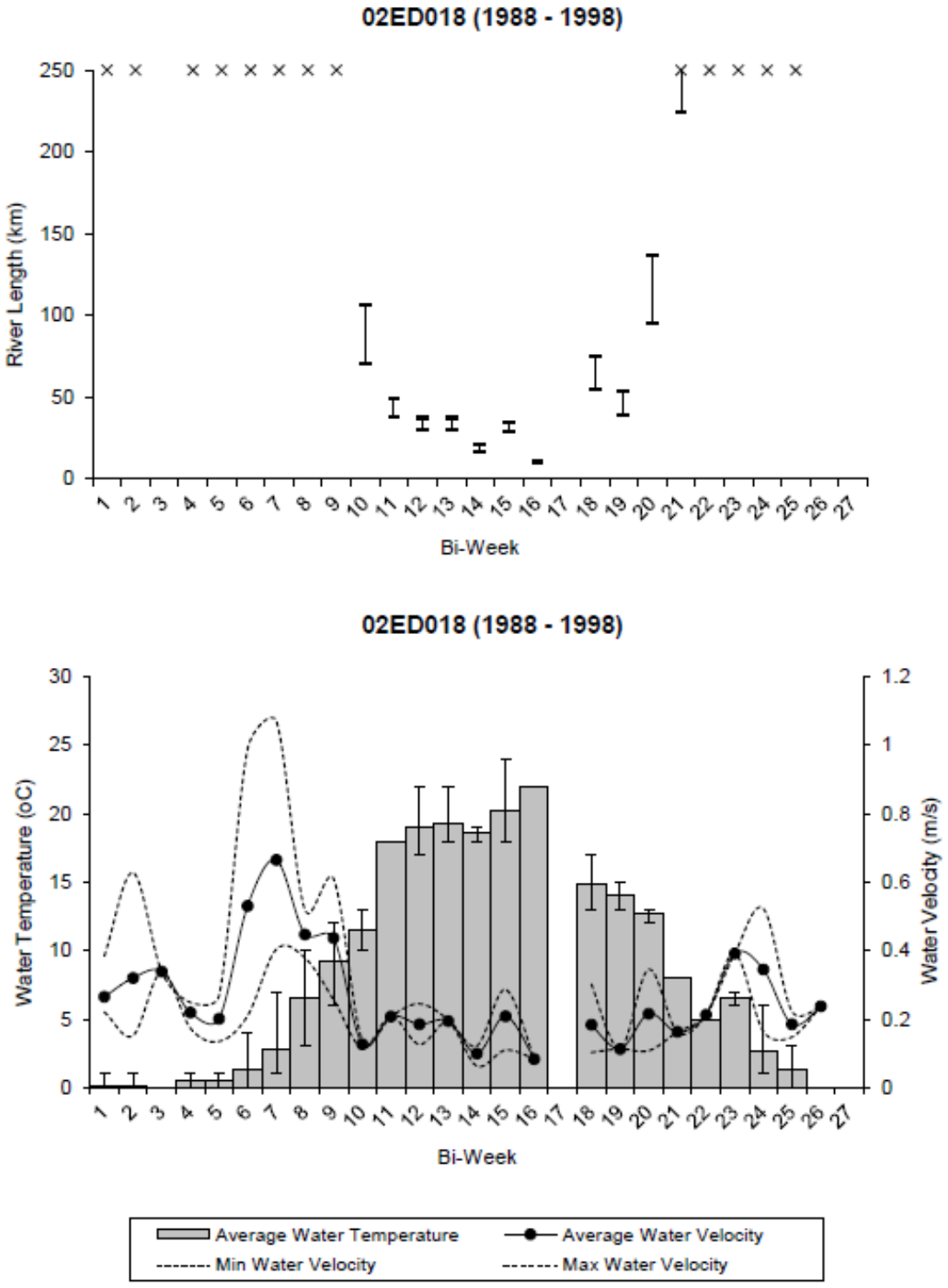


*Figure A1-54. Gauging station 02ED018 data from 1988–1998. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

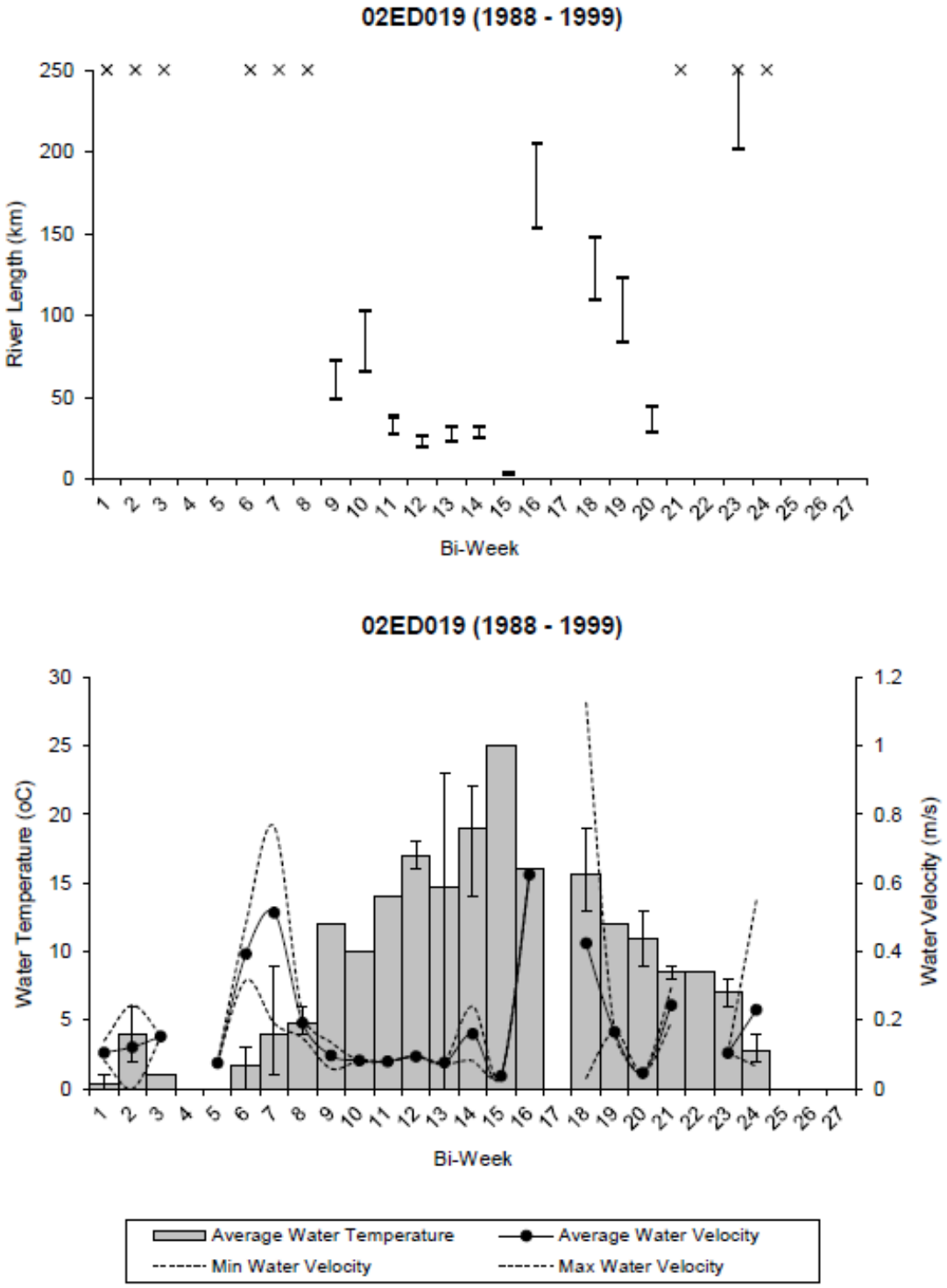


*Figure A1-55. Gauging station 02ED019 data from 1988–1999. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

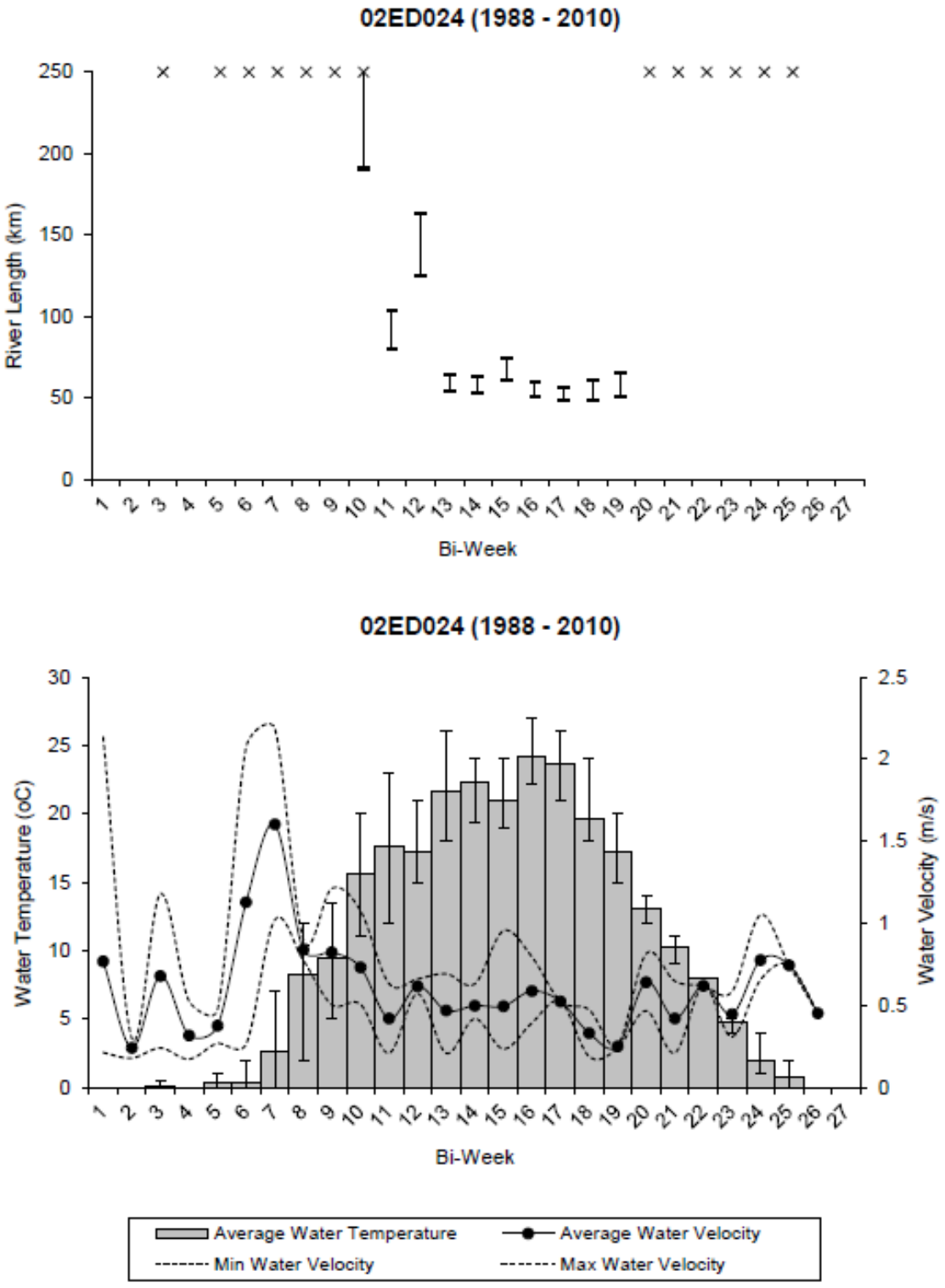


*Figure A1-56. Gauging station 02ED024 data from 1988–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

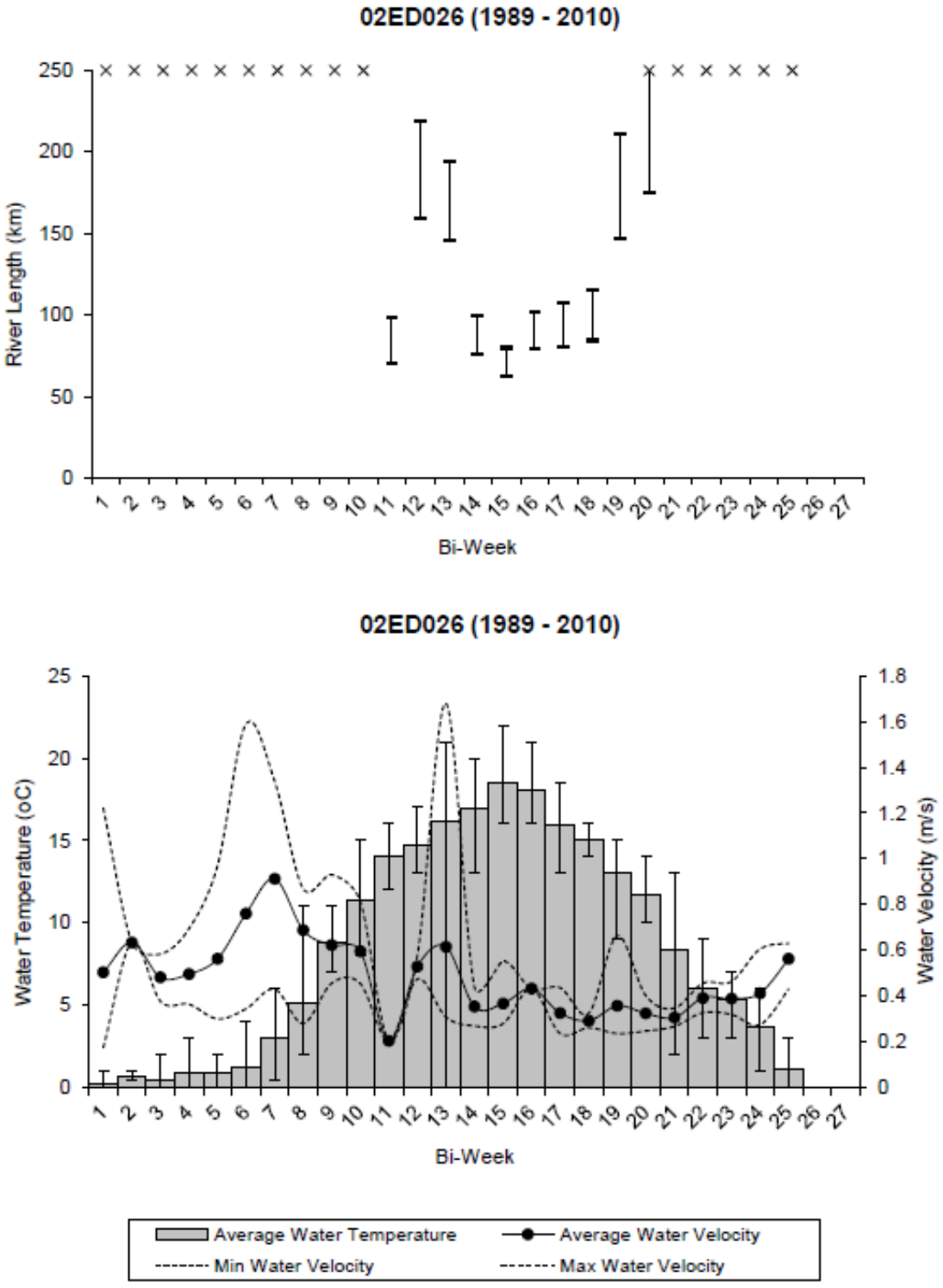


*Figure A1-57. Gauging station 02ED026 data from 1989–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

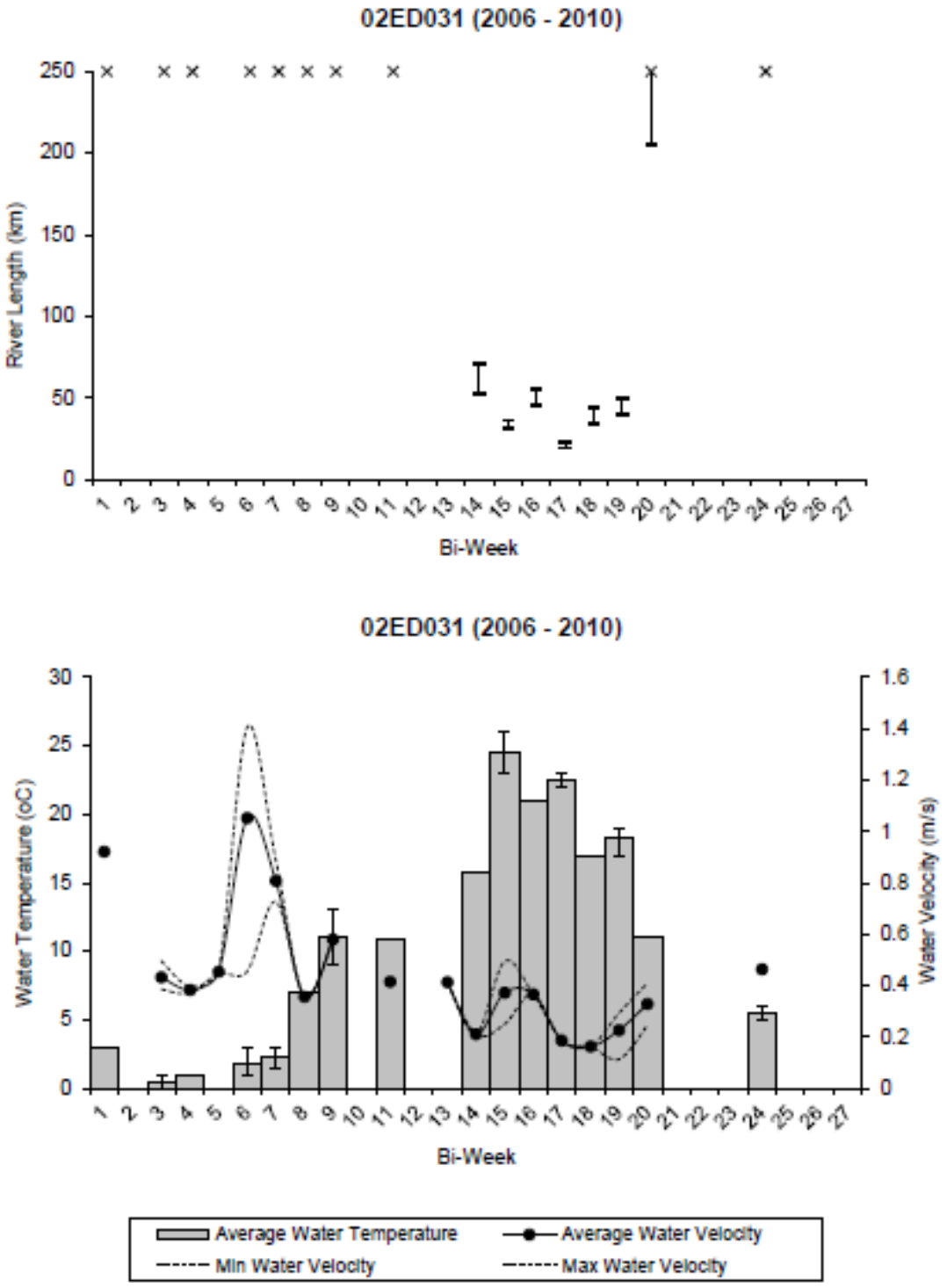


*Figure A1-58. Gauging station 02ED031 data from 2006–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

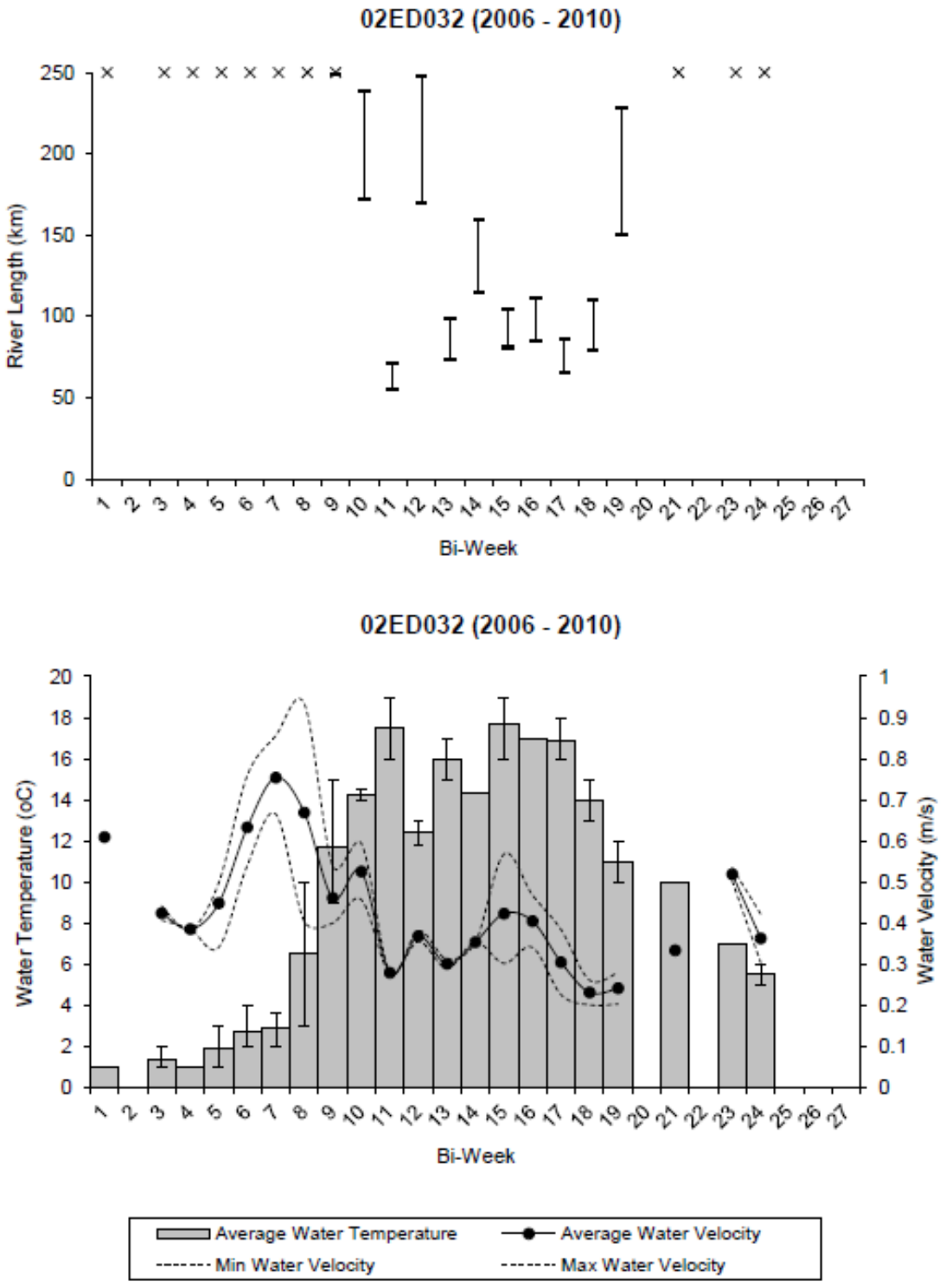


*Figure A1-59. Gauging station 02ED032 data from 2006–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

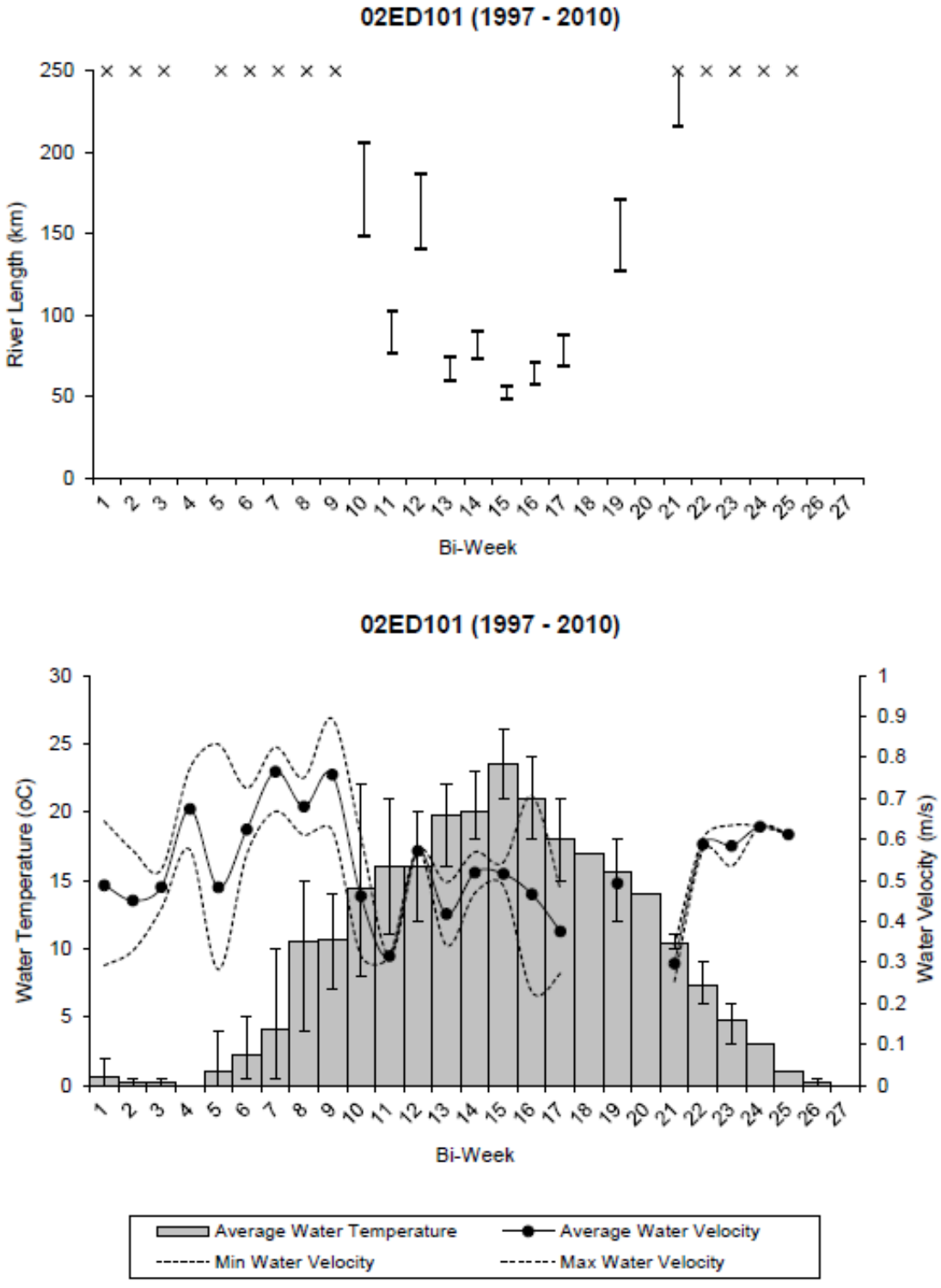


*Figure A1-60. Gauging station 02ED101 data from 1997–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

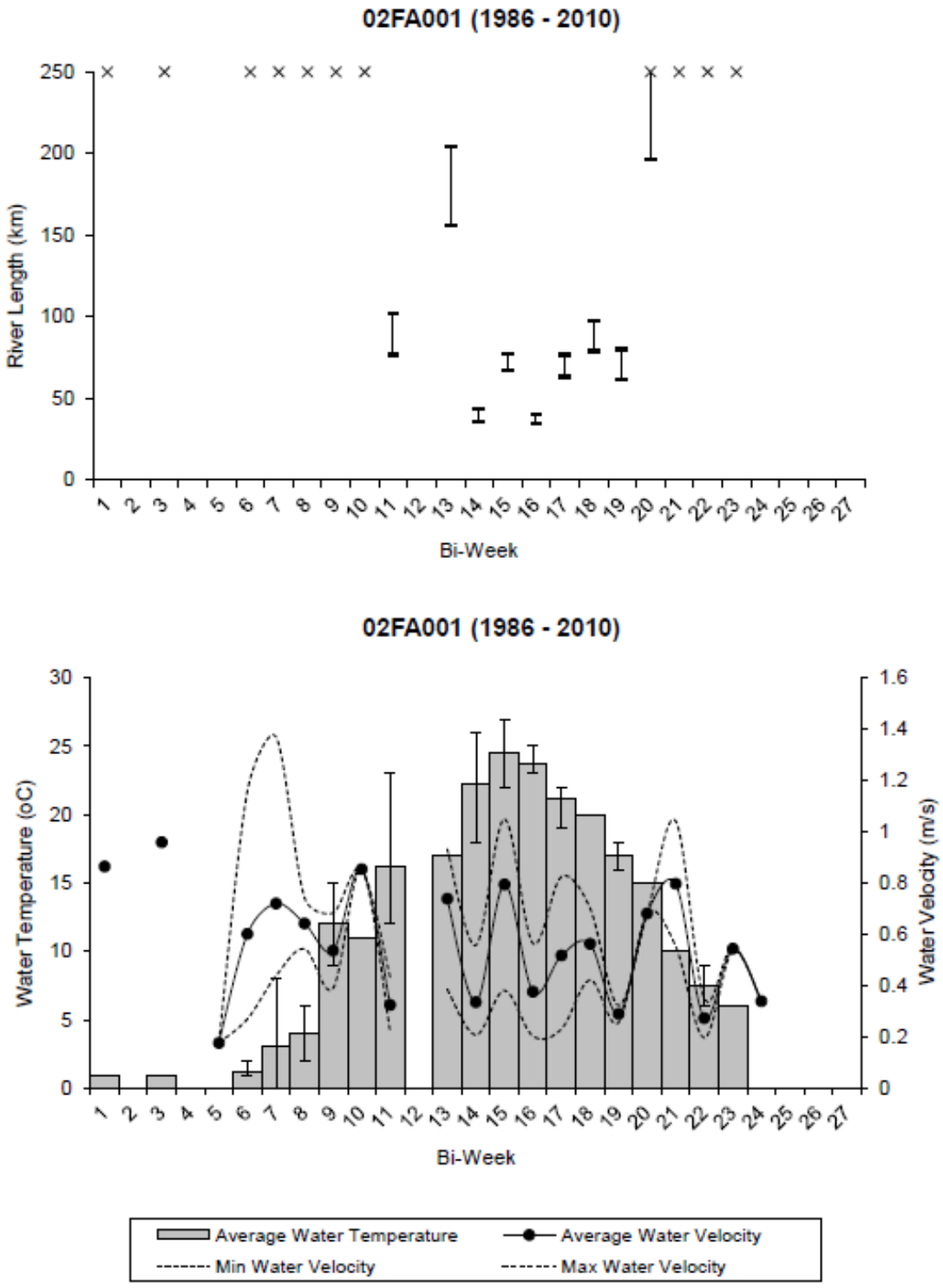


*Figure A1-61. Gauging station 02FA001 data from 1986–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

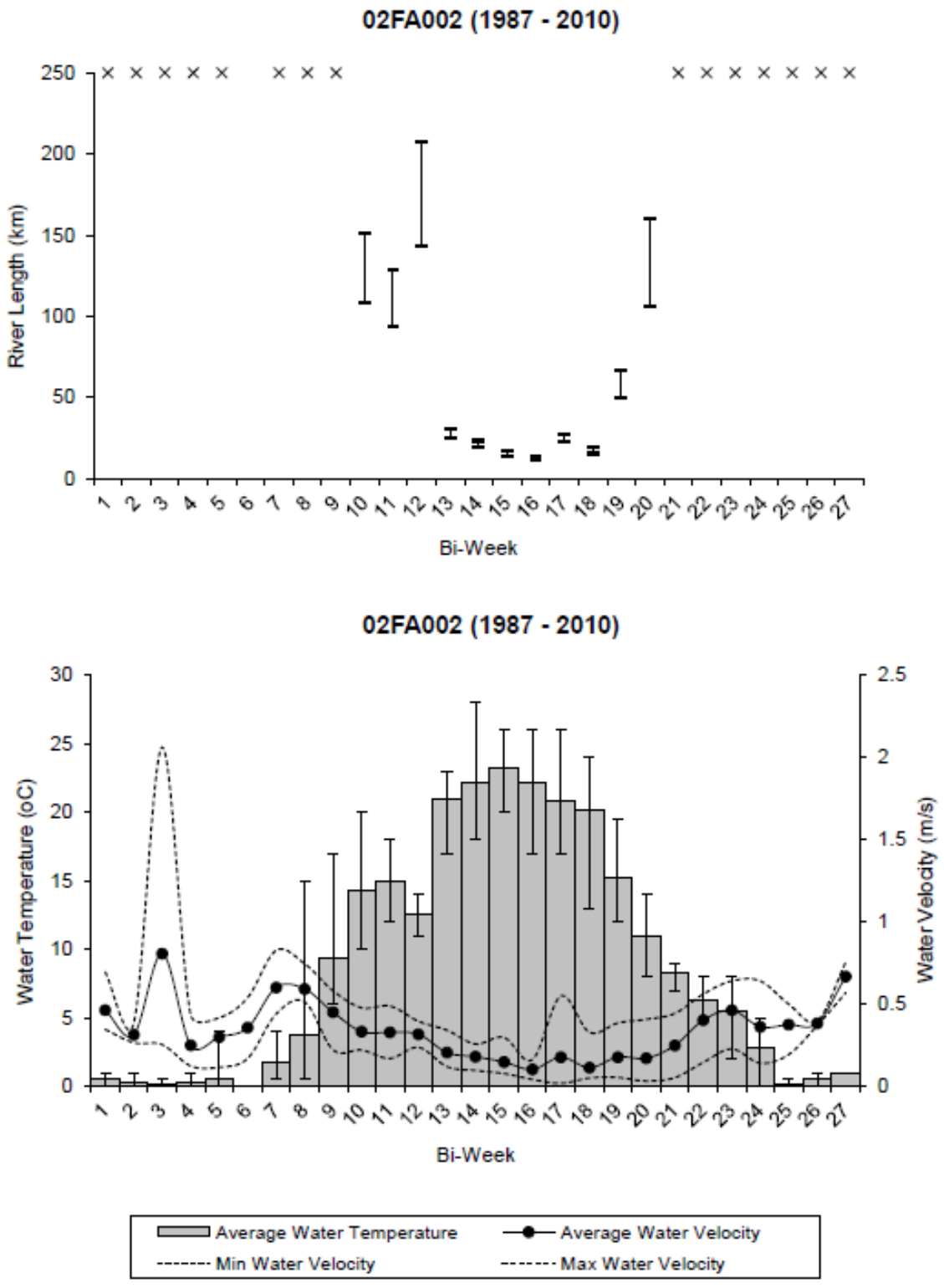


*Figure A1-62. Gauging station 02FA002 data from 1987–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

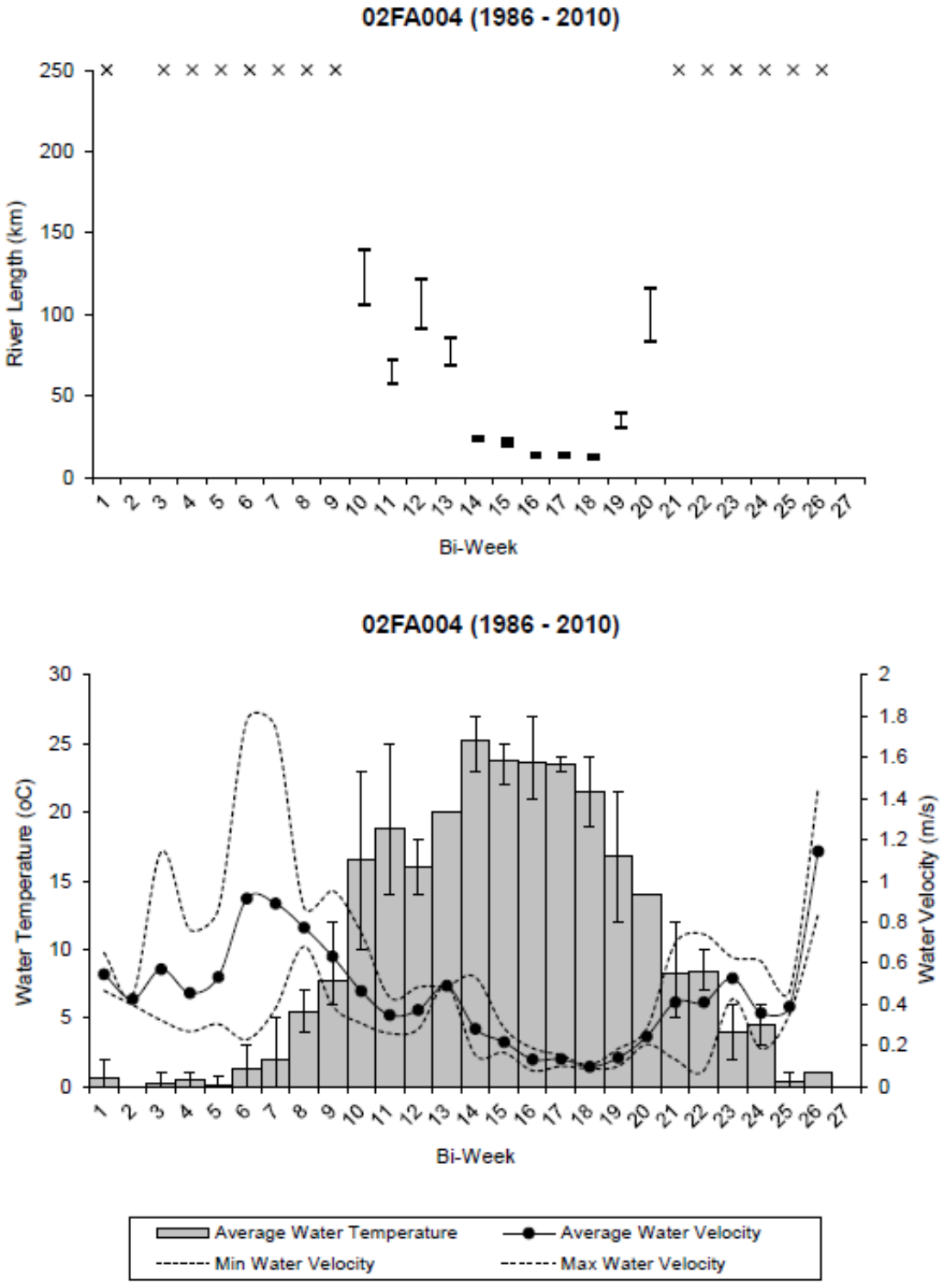


*Figure A1-63. Gauging station 02FA004 data from 1986–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

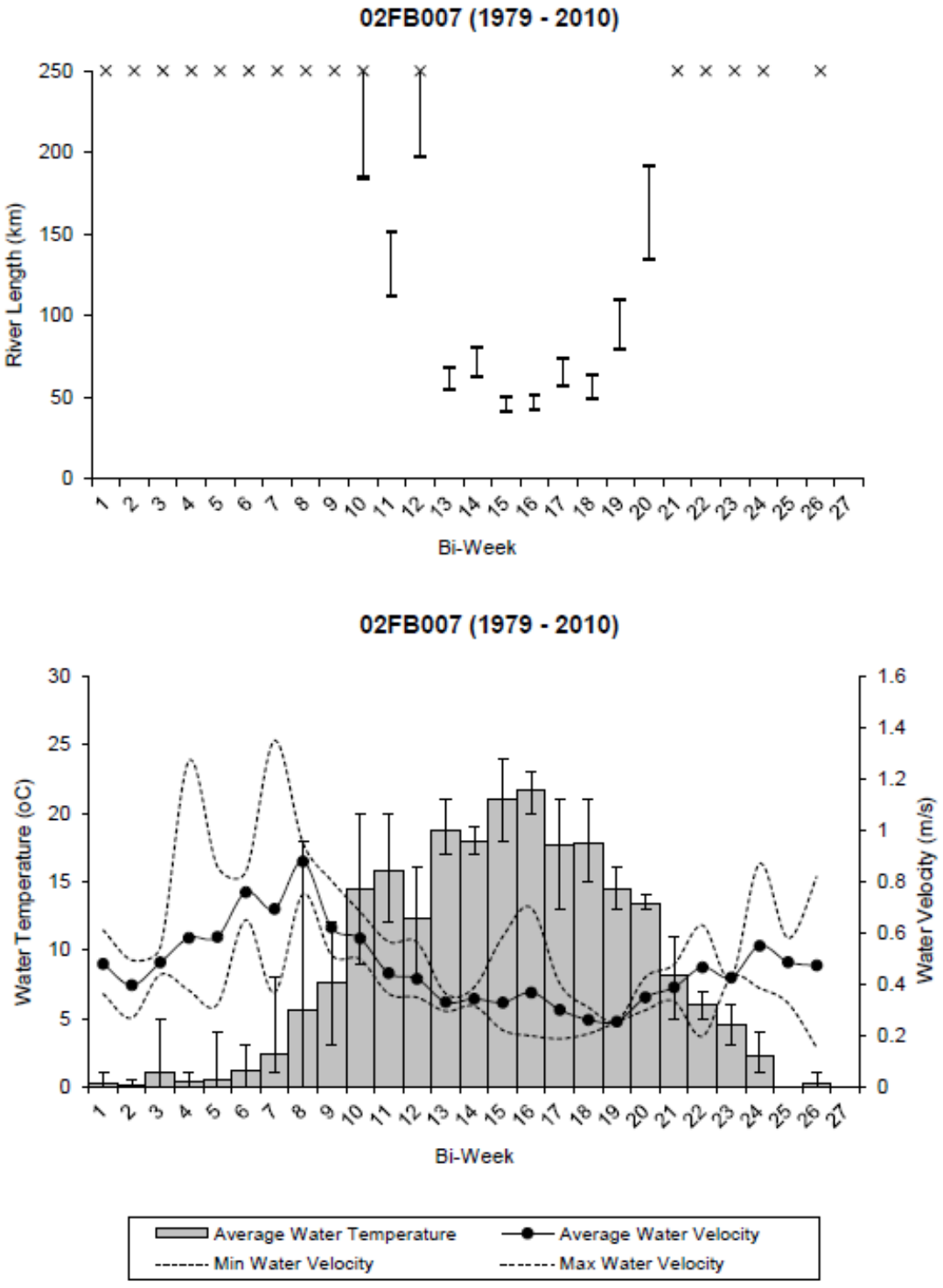


*Figure A1-64. Gauging station 02FB007 data from 1979–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

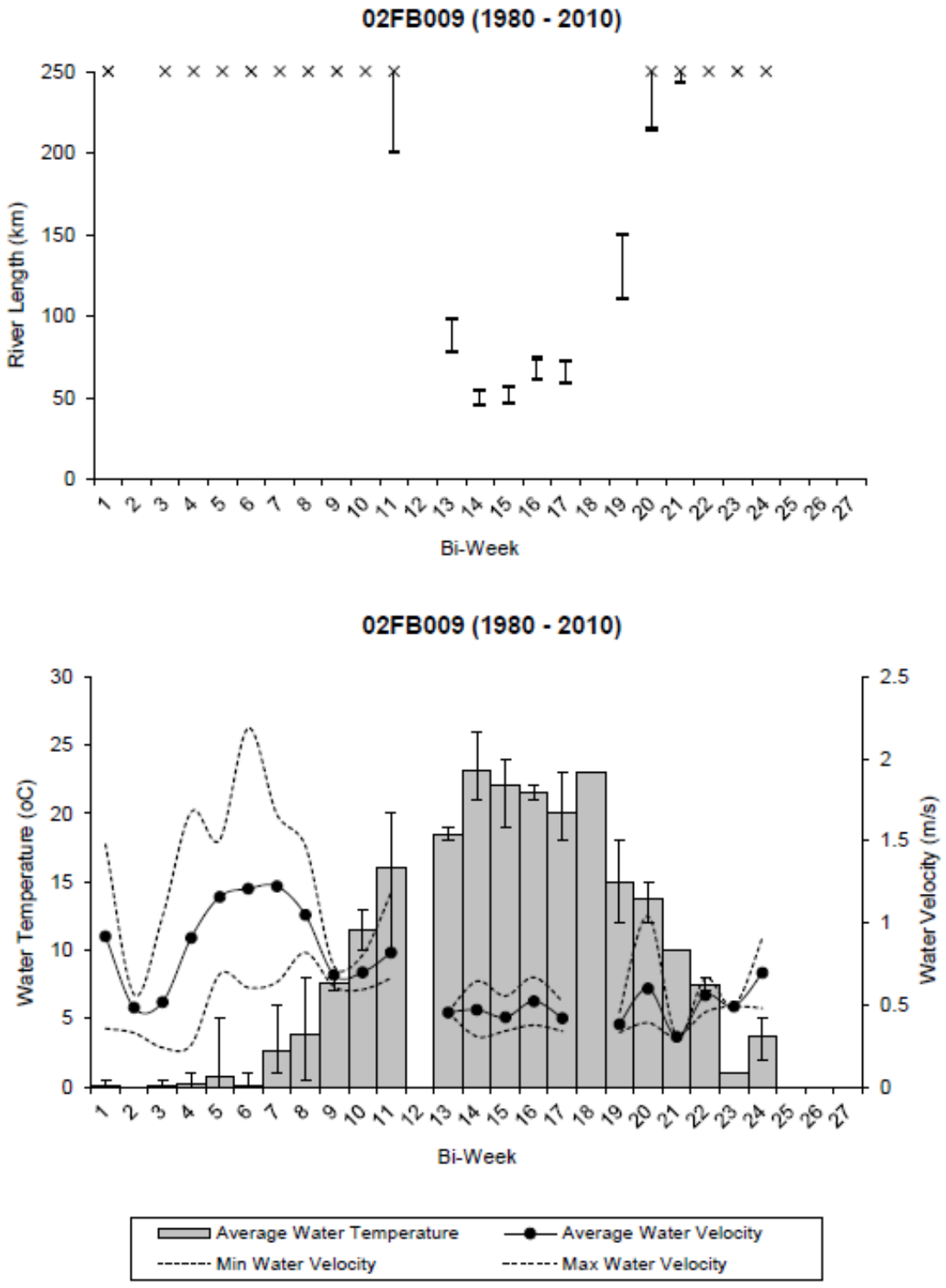


*Figure A1-65. Gauging station 02FB009 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

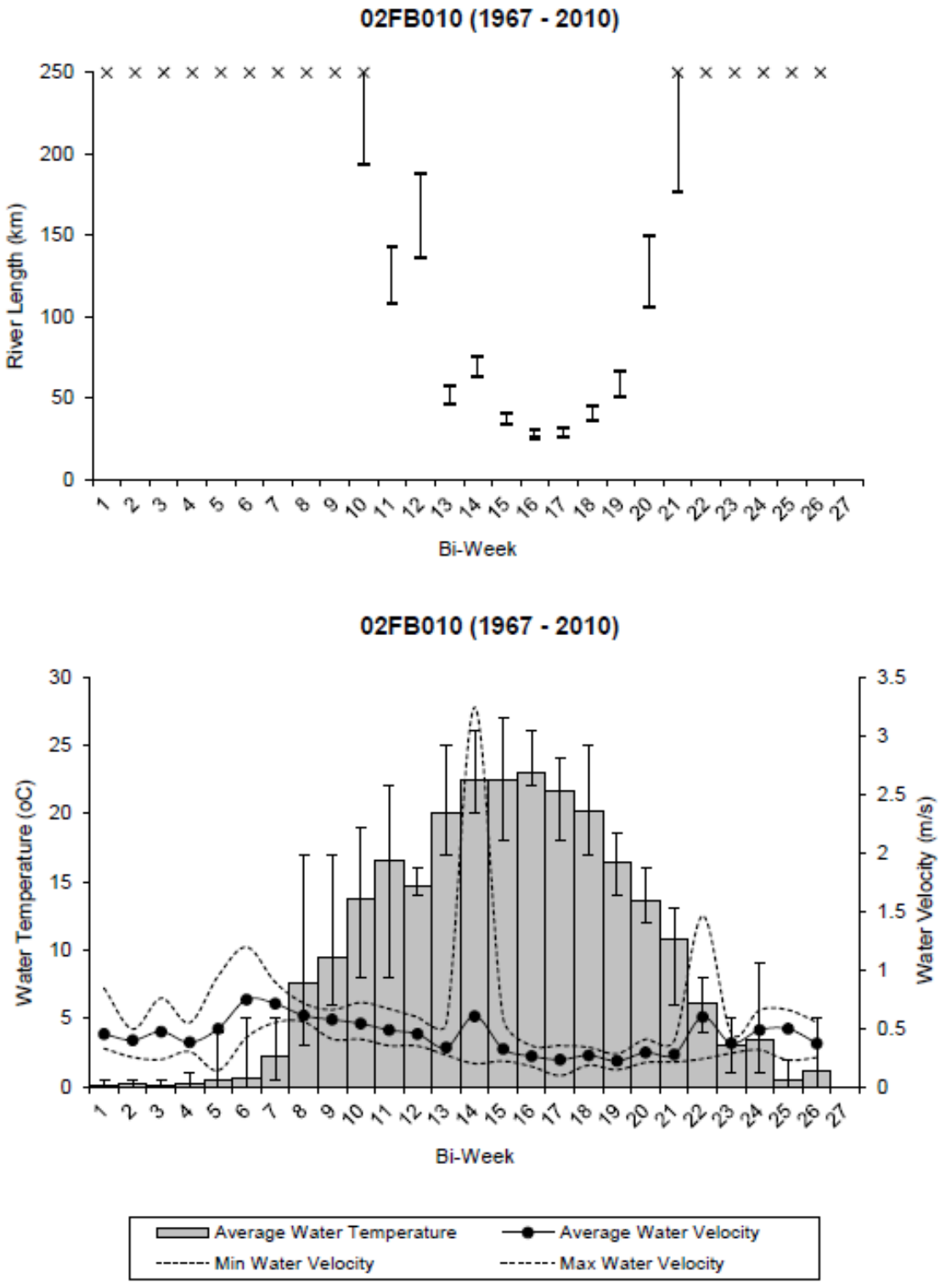


*Figure A1-66. Gauging station 02FB010 data from 1967–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

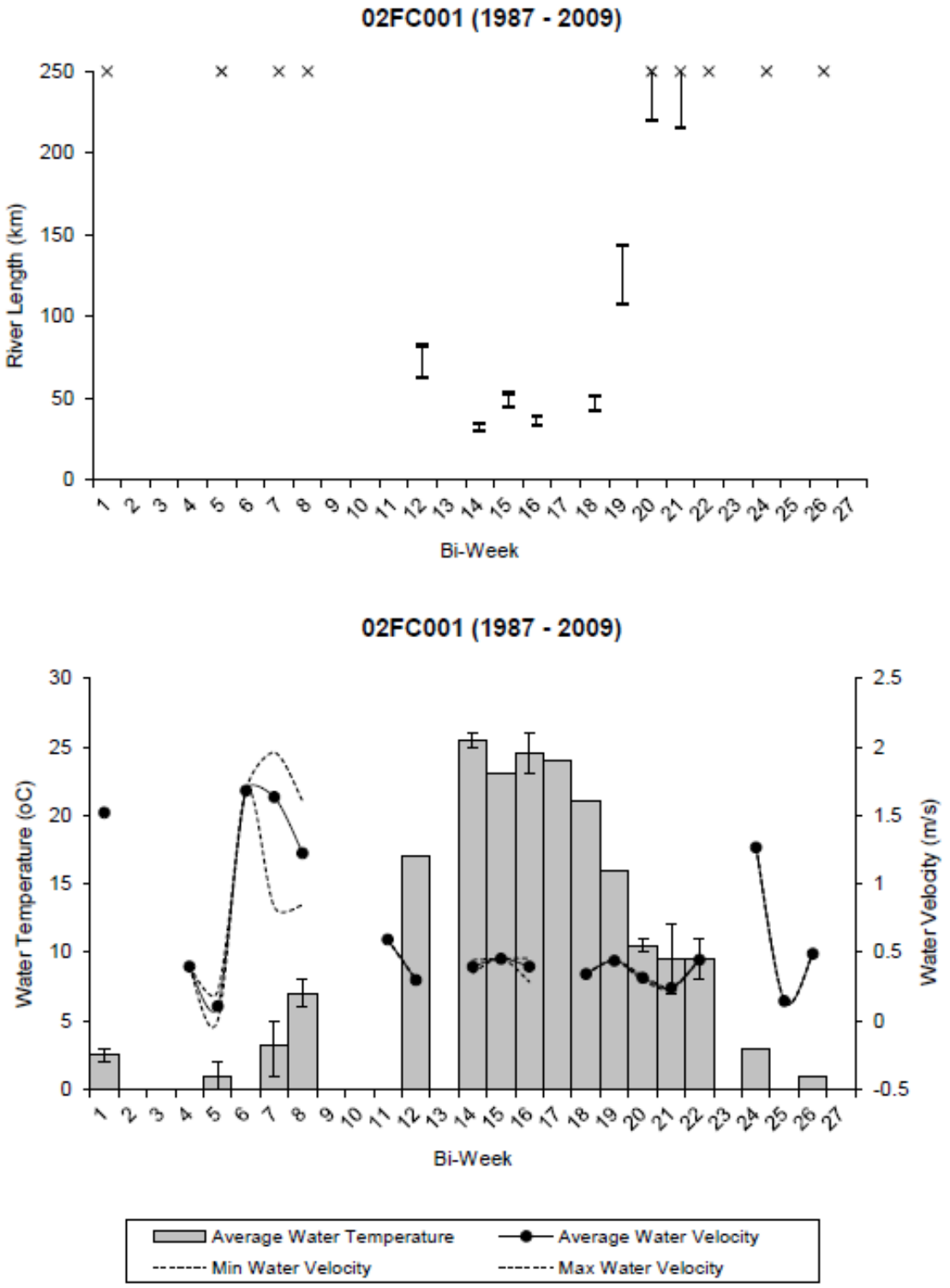


*Figure A1-67. Gauging station 02FC001 data from 1987–2009. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

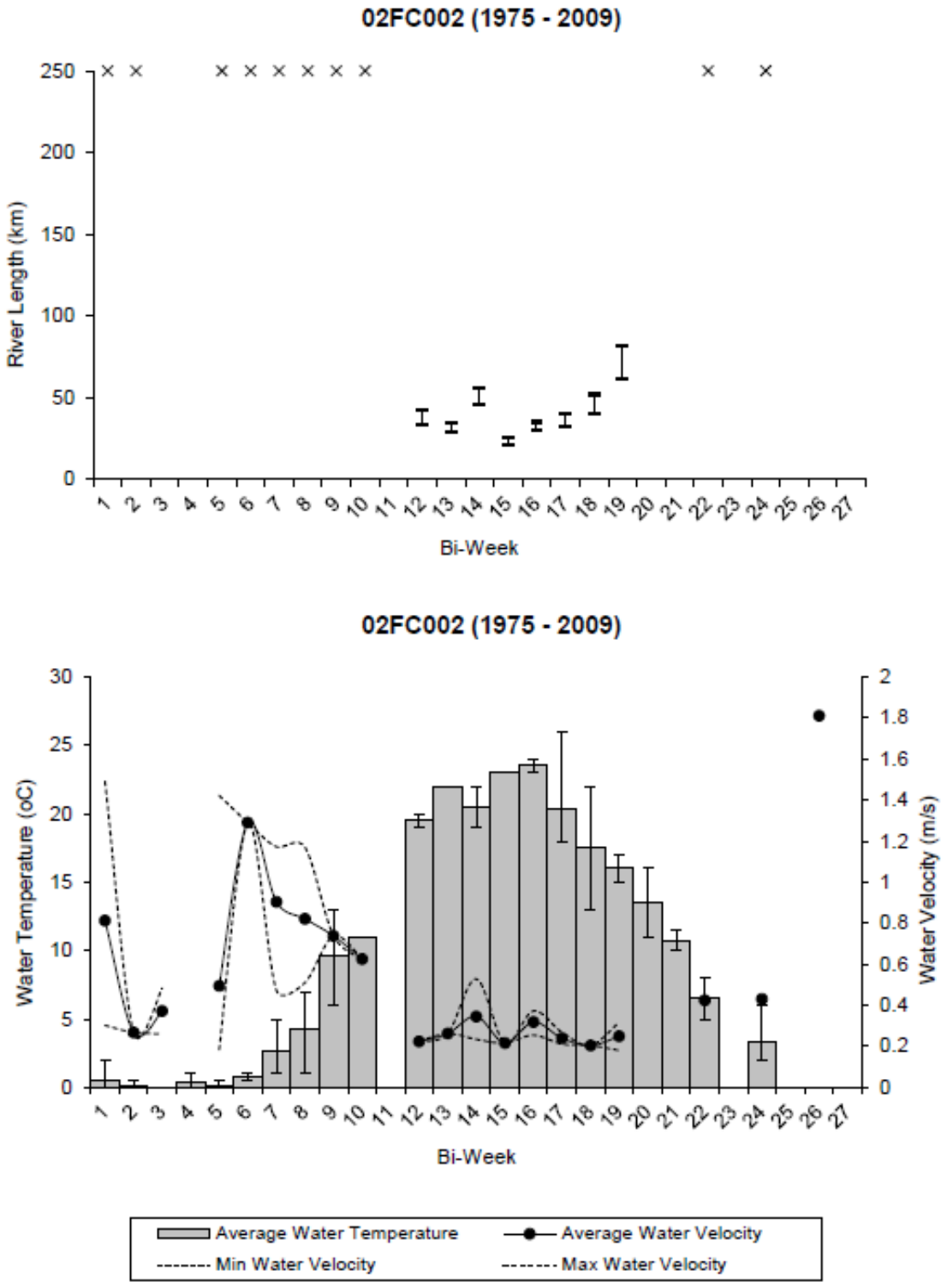


*Figure A1-68. Gauging station 02FC002 data from 1975–2009. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

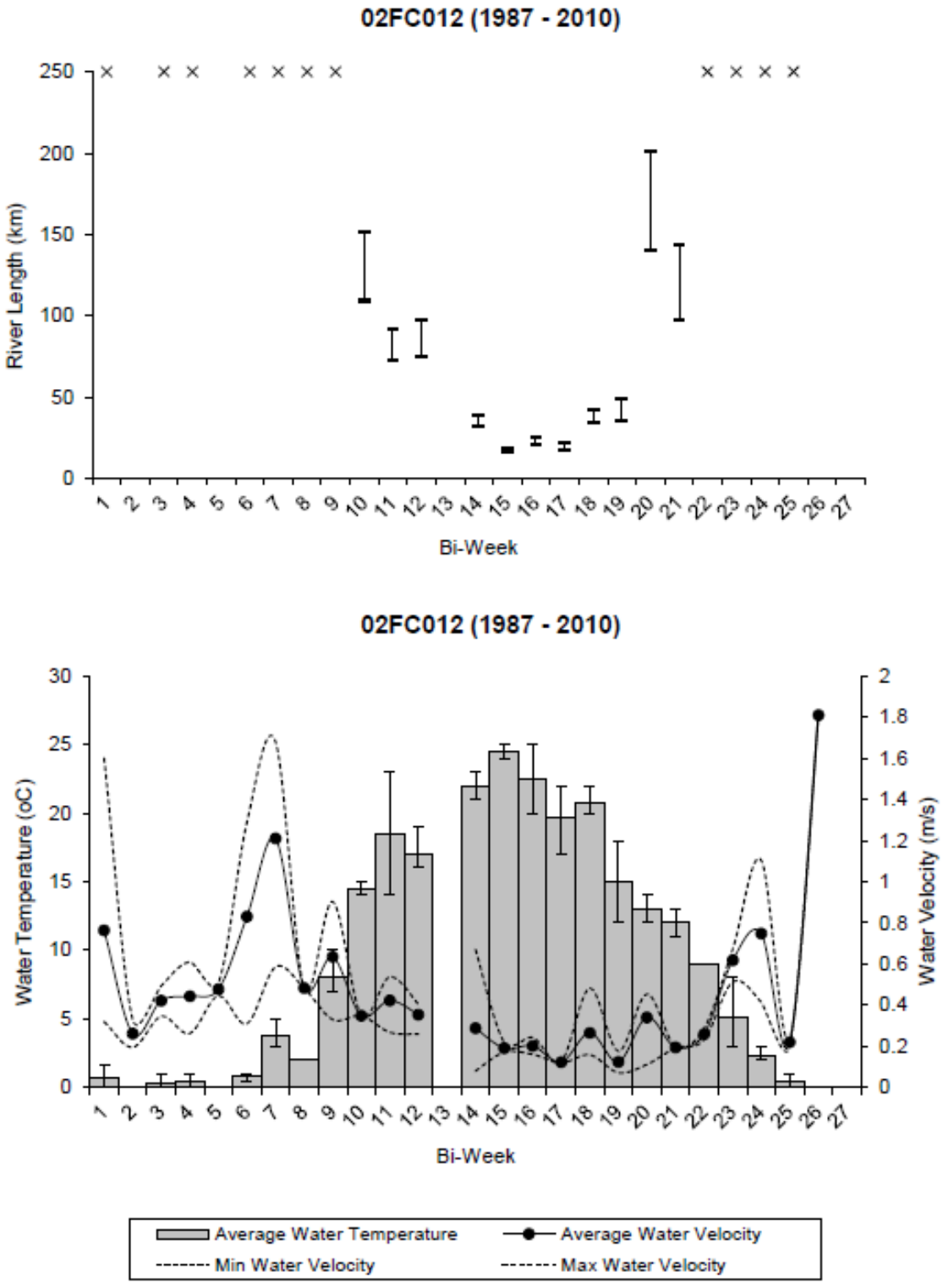


*Figure A1-69. Gauging station 02FC012 data from 1987–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

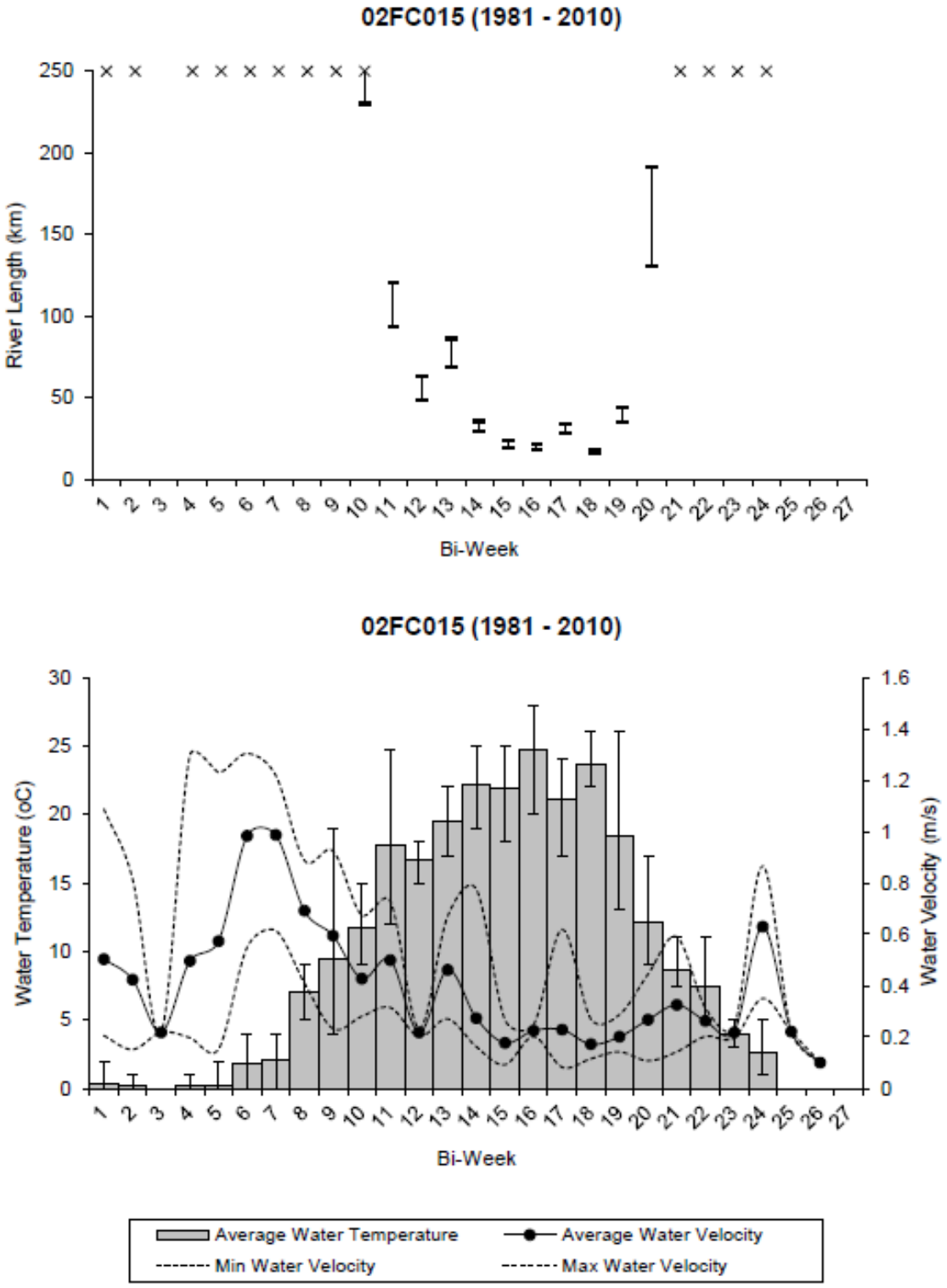


*Figure A1-70. Gauging station 02FC015 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

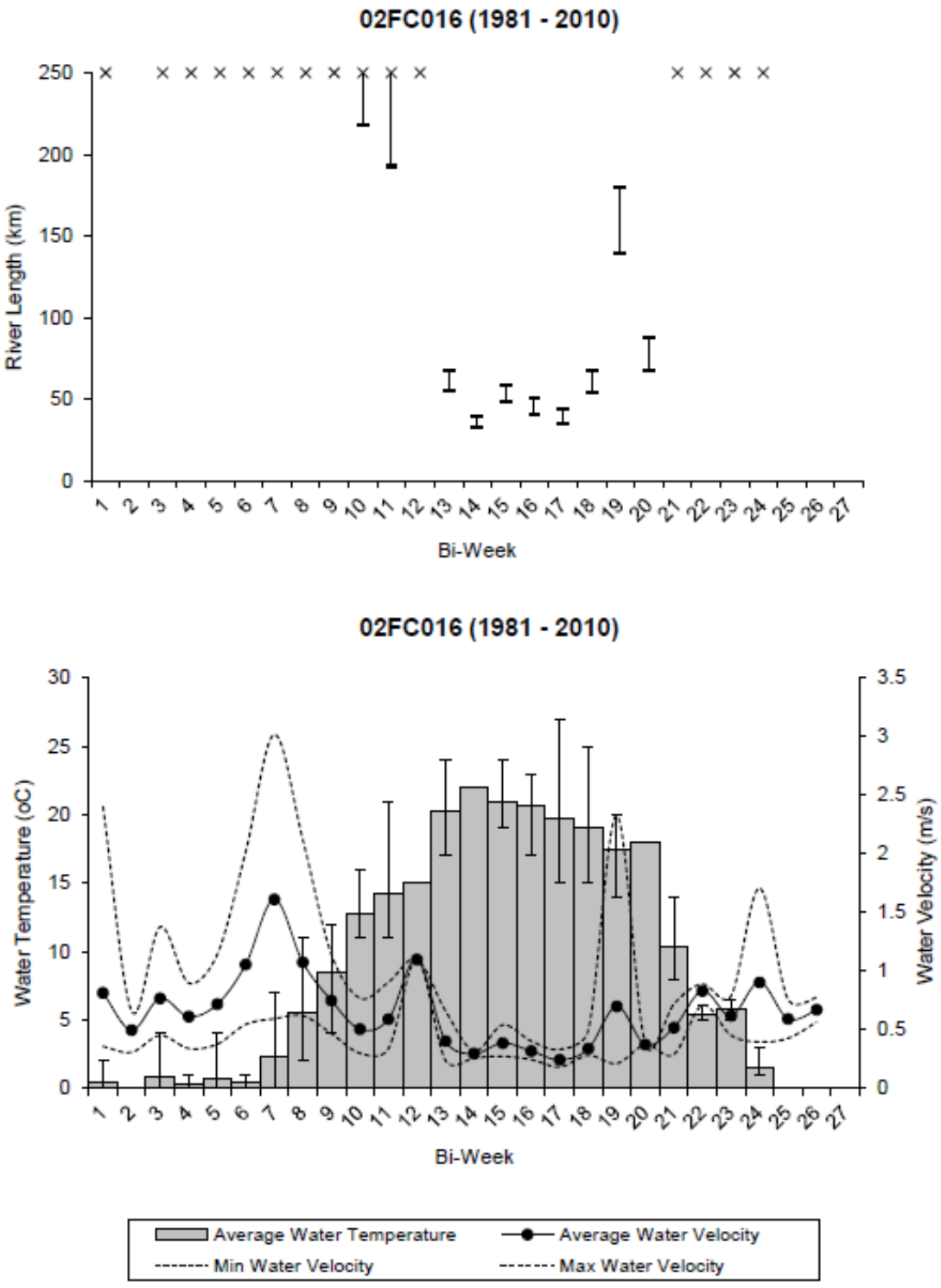


*Figure A1-71. Gauging station 02FC016 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

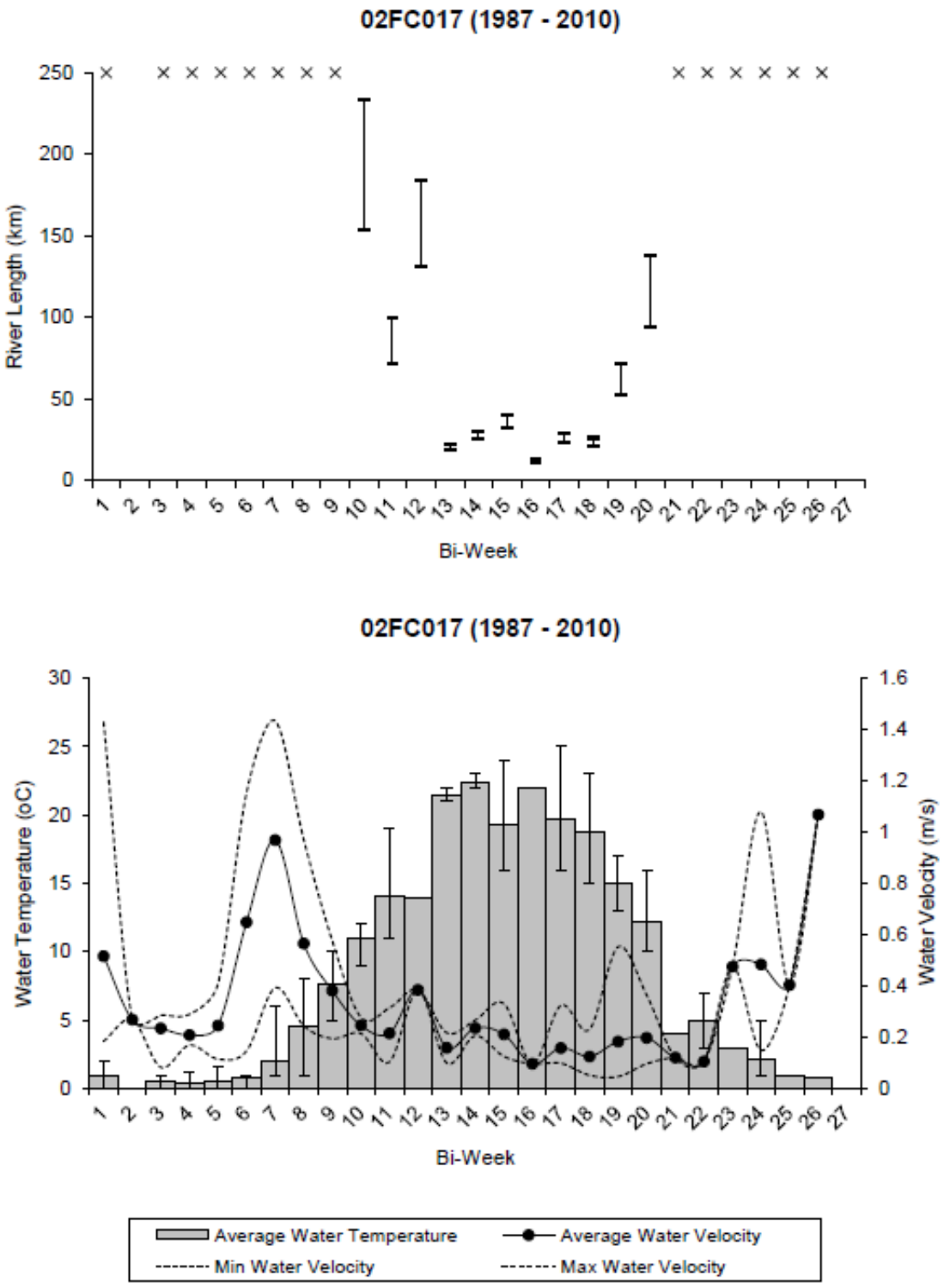


*Figure A1-72. Gauging station 02FC017 data from 1987–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

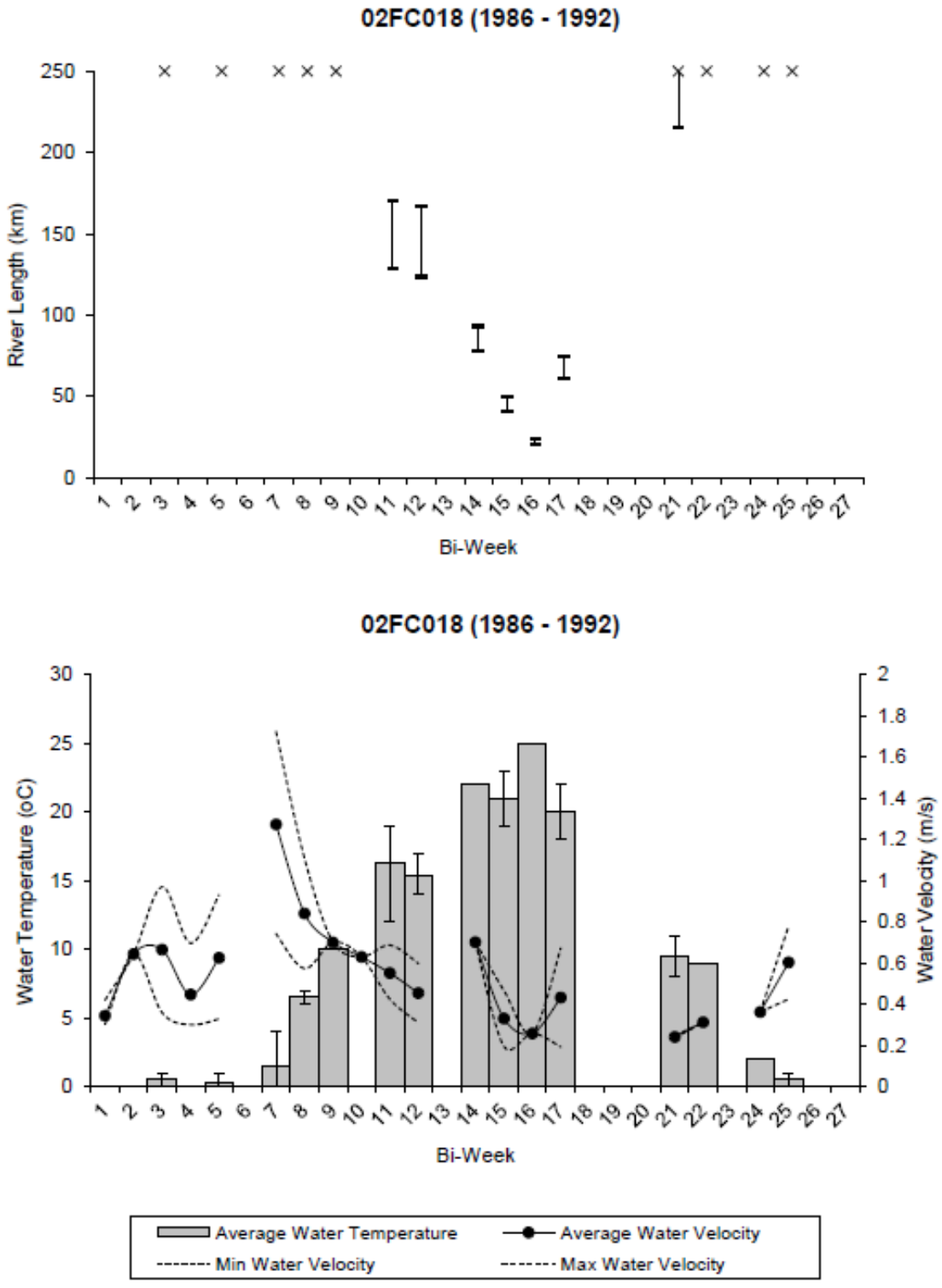


*Figure A1-73. Gauging station 02FC018 data from 1986–1992. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

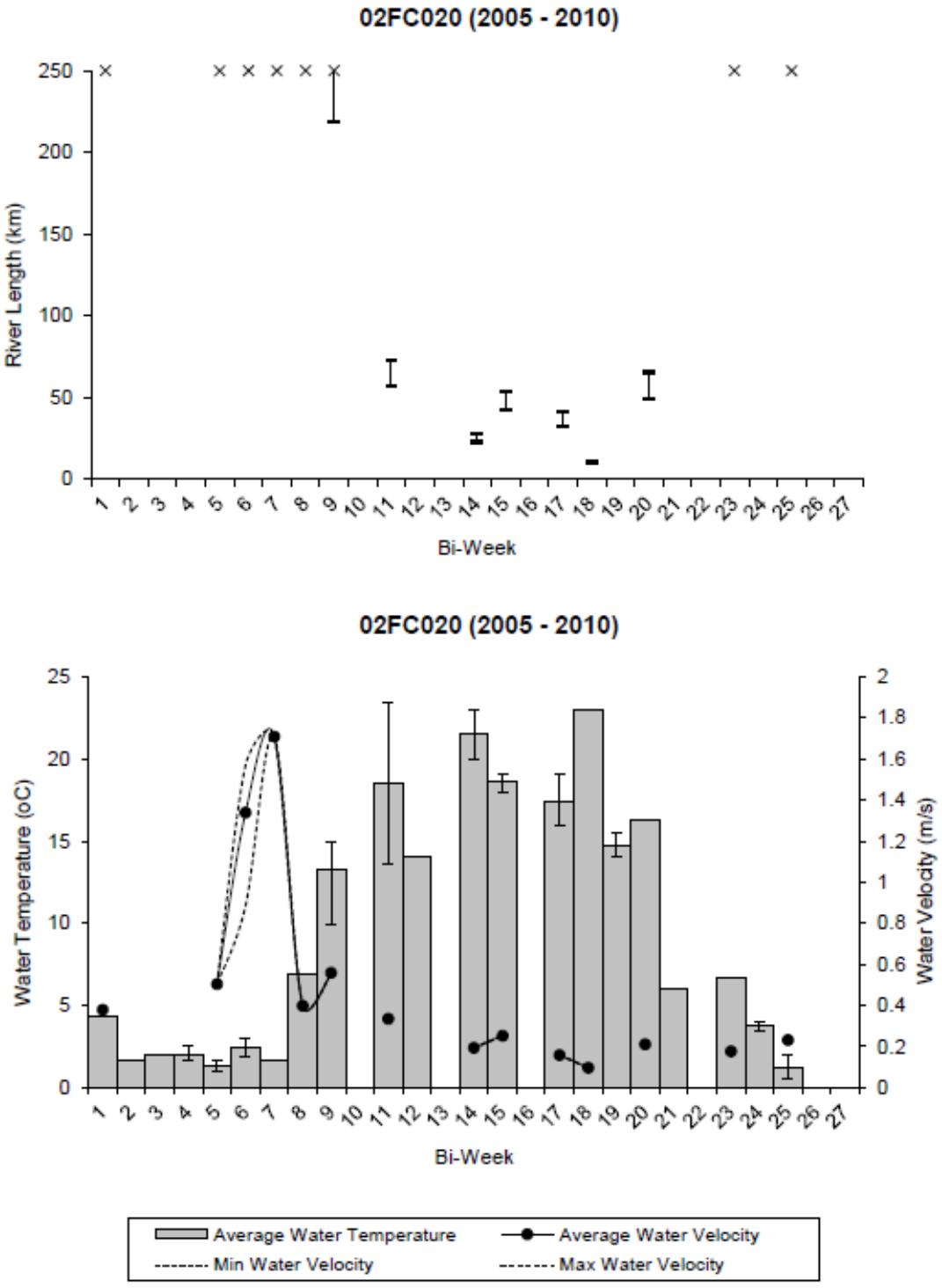


*Figure A1-74. Gauging station 02FC020 data from 2005–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

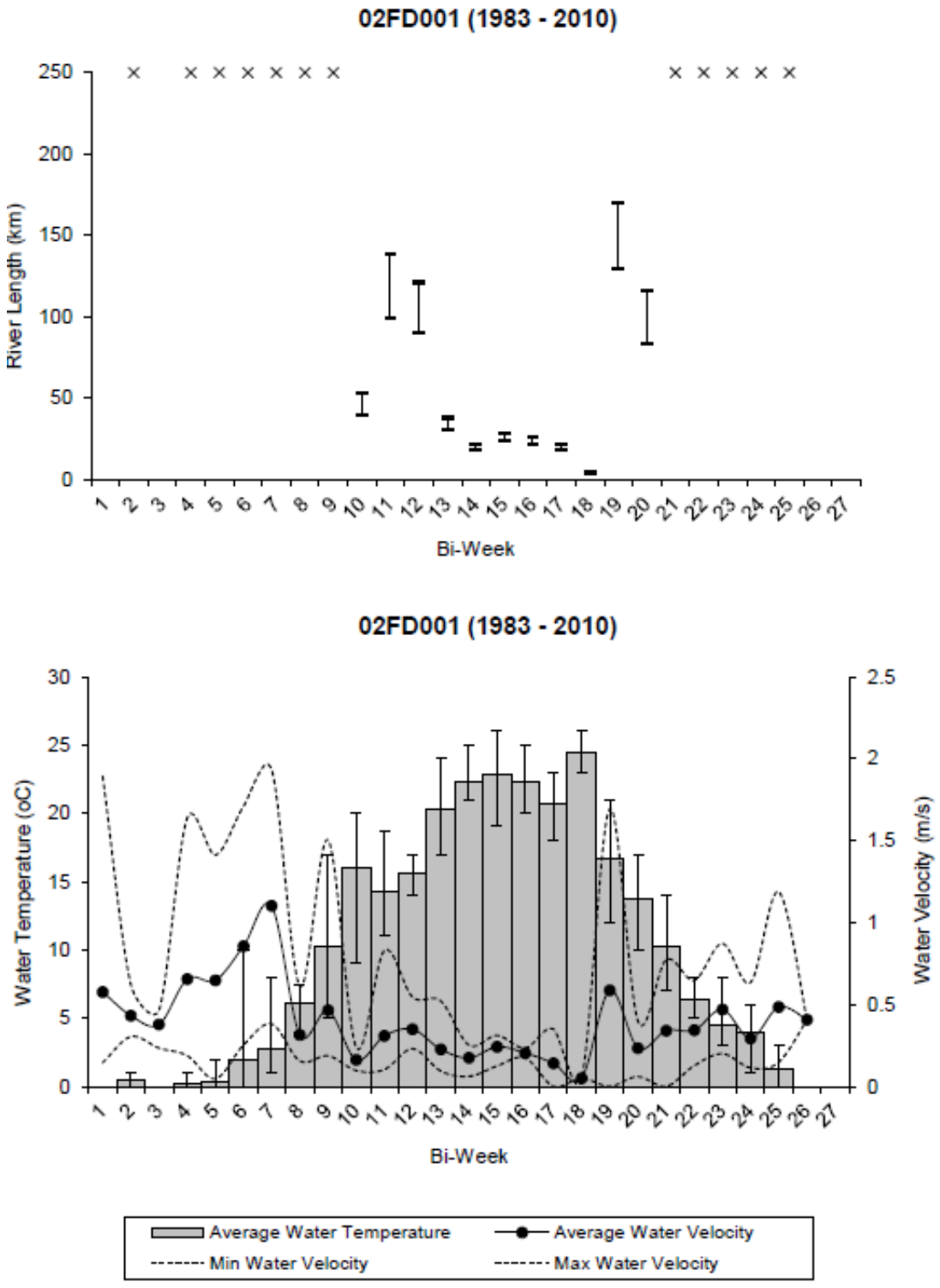


*Figure A1-75. Gauging station 02FD001 data from 1983–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

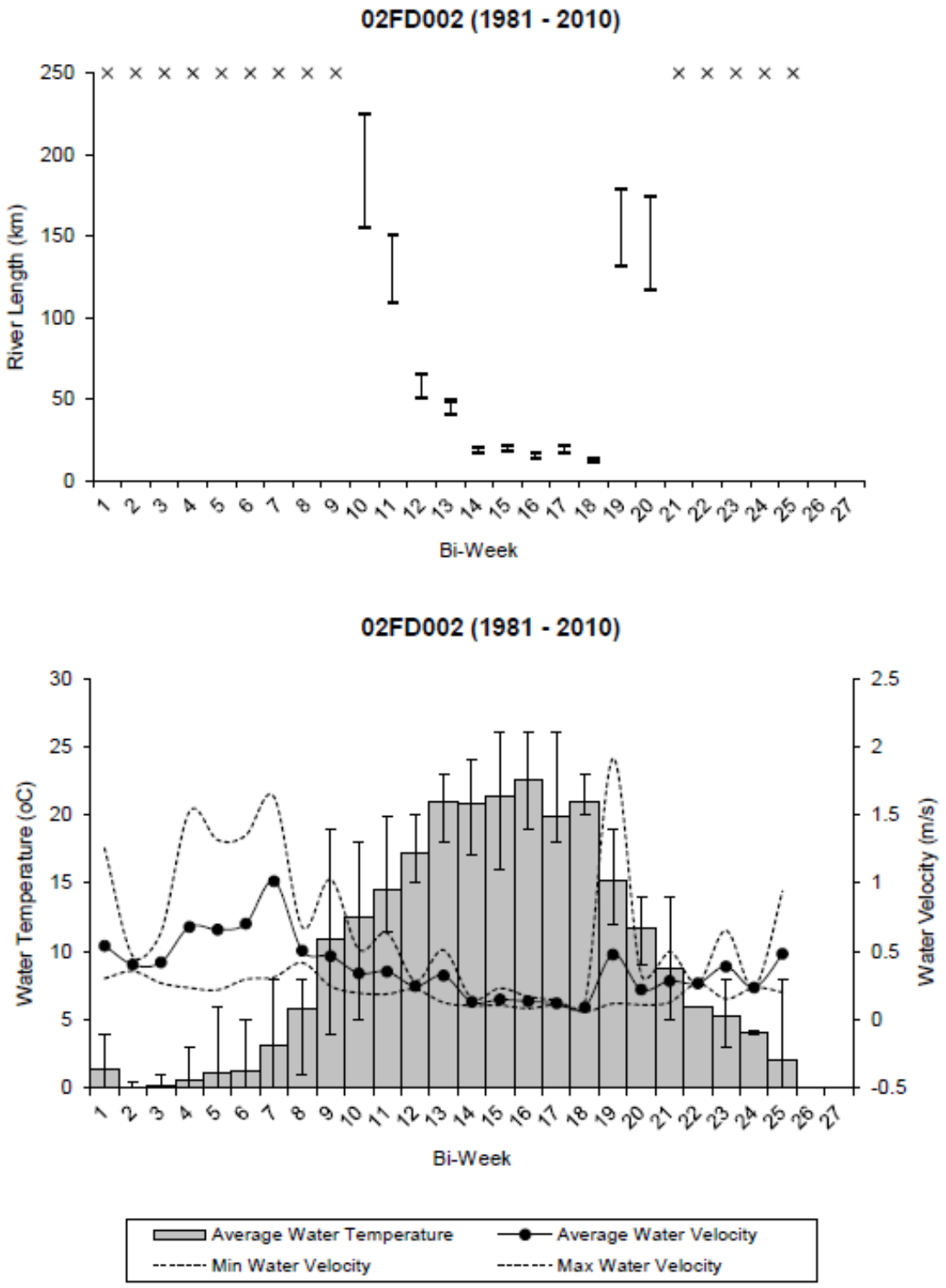


*Figure A1-76. Gauging station 02FD002 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

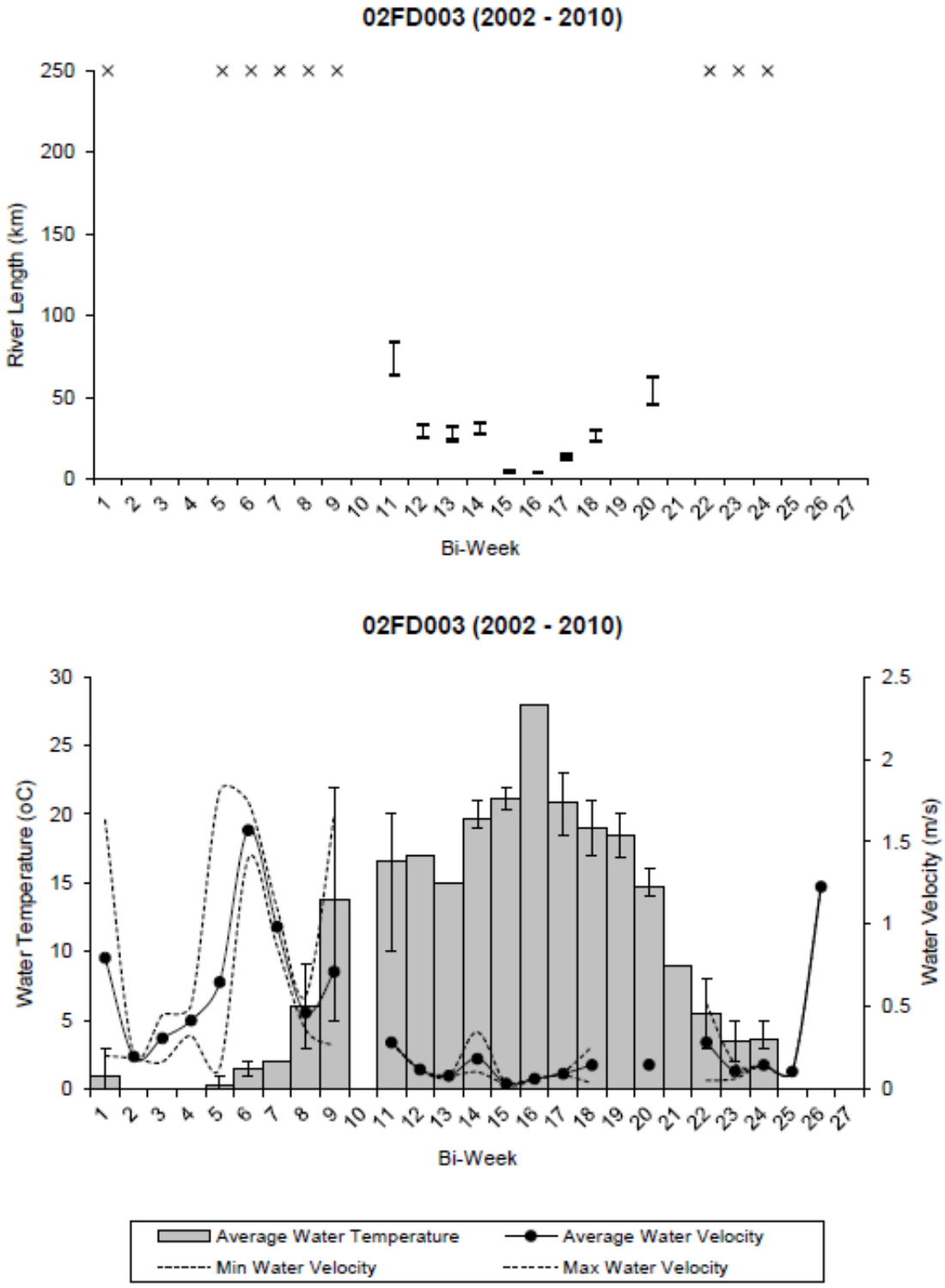


*Figure A1-77. Gauging station 02FD003 data from 2002–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

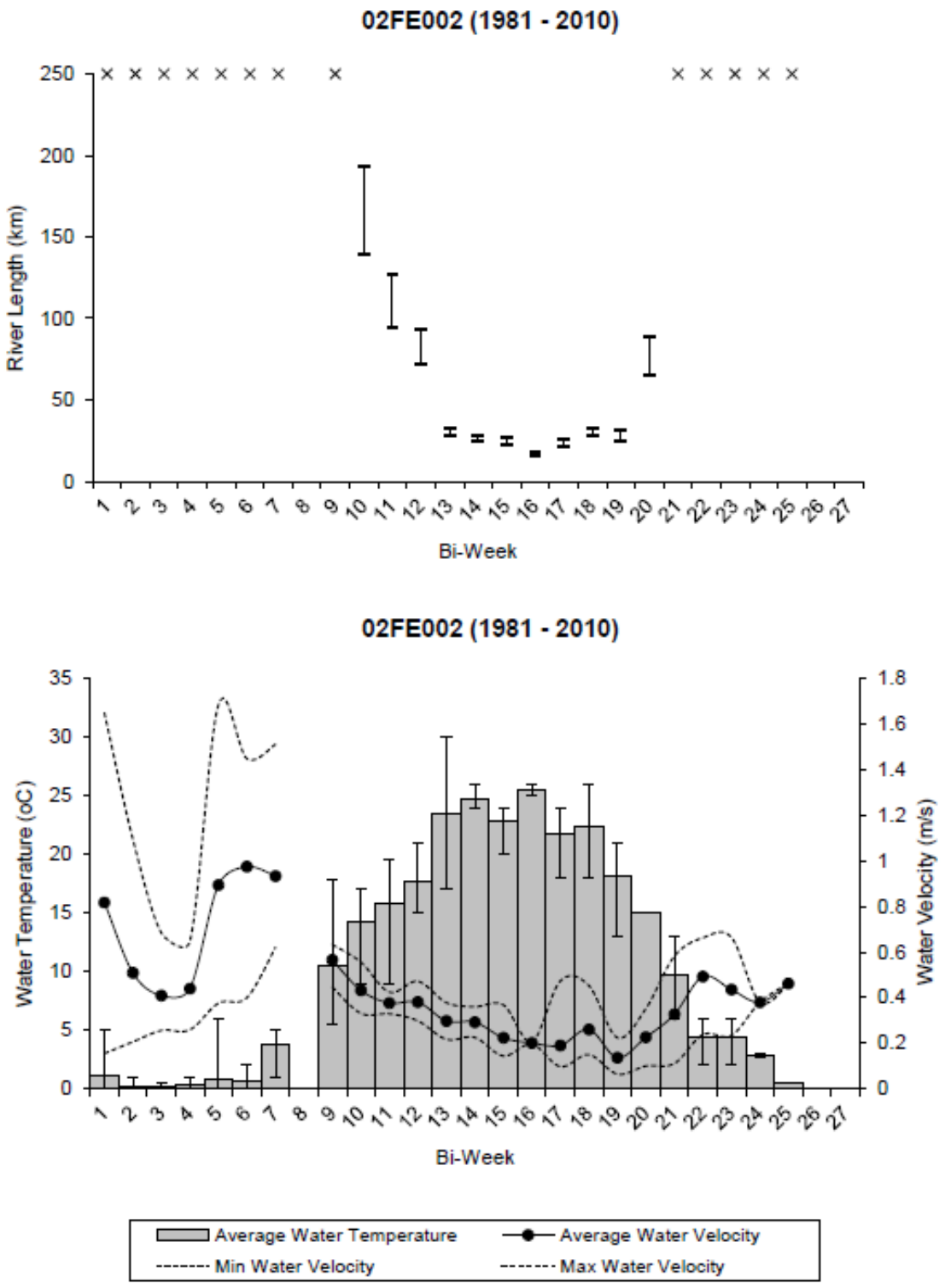


*Figure A1-78. Gauging station 02FE002 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

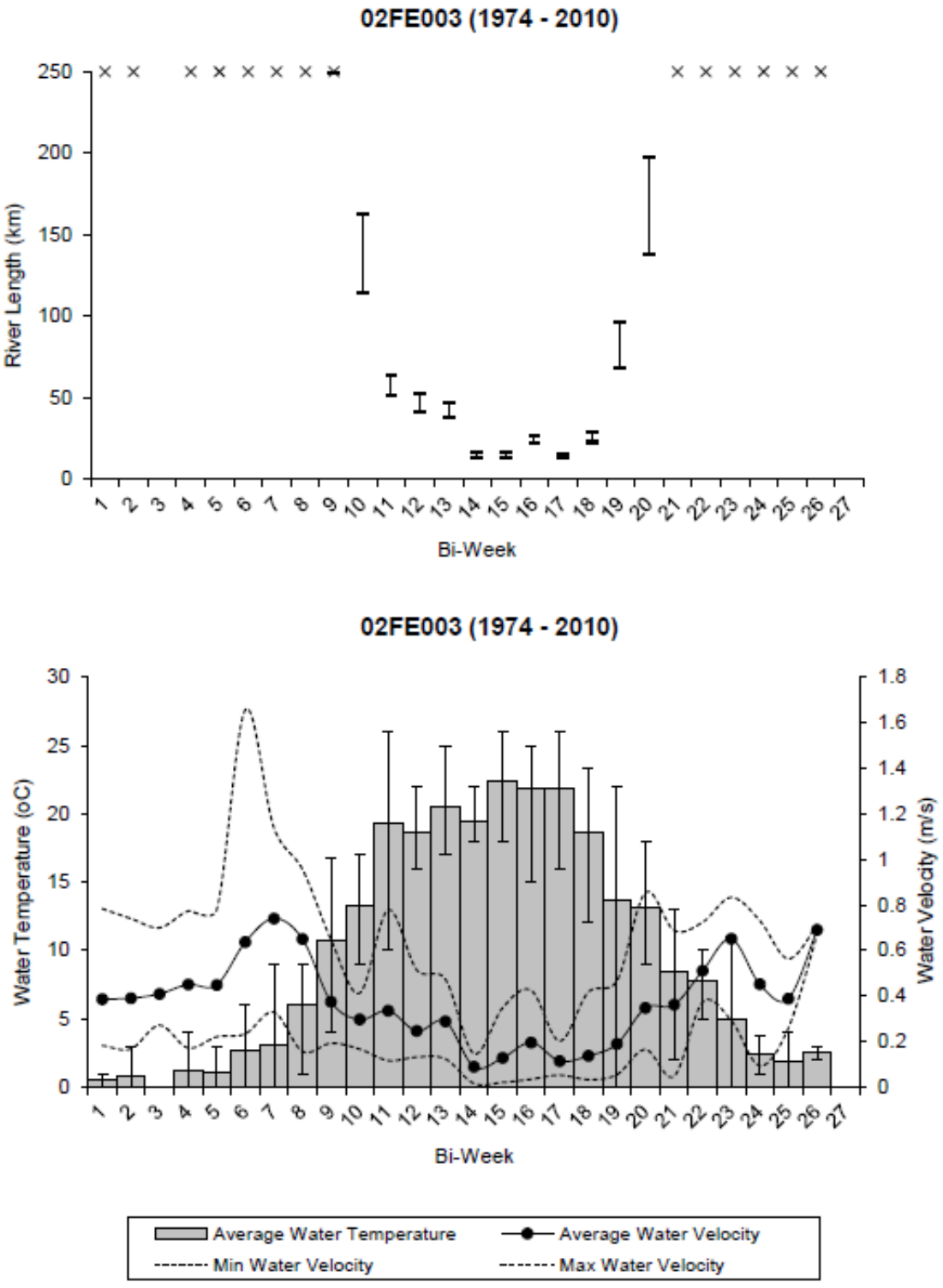


*Figure A1-79. Gauging station 02FE003 data from 1974–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

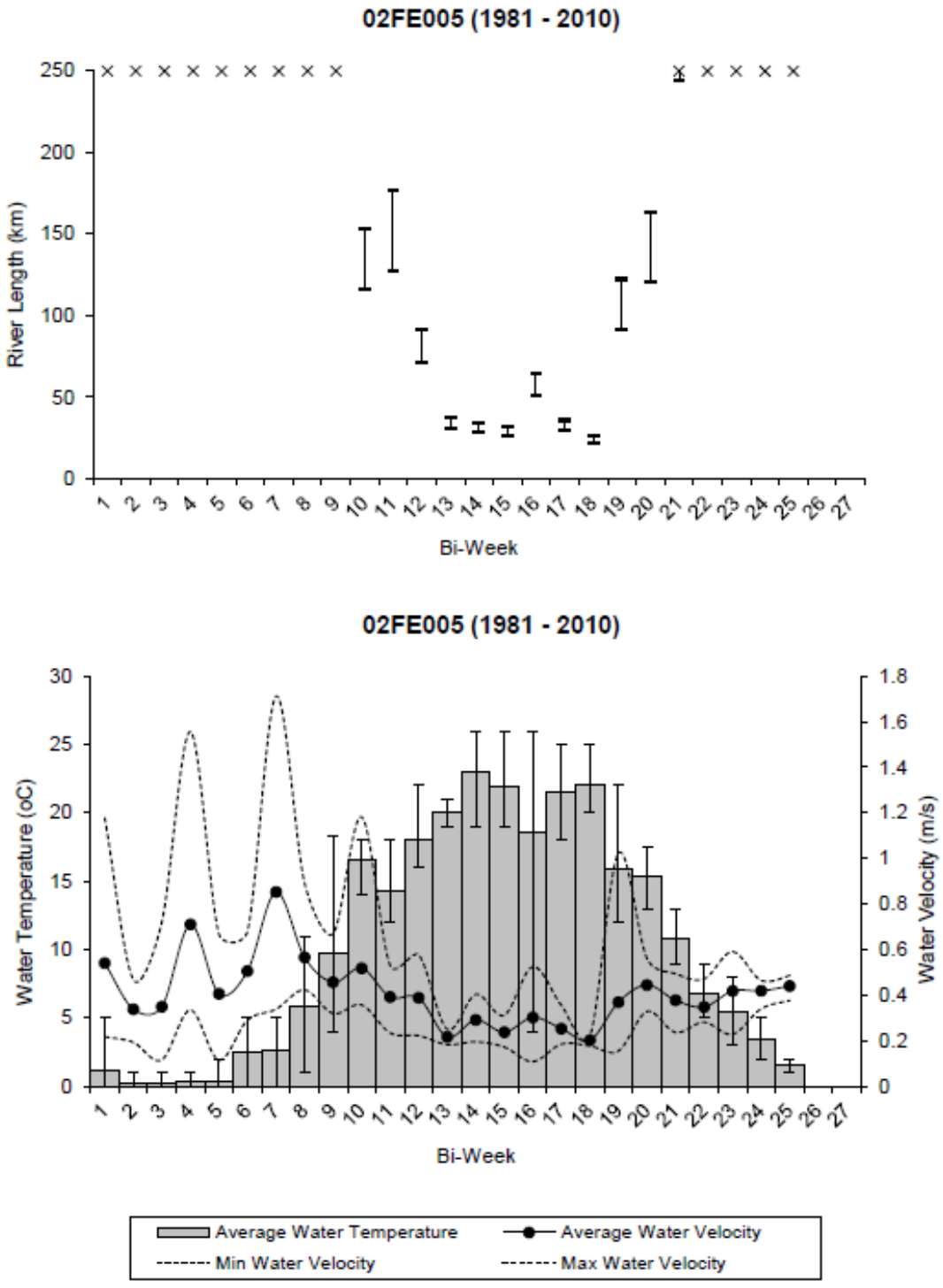


*Figure A1-80. Gauging station 02FE005 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

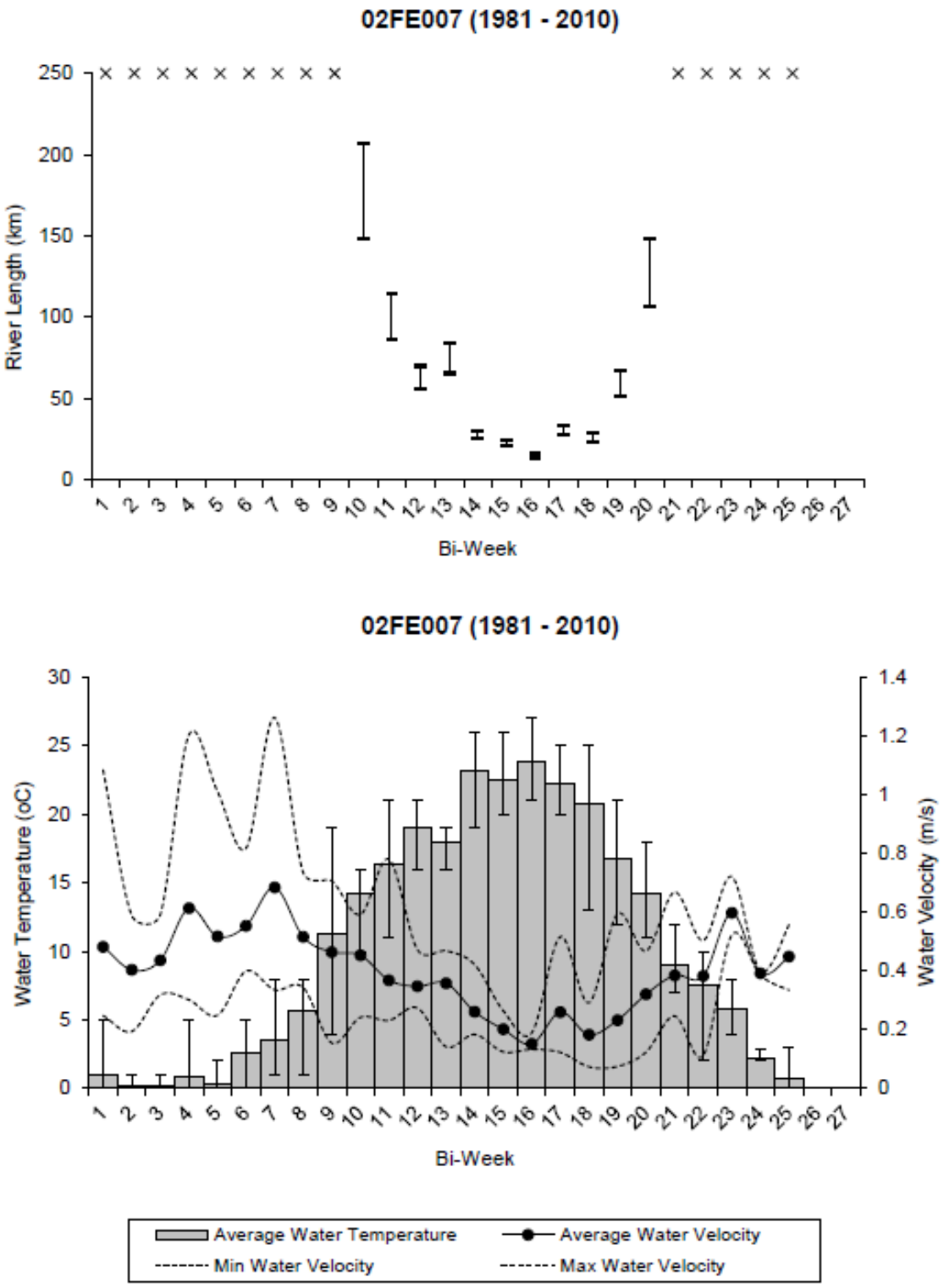


*Figure A1-81. Gauging station 02FE007 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

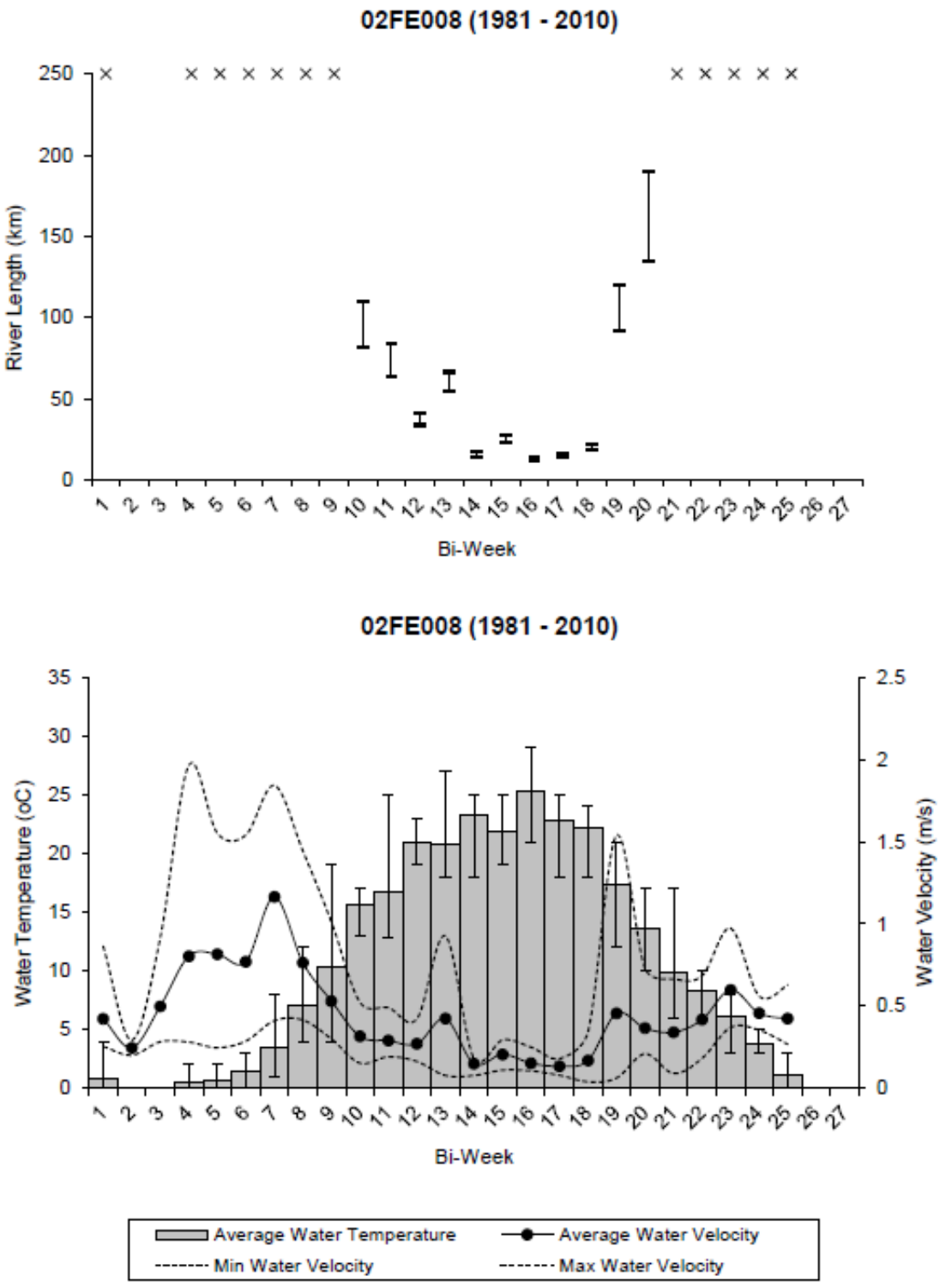


*Figure A1-82. Gauging station 02FE008 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

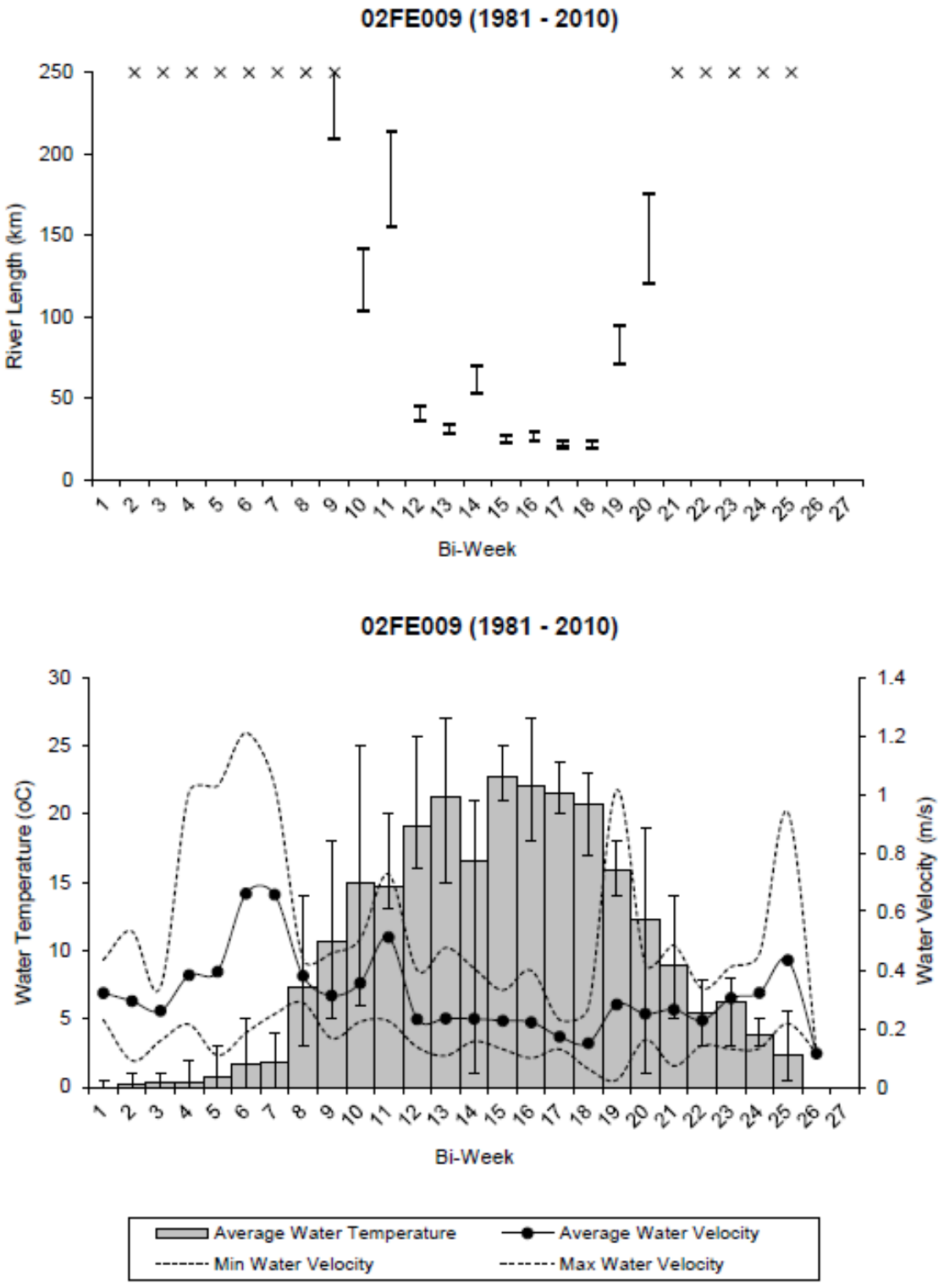


*Figure A1-83. Gauging station 02FE009 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

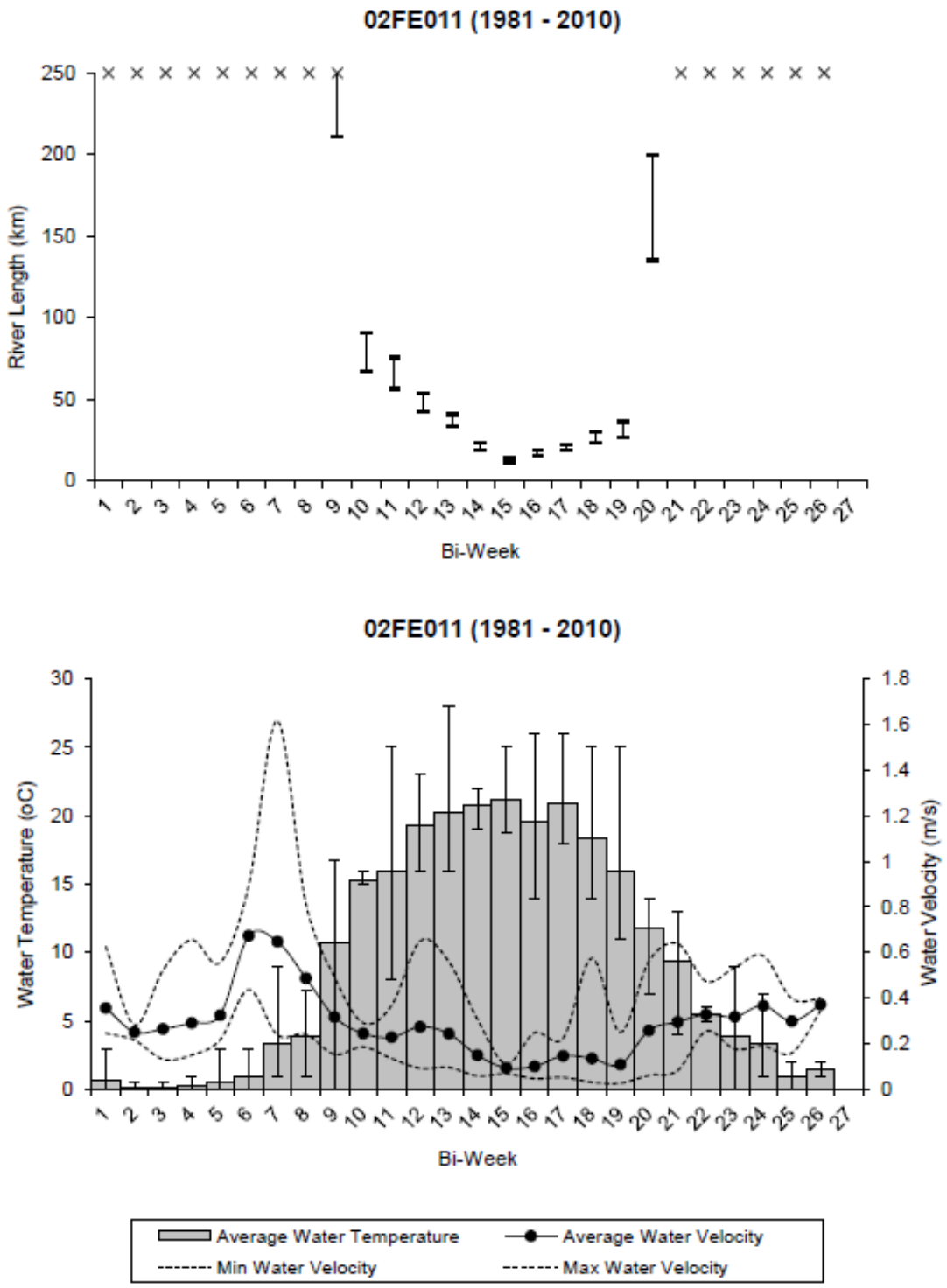


*Figure A1-84. Gauging station 02FE011 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

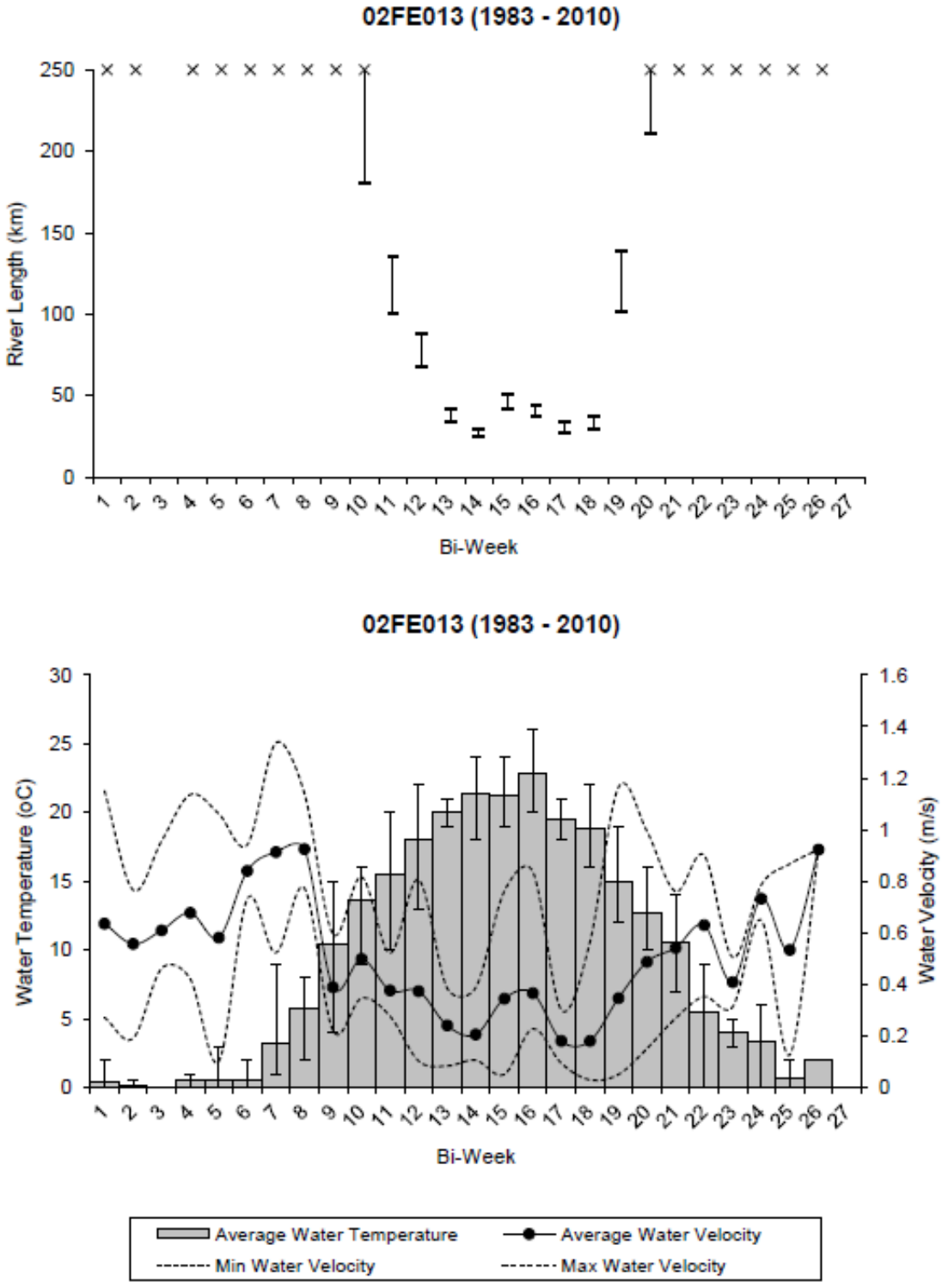


*Figure A1-85. Gauging station 02FE013 data from 1983–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

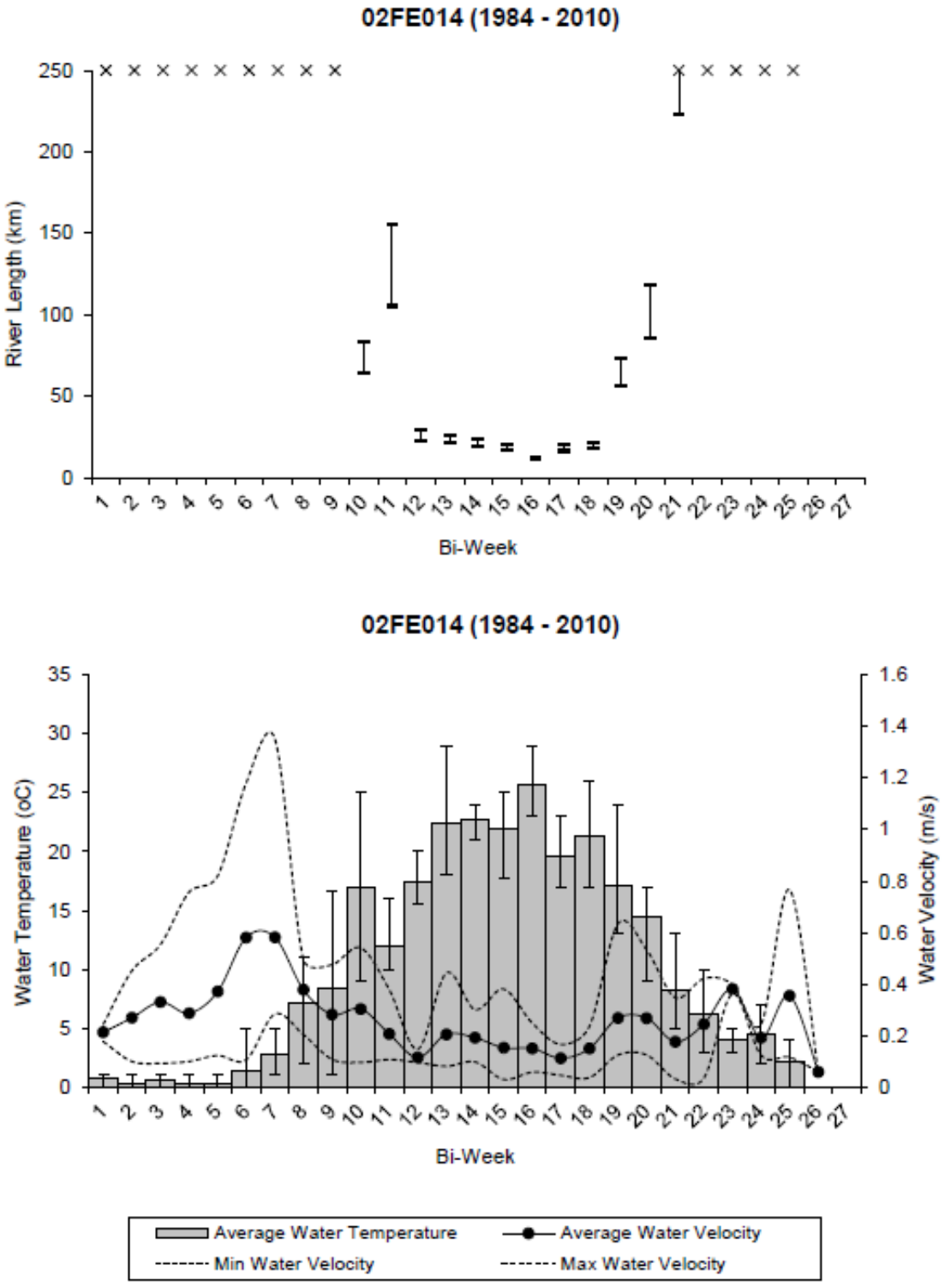


*Figure A1-86. Gauging station 02FE014 data from 1984–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

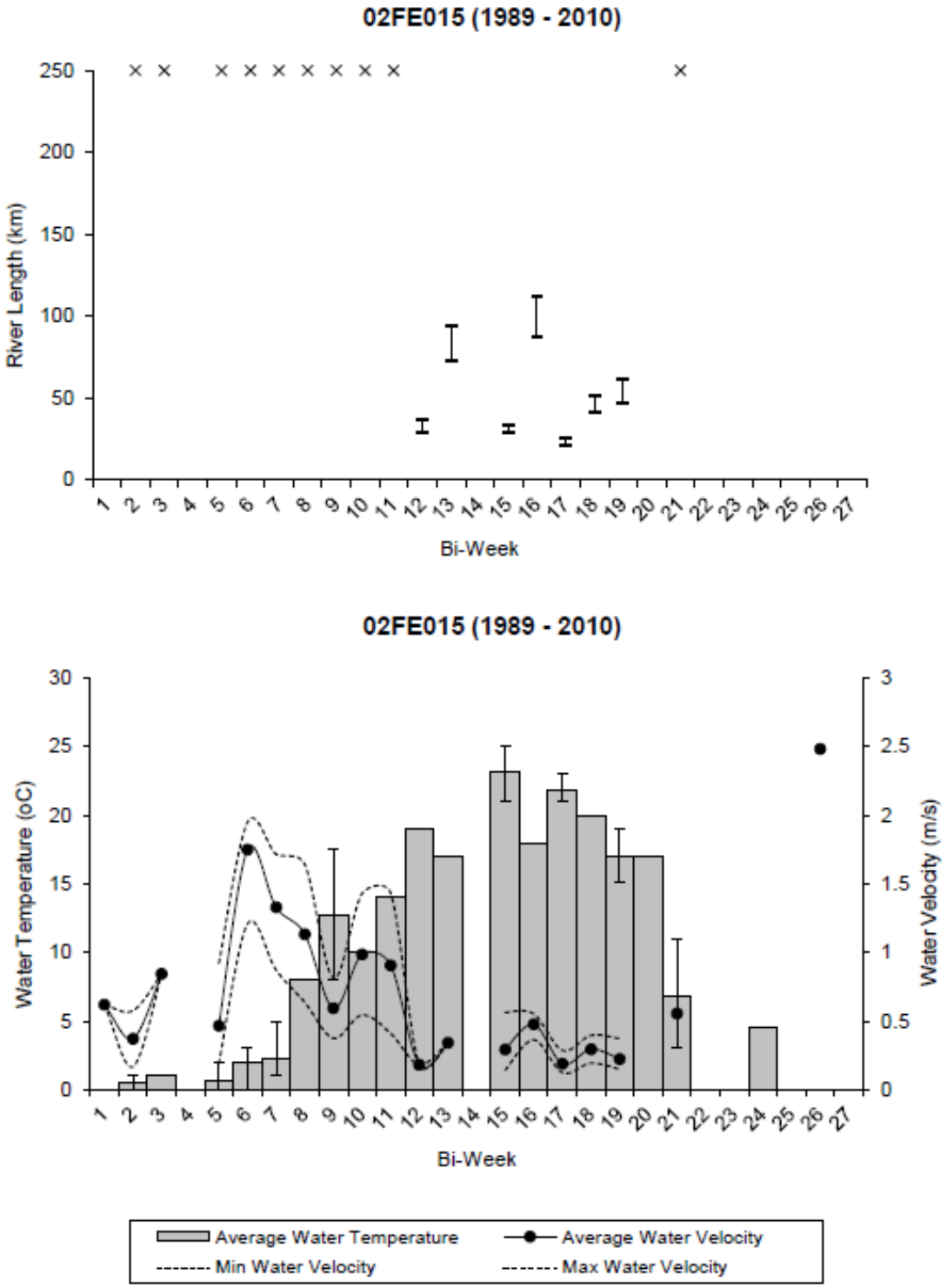


*Figure A1-87. Gauging station 02FE015 data from 1989–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

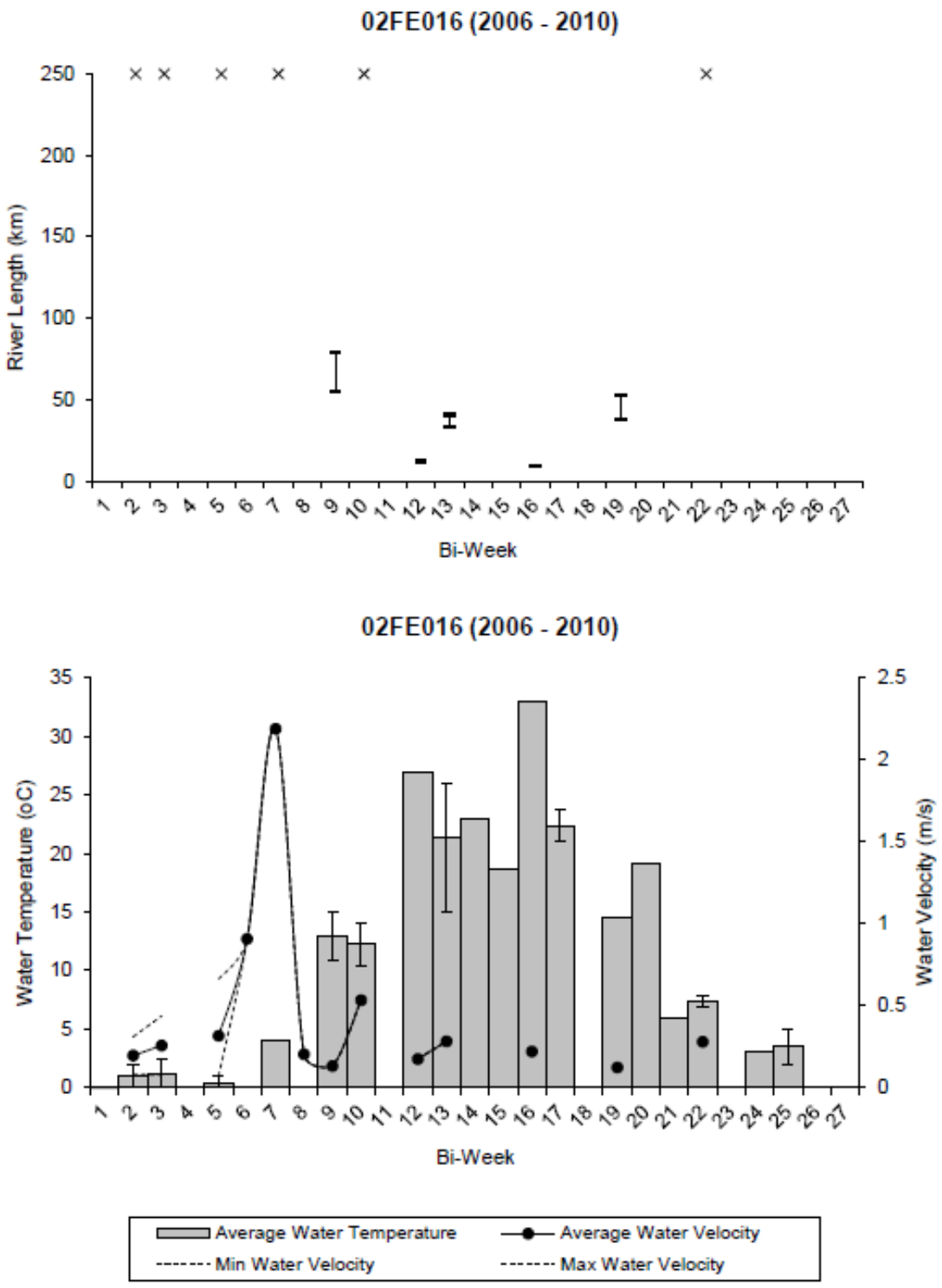


*Figure A1-88. Gauging station 02FE016 data from 2006–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

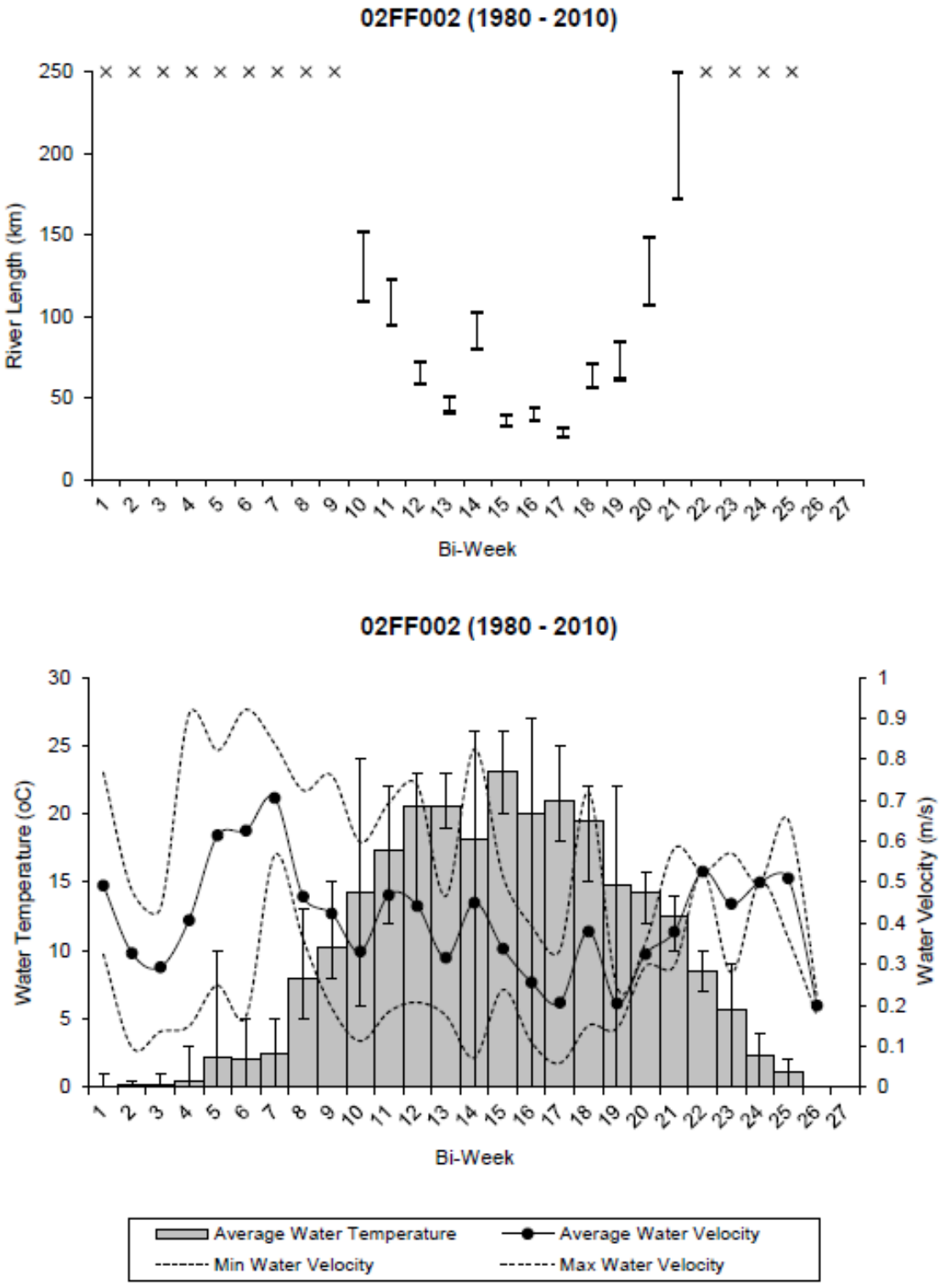


*Figure A1-89. Gauging station 02FF002 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

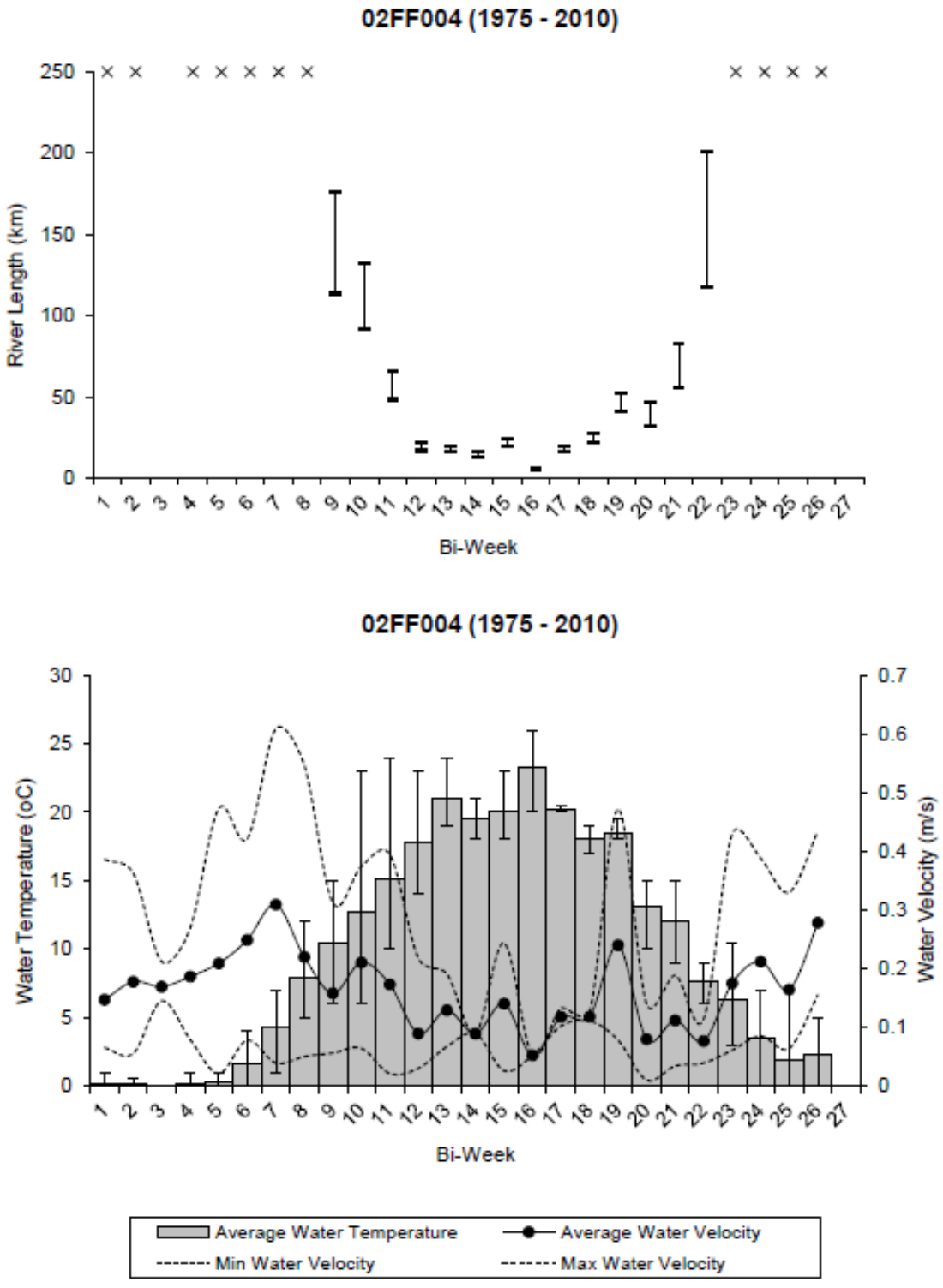


*Figure A1-90. Gauging station 02FF004 data from 1975–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

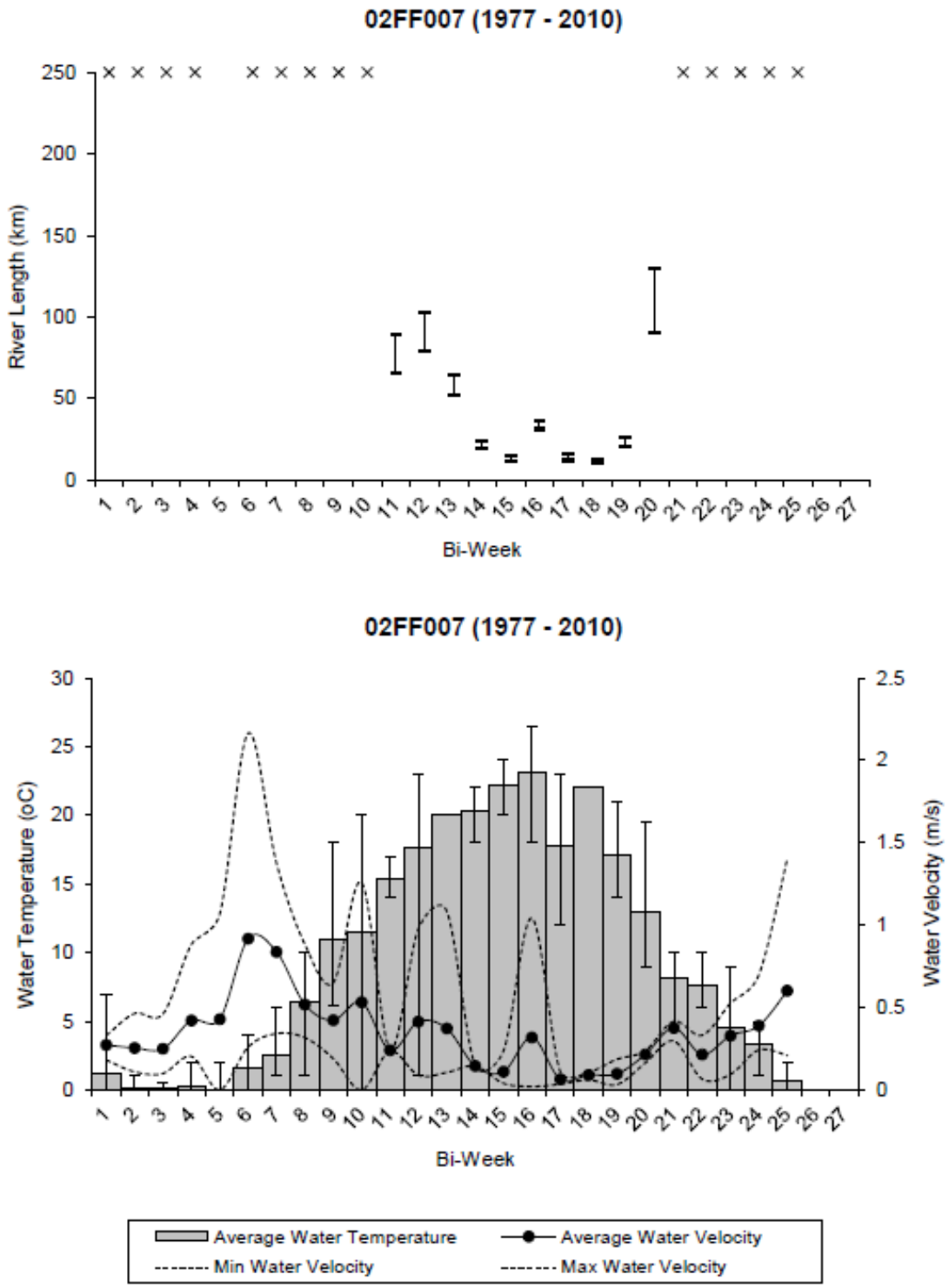


*Figure A1-91. Gauging station 02FF007 data from 1977–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

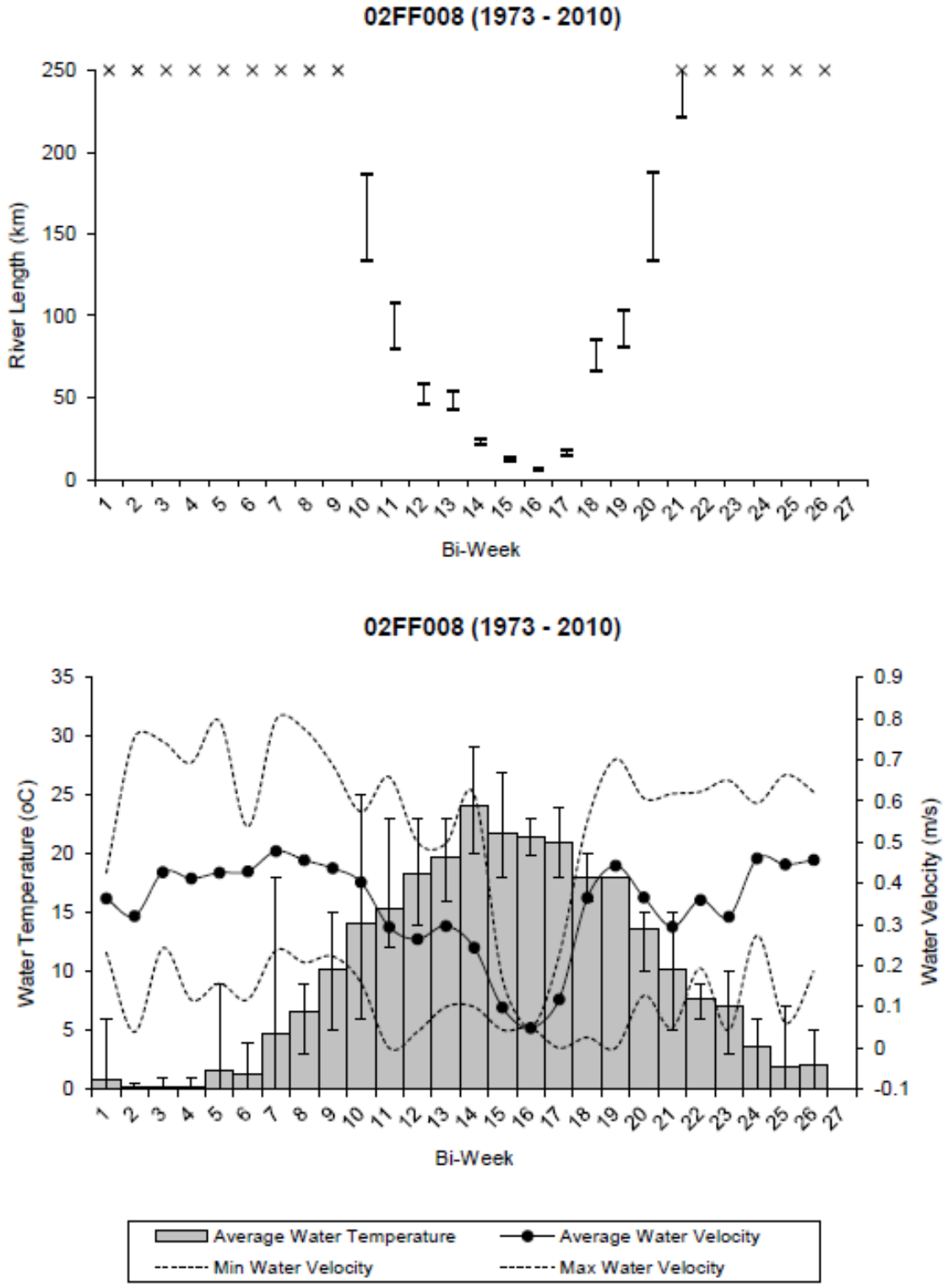


*Figure A1-92. Gauging station 02FF008 data from 1973–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

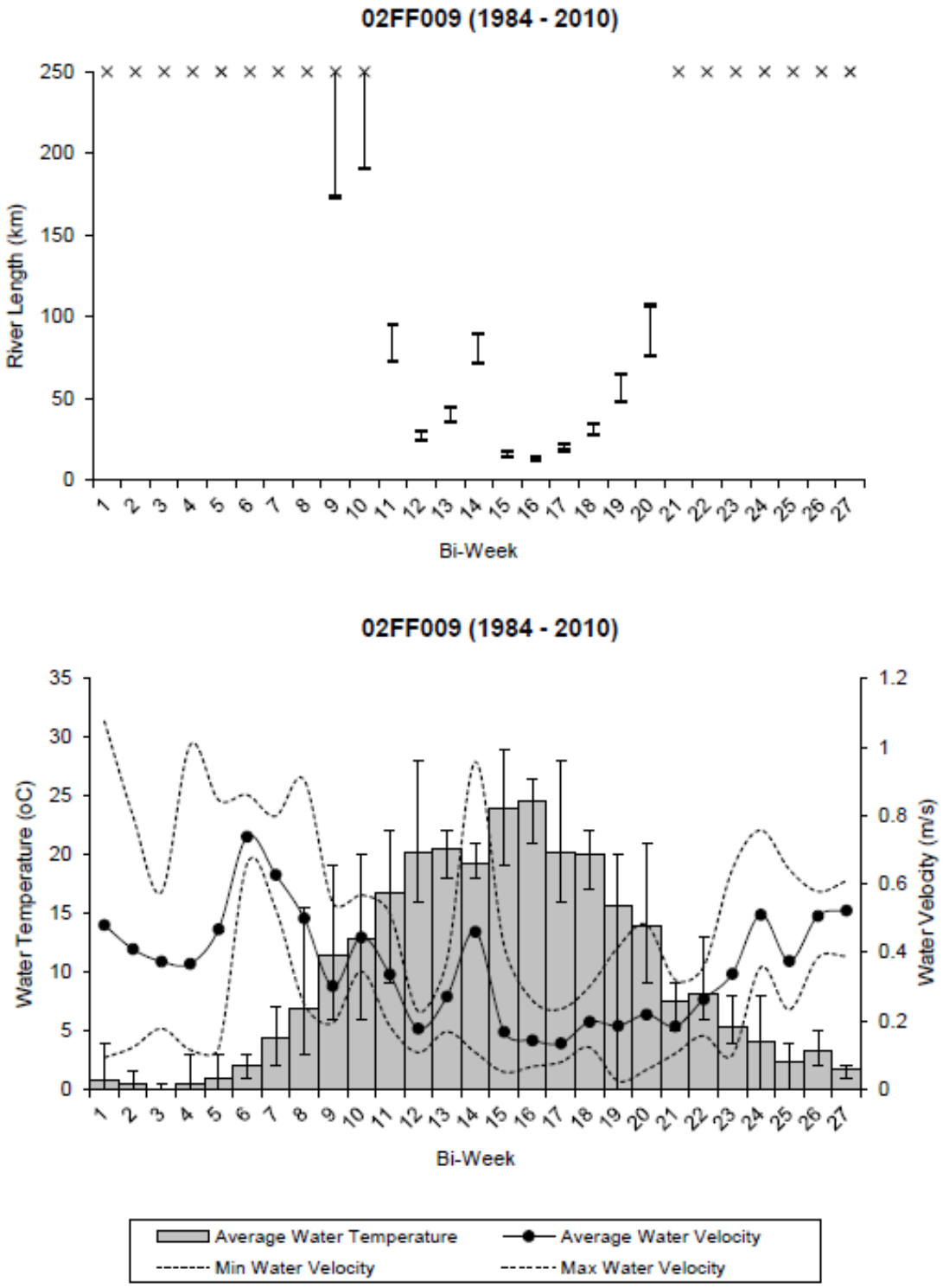


*Figure A1-93. Gauging station 02FF009 data from 1984–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

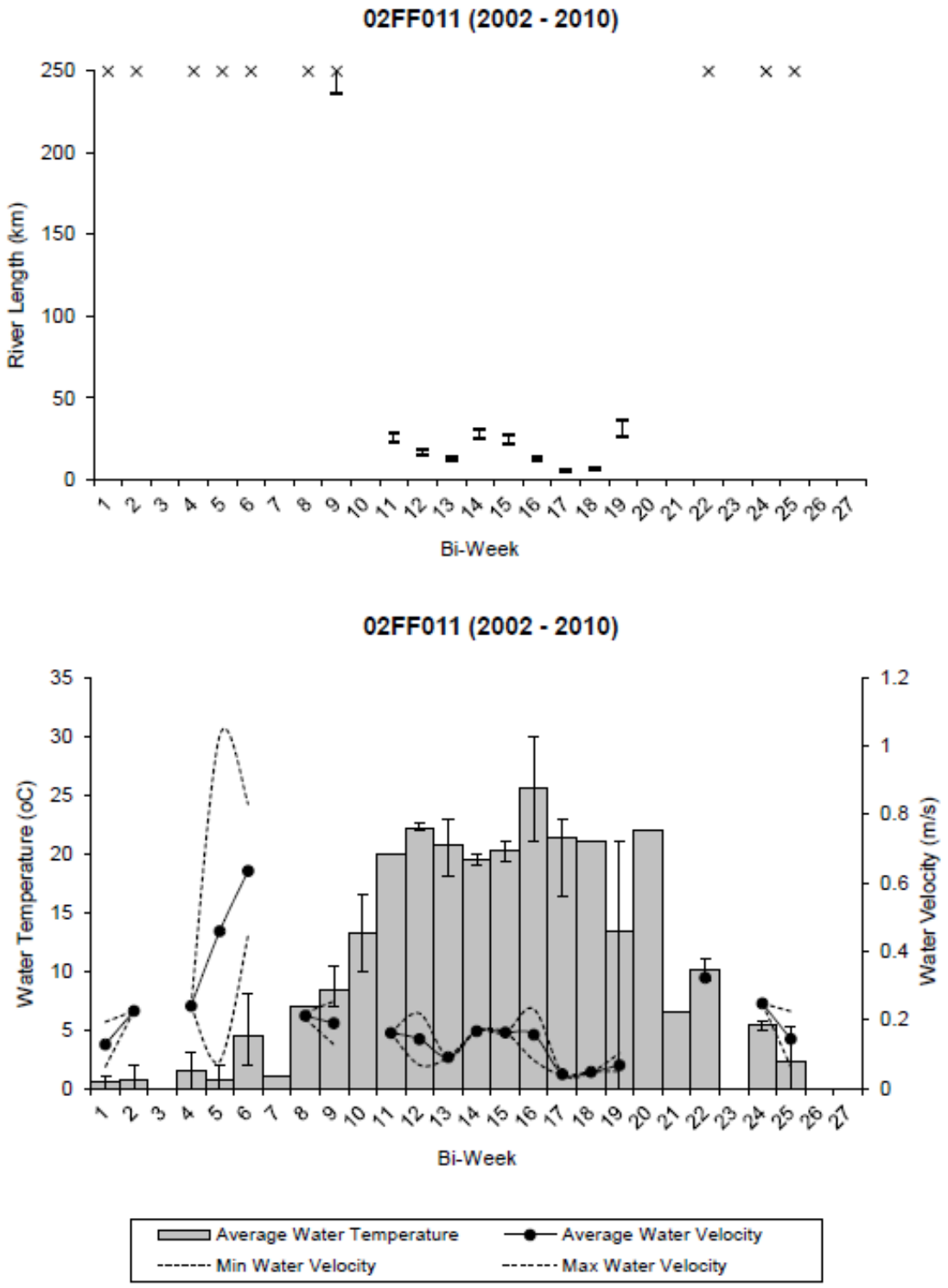


*Figure A1-94. Gauging station 02FF011 data from 2002–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

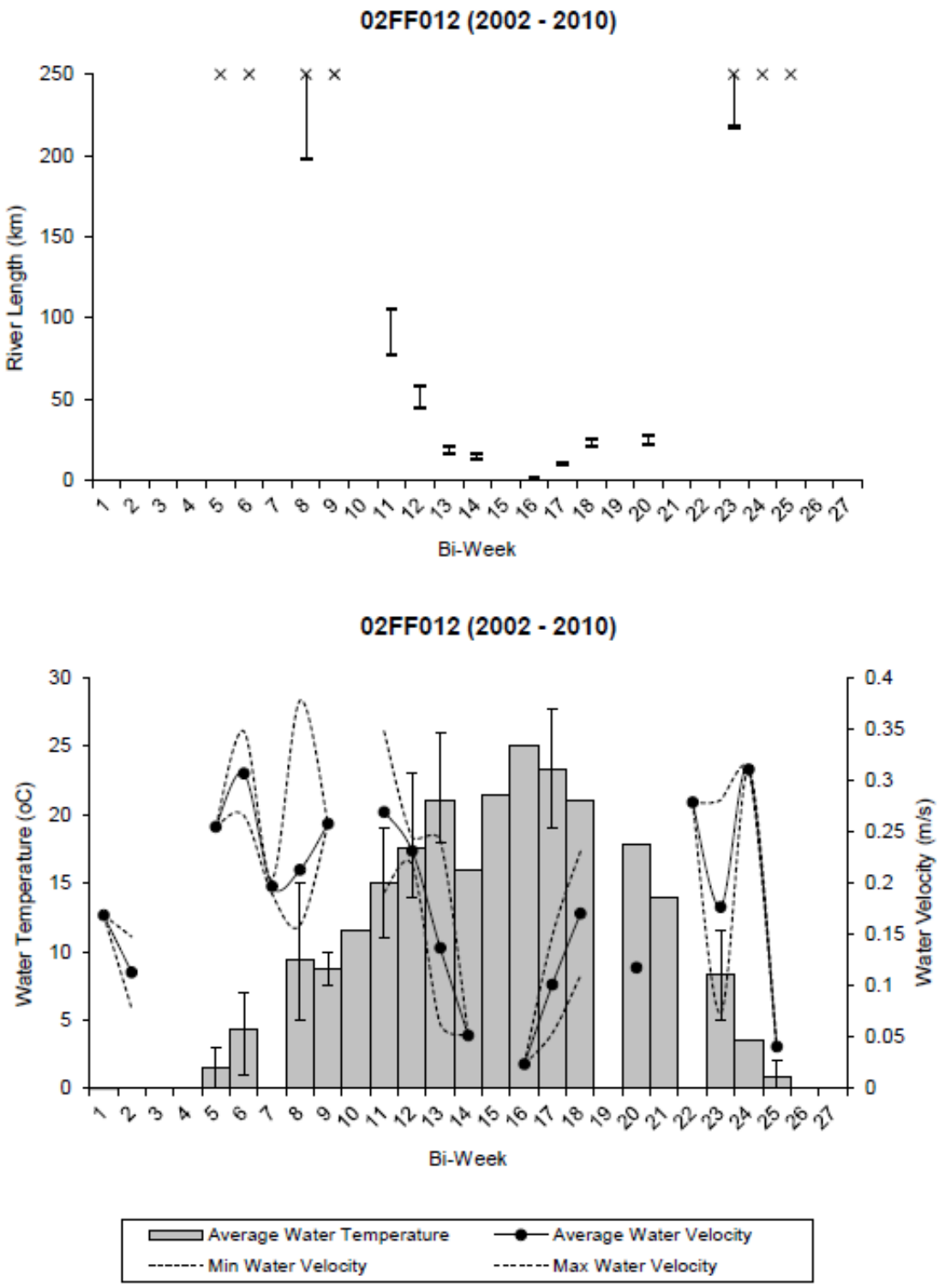


*Figure A1-95. Gauging station 02FF012 data from 2002–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

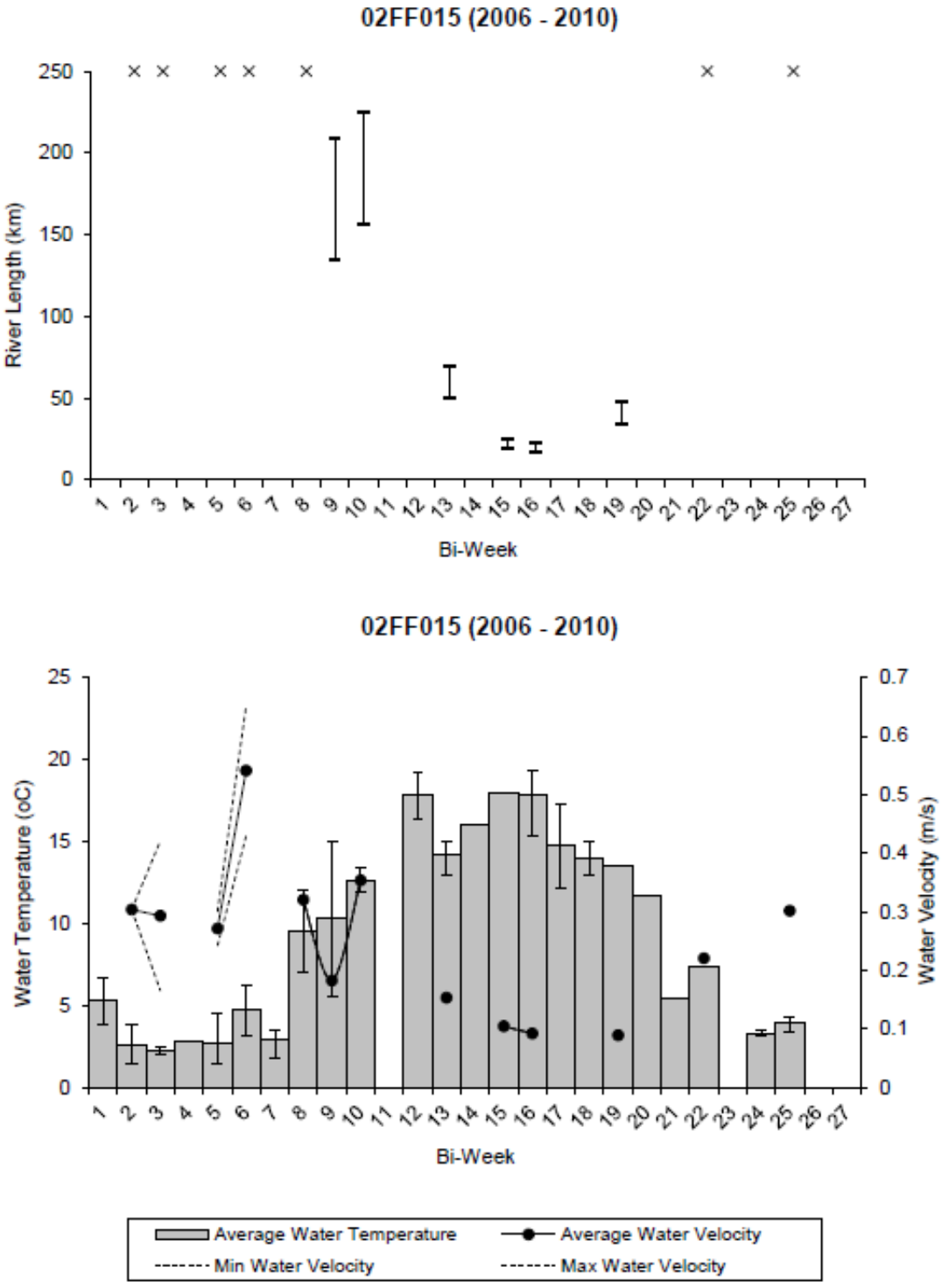


*Figure A1-96. Gauging station 02FF015 data from 2006–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

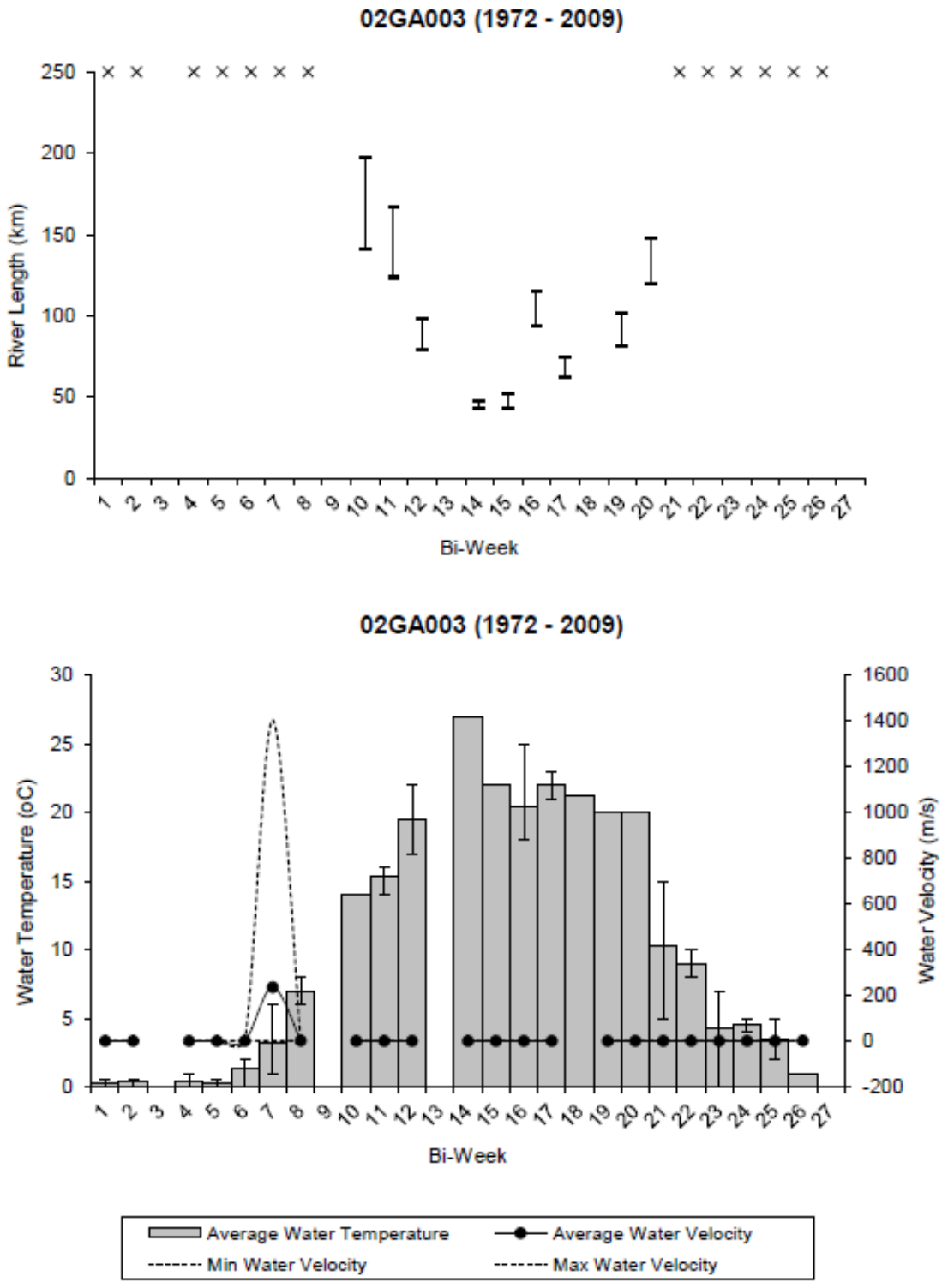


*Figure A1-97. Gauging station 02GA003 data from 1972–2009. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

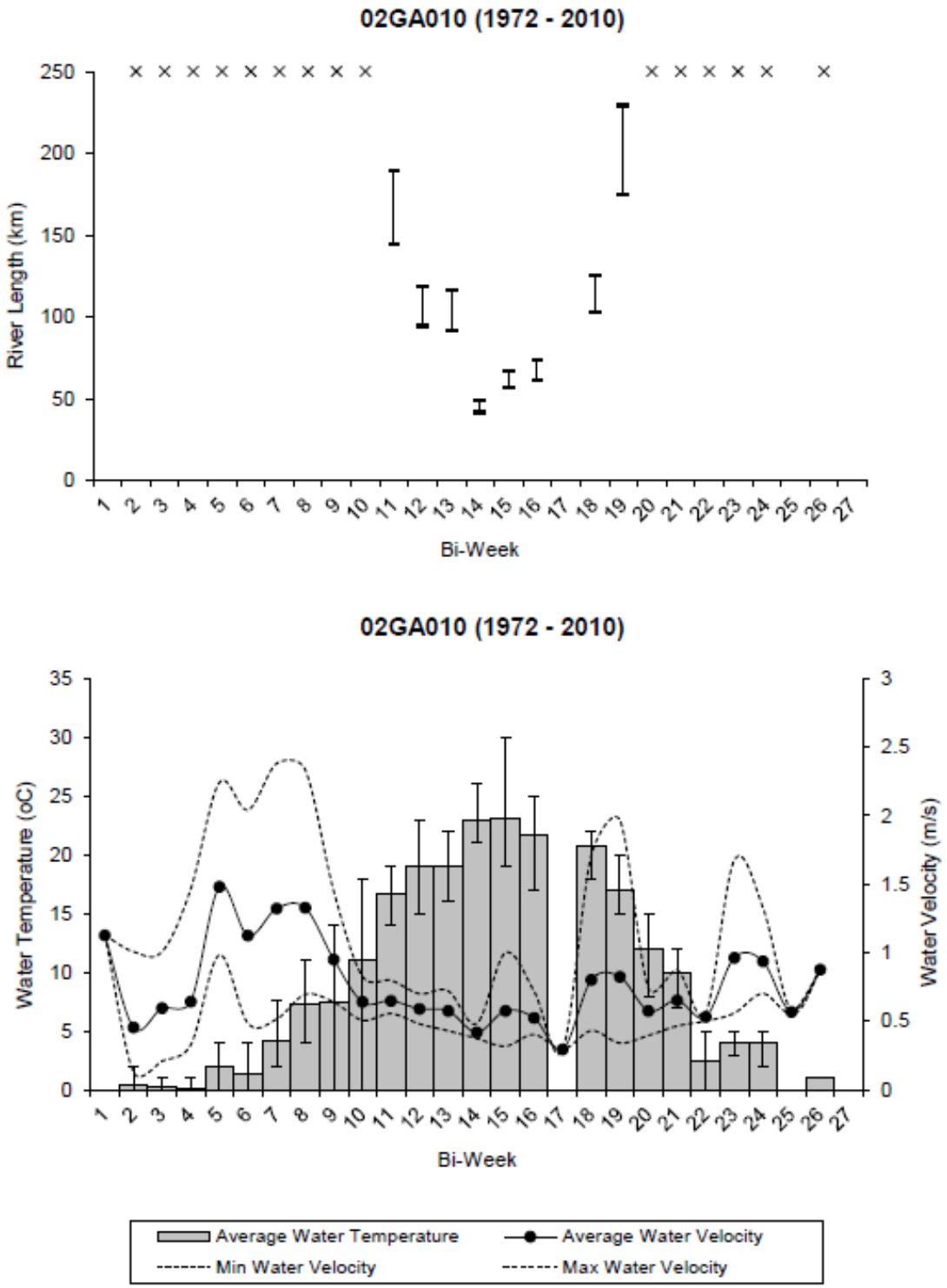


*Figure A1-98. Gauging station 02GA010 data from 1972–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

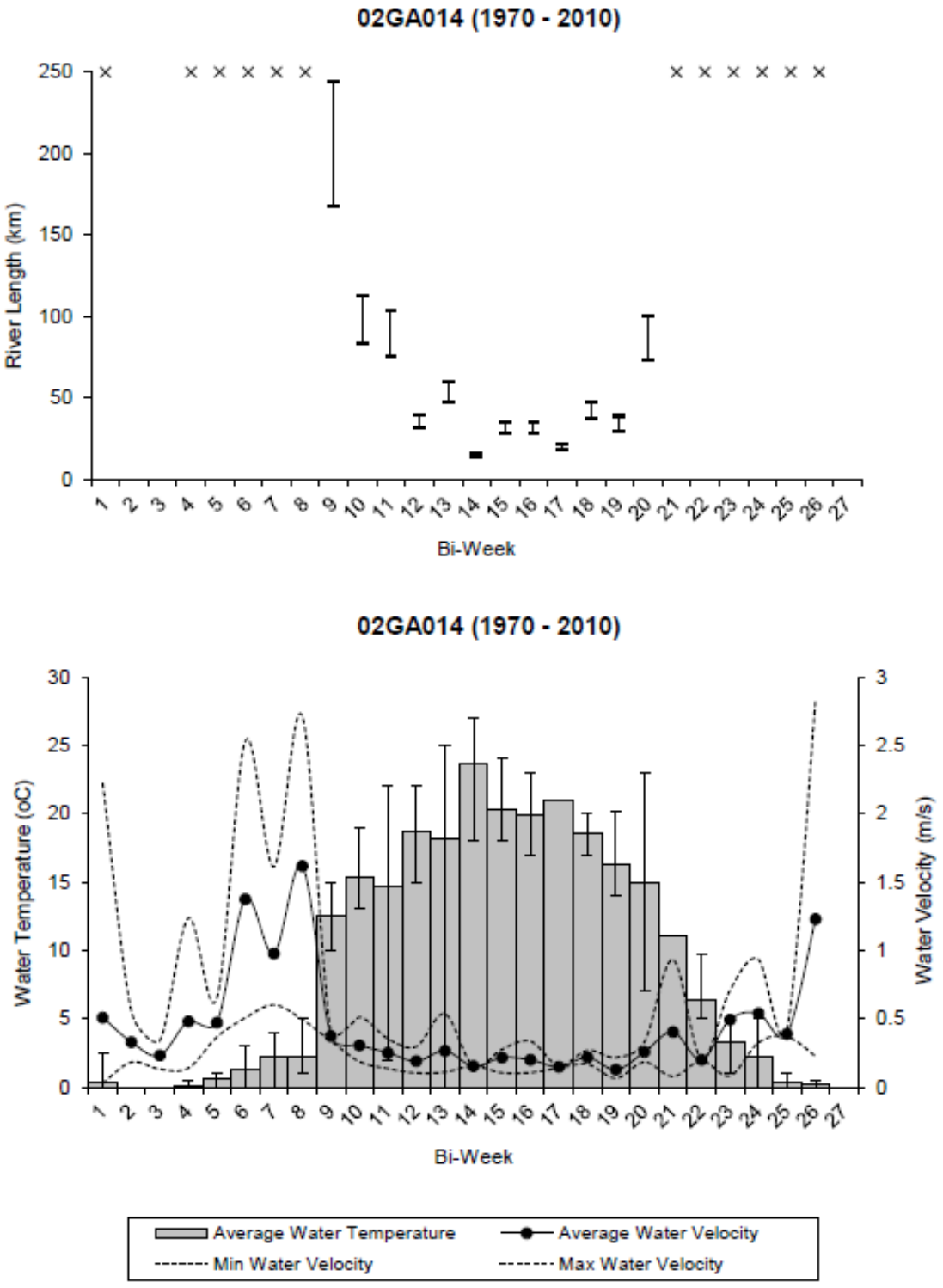


*Figure A1-99. Gauging station 02GA014 data from 1970–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

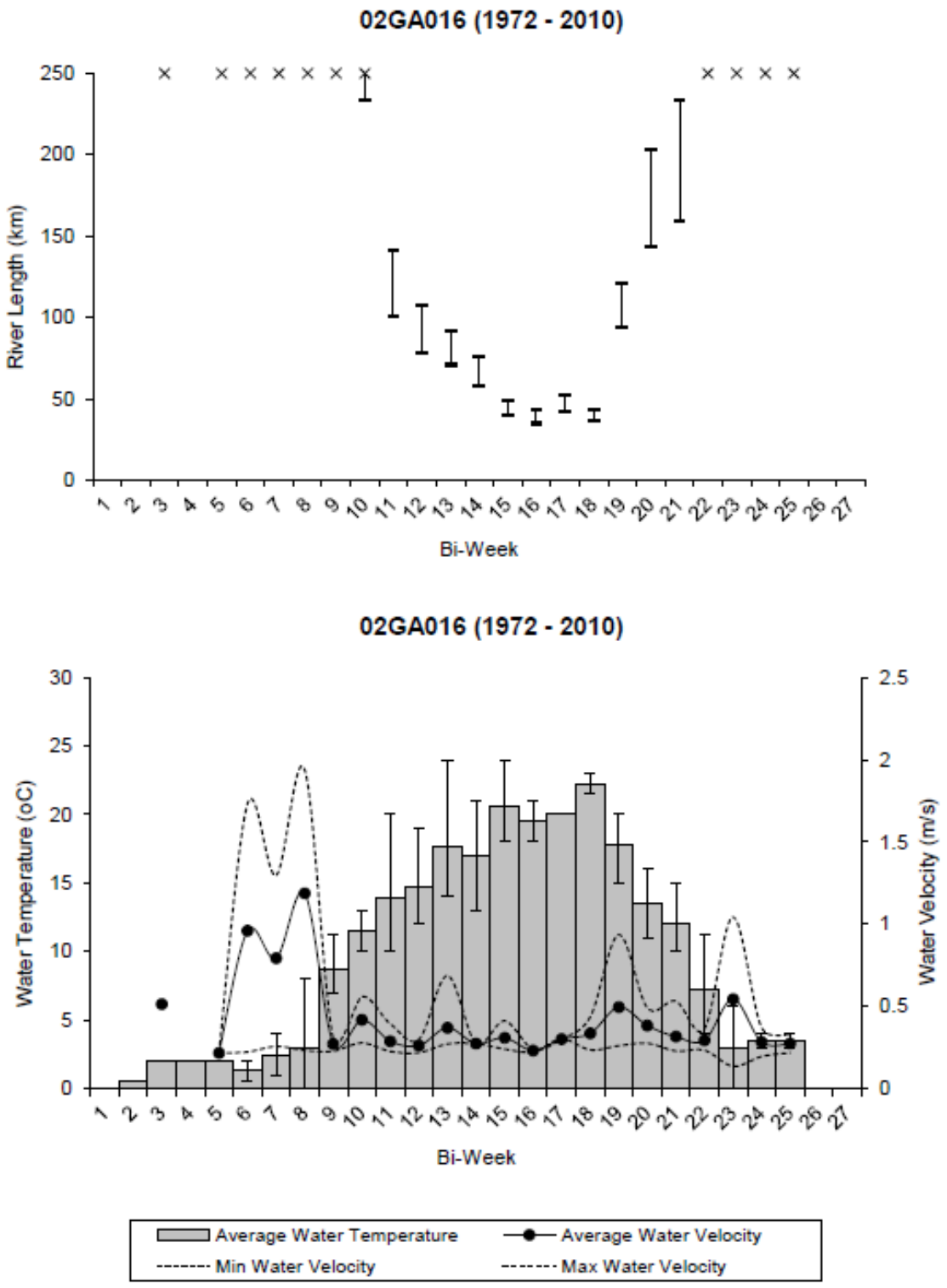


*Figure A1-100. Gauging station 02GA016 data from 1972–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

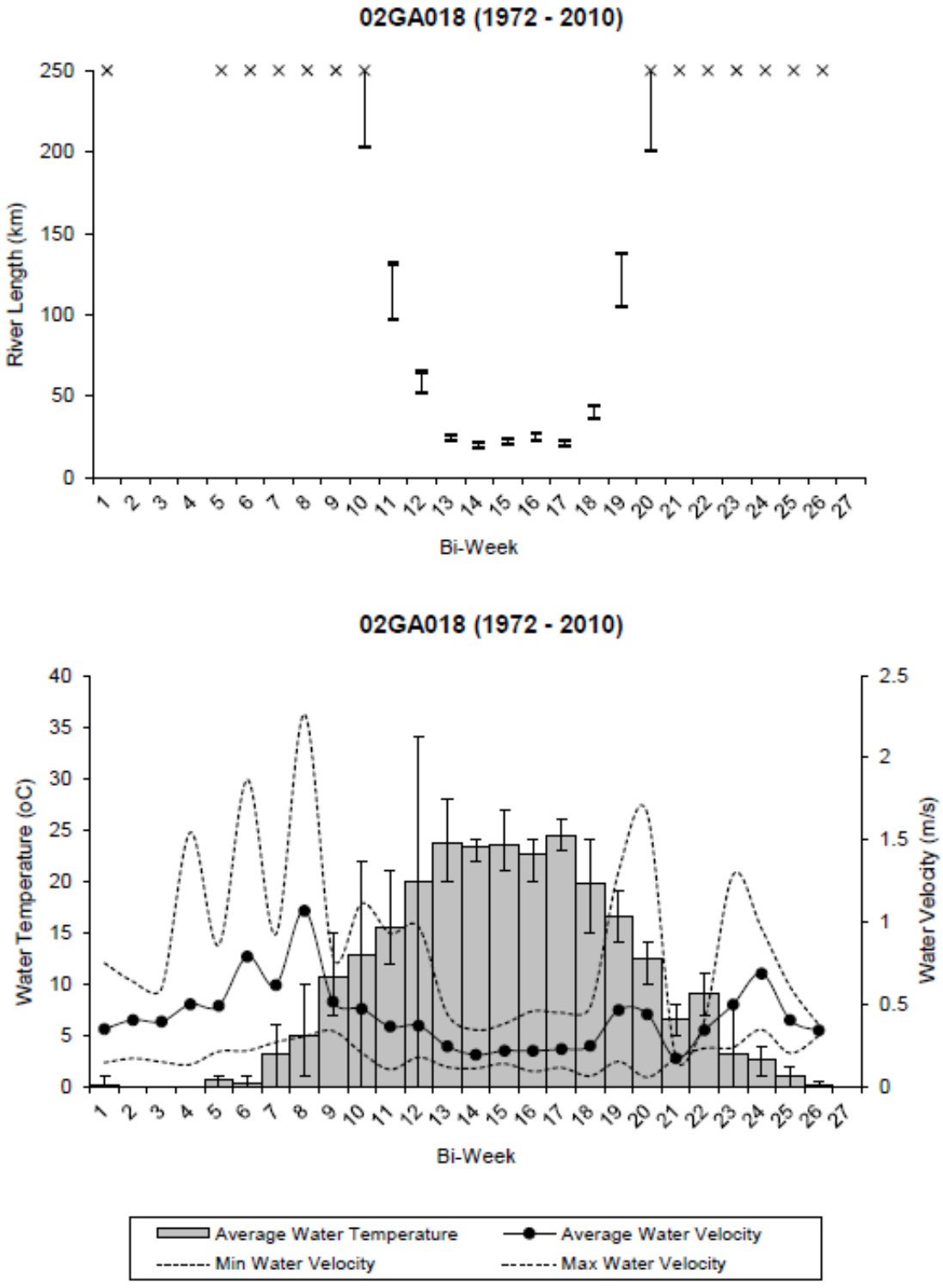


*Figure A1-101. Gauging station 02GA018 data from 1972–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

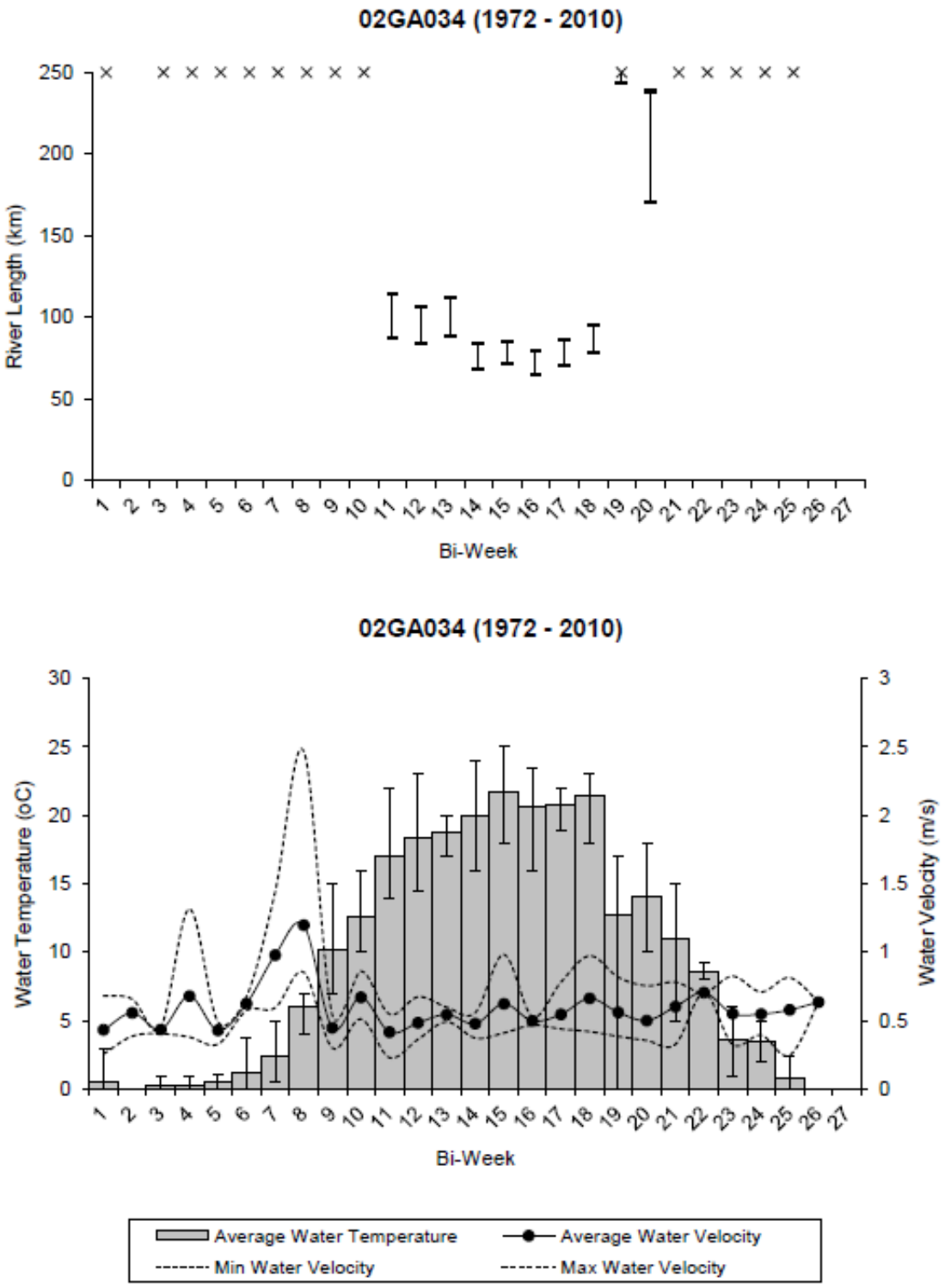


*Figure A1-102. Gauging station 02GA034 data from 1972–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

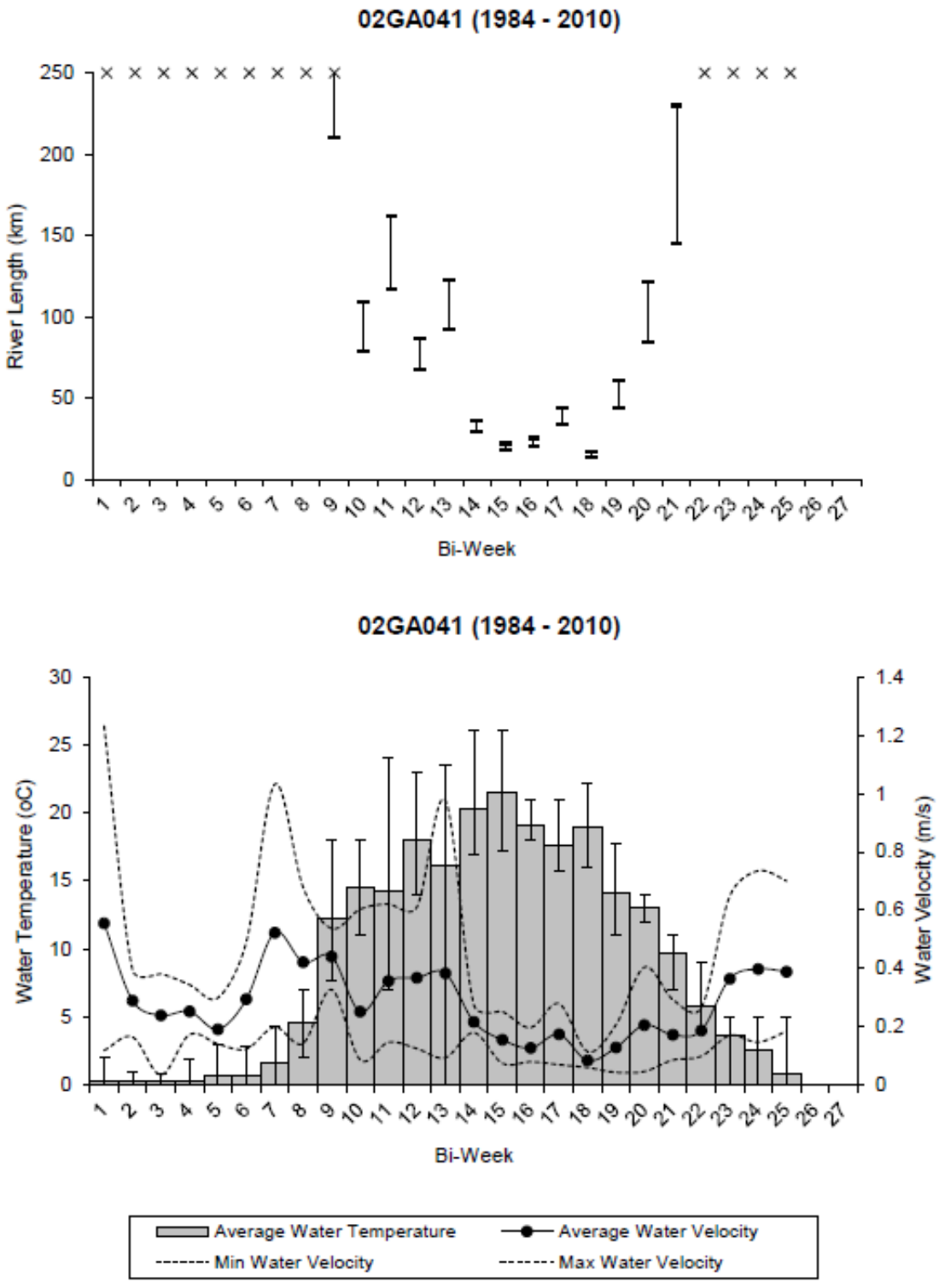


*Figure A1-103. Gauging station 02GA041 data from 1984–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

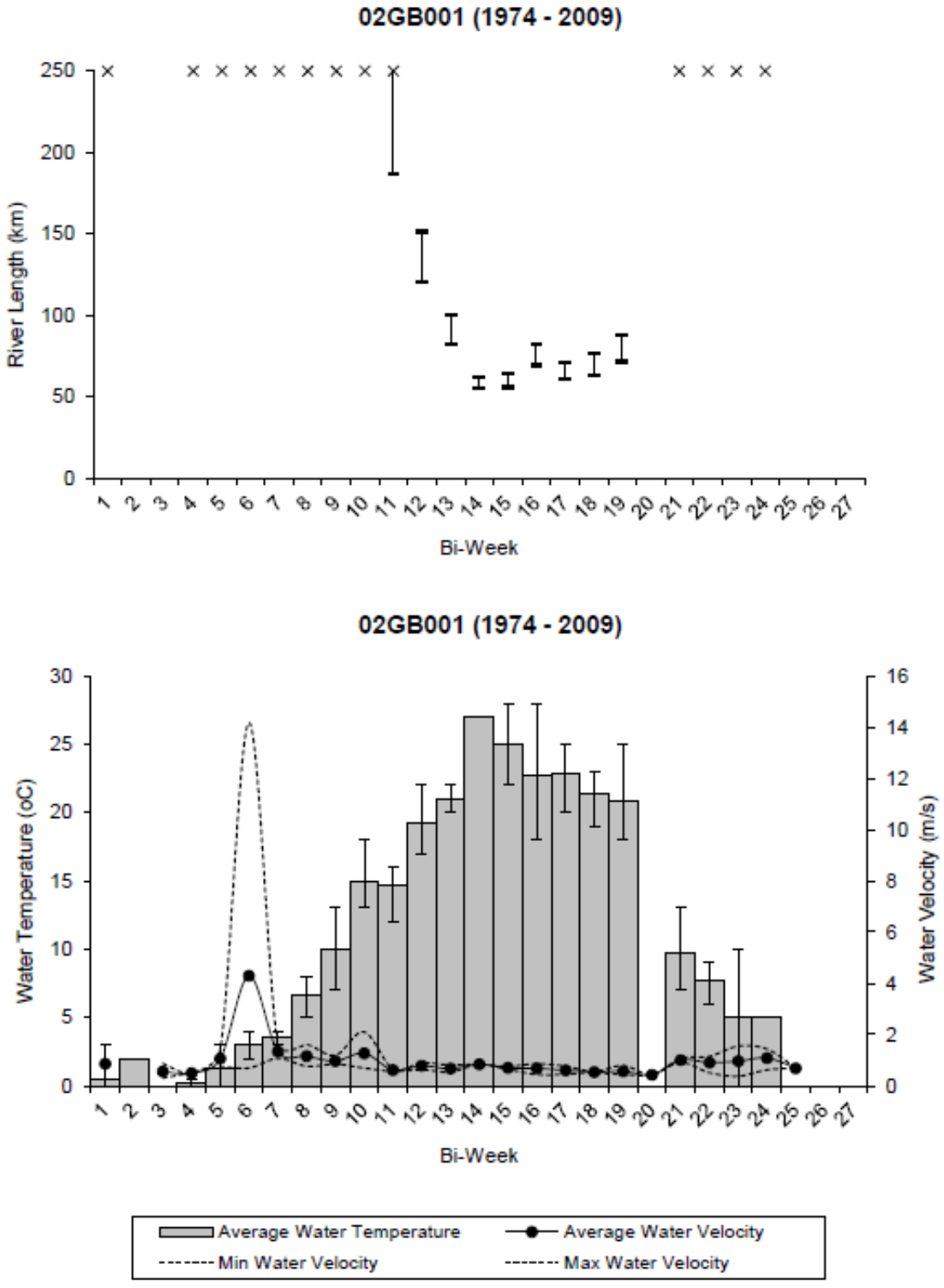


*Figure A1-104. Gauging station 02GB001 data from 1974–2009. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

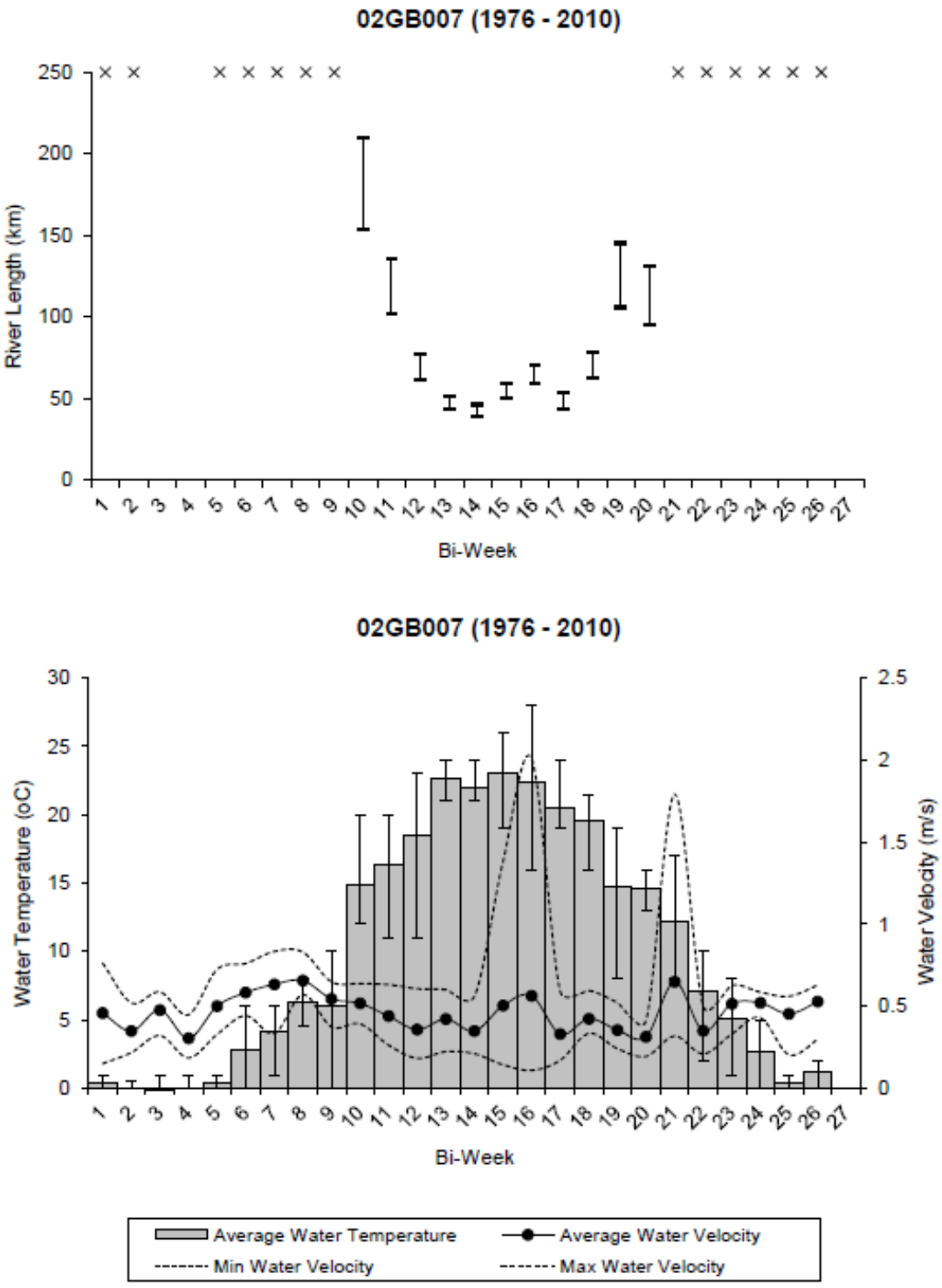


*Figure A1-105. Gauging station 02GB007 data from 1976–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

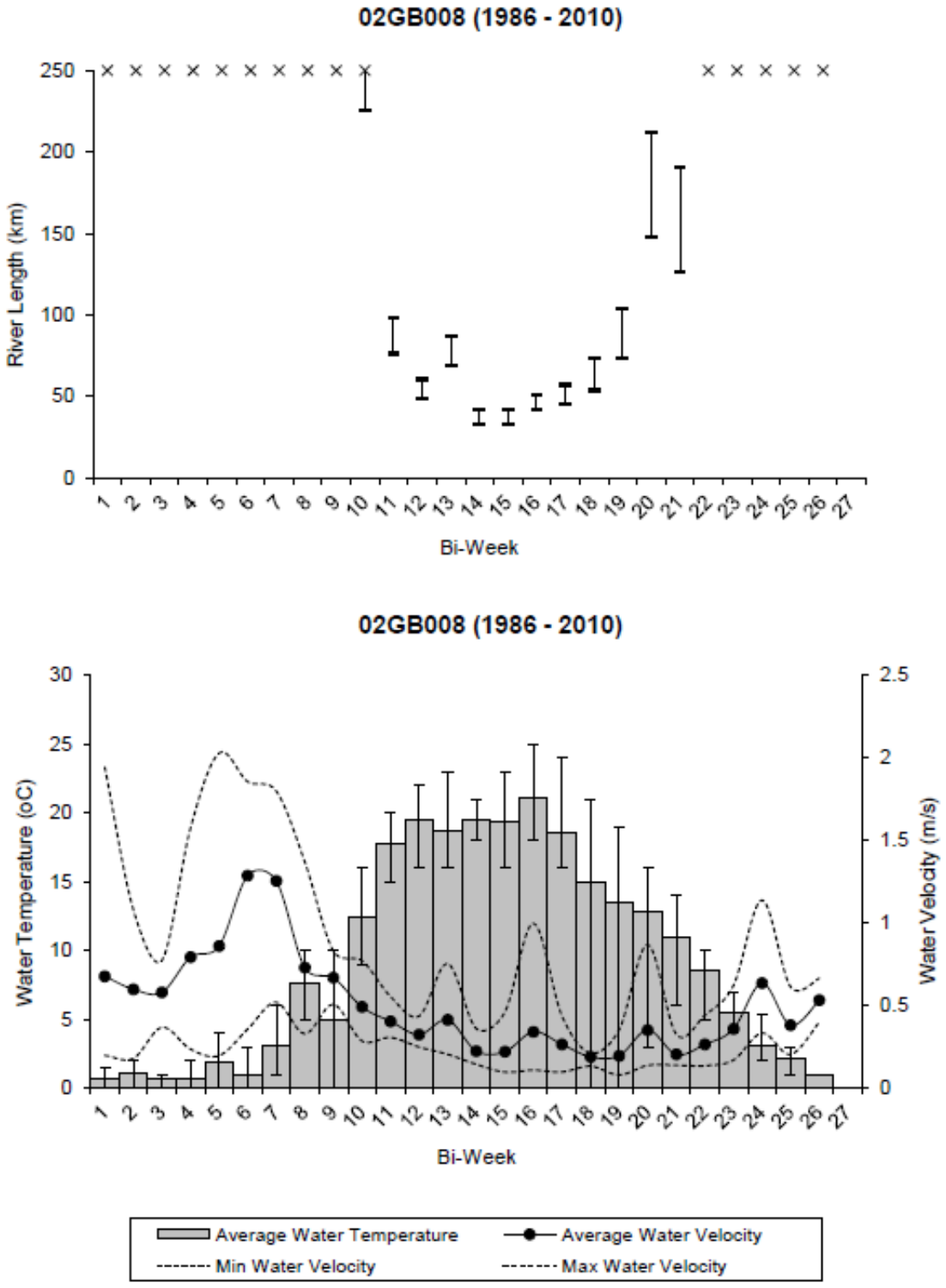


*Figure A1-106. Gauging station 02GB008 data from 1986–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

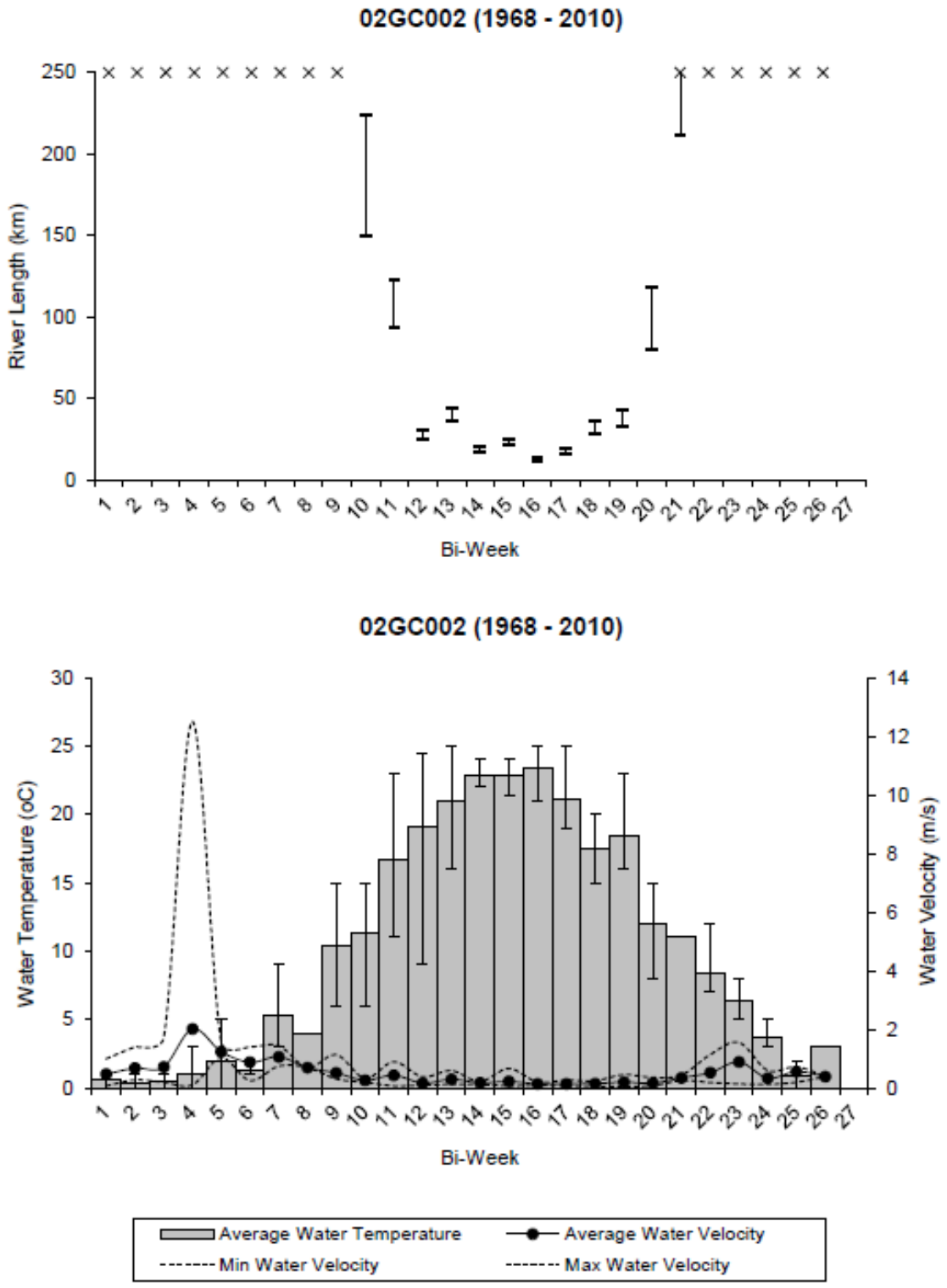


*Figure A1-107. Gauging station 02GC002 data from 1968–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

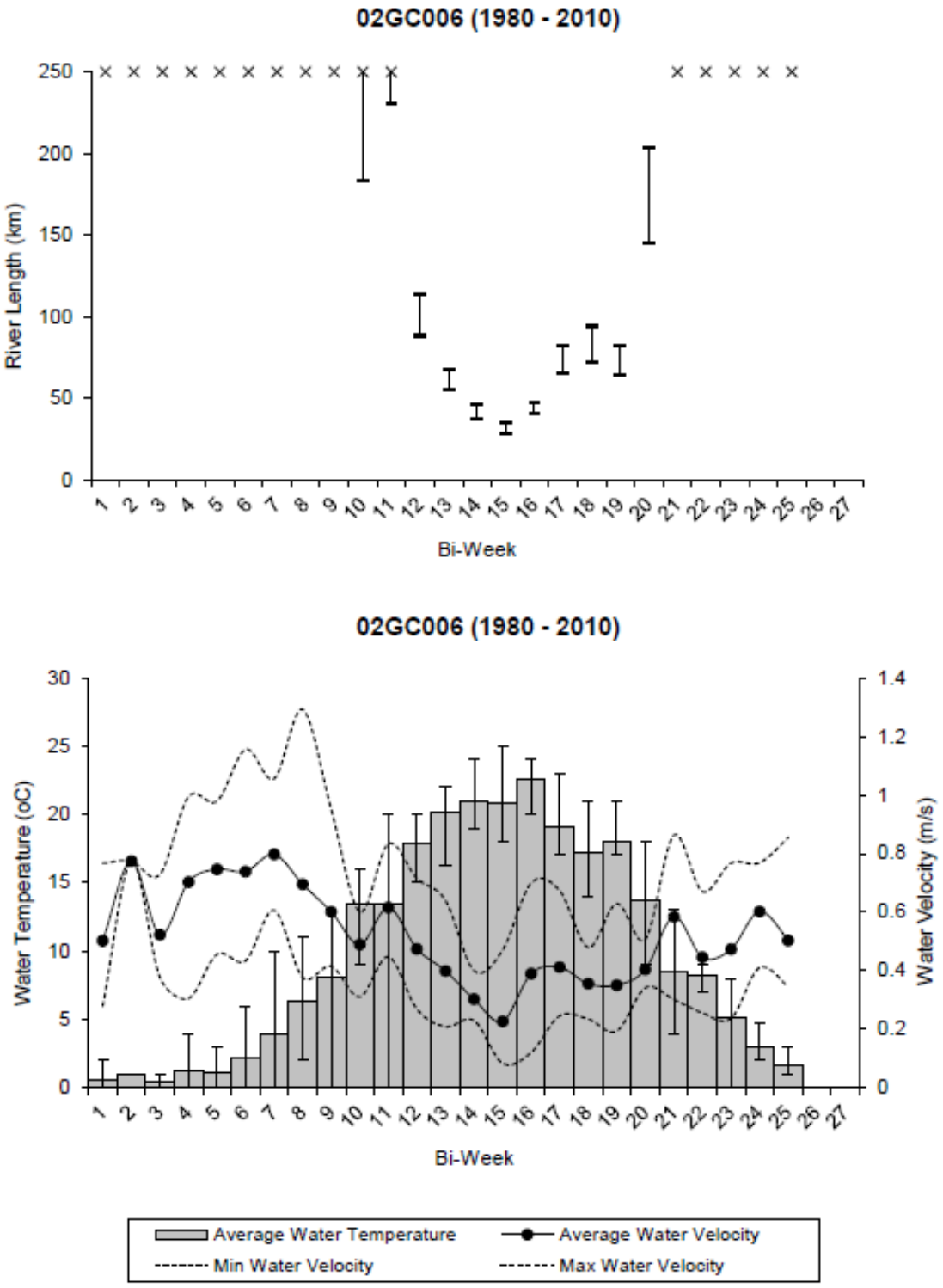


*Figure A1-108. Gauging station 02GC006 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

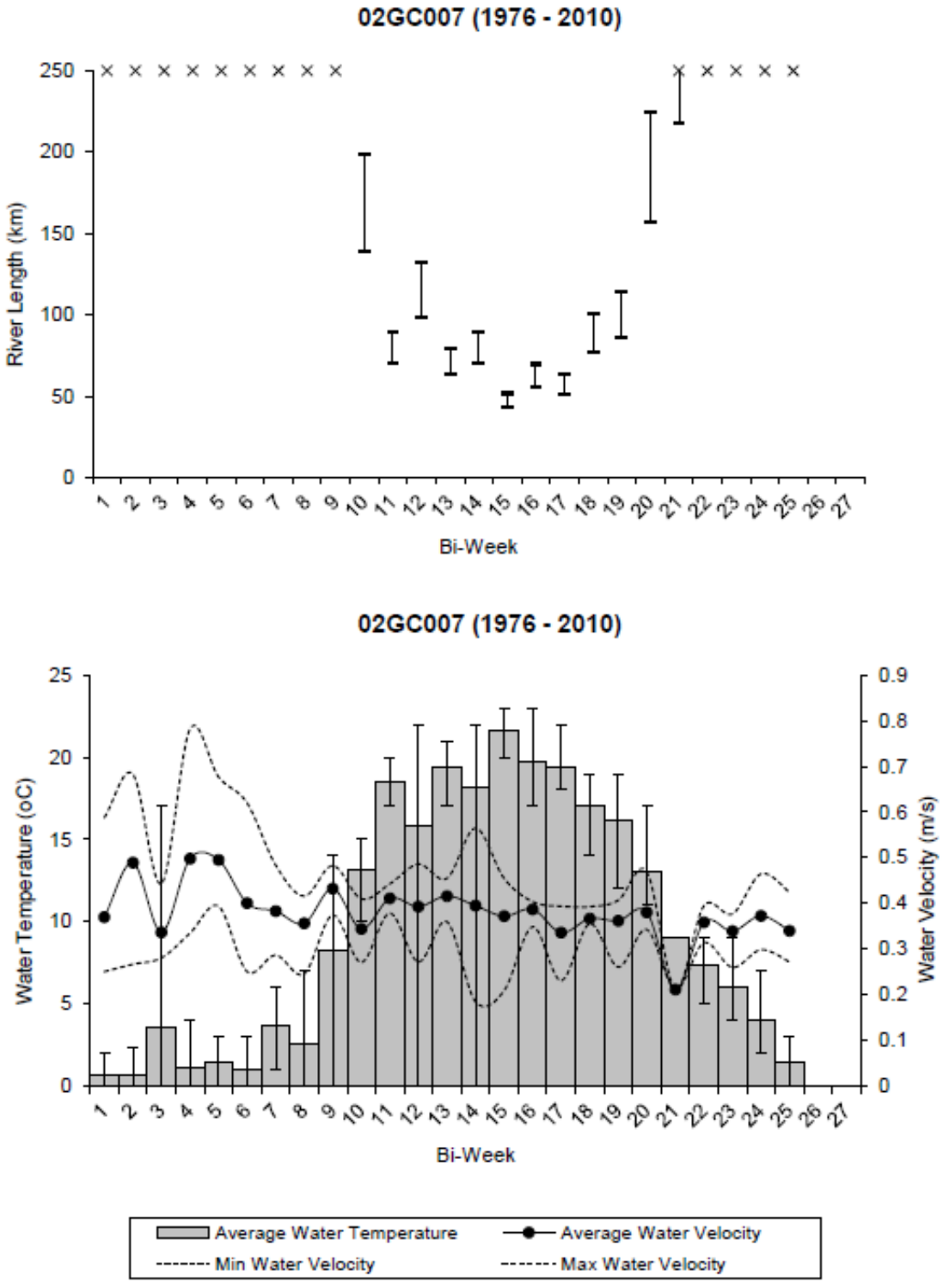


*Figure A1-109. Gauging station 02GC007 data from 1976–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

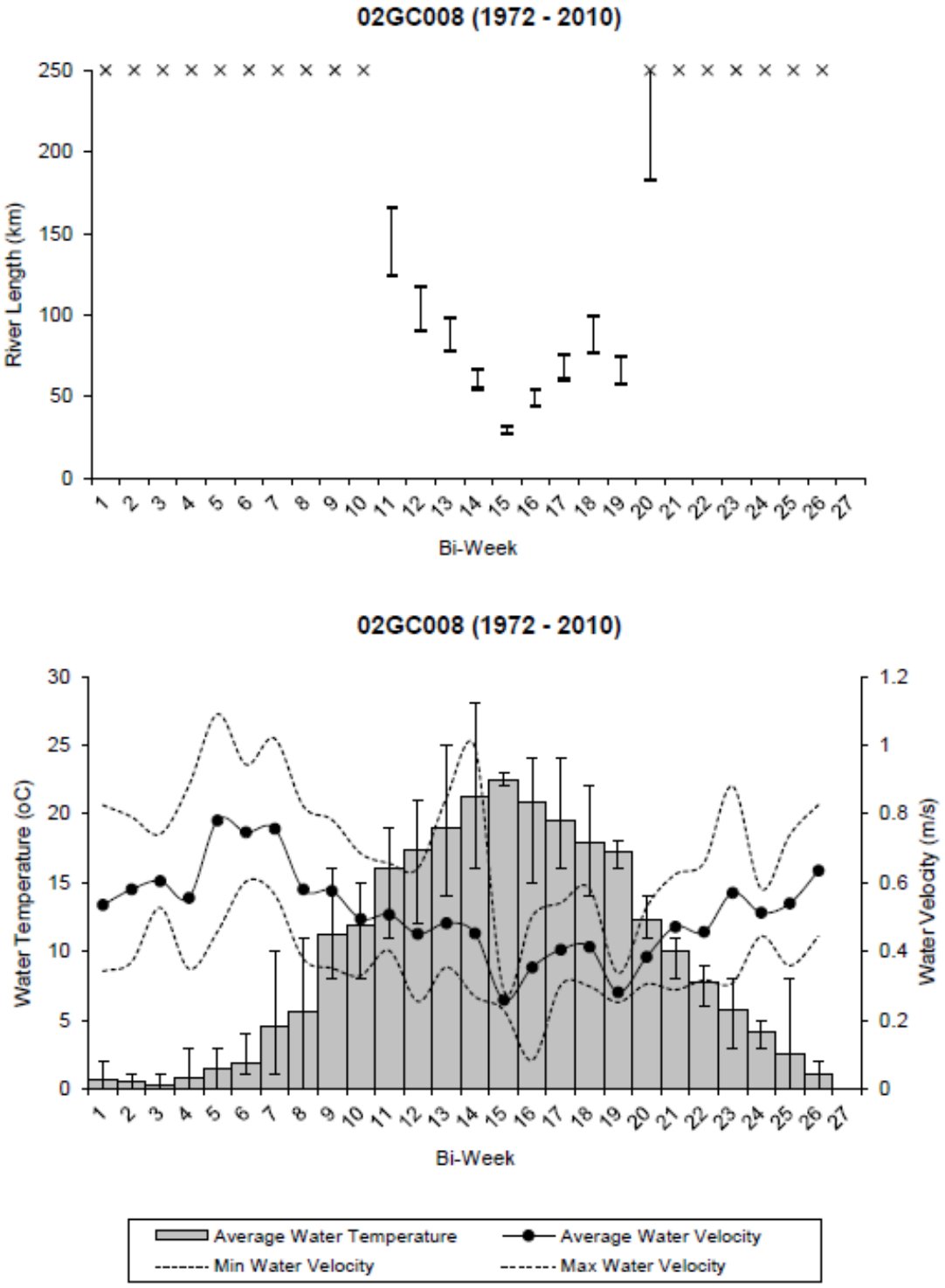


*Figure A1-110. Gauging station 02GC008 data from 1972–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

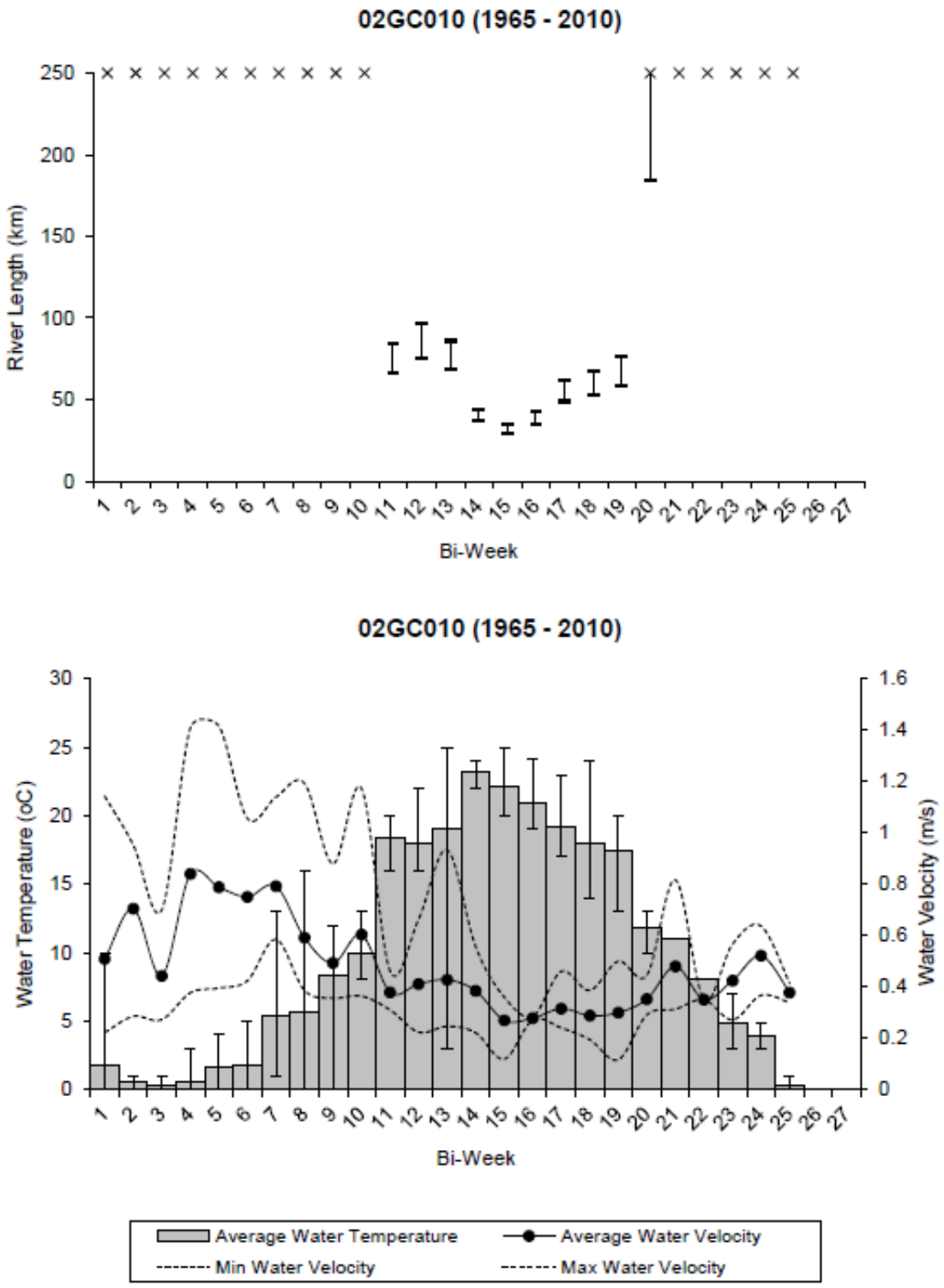


*Figure A1-111. Gauging station 02GC010 data from 1965–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

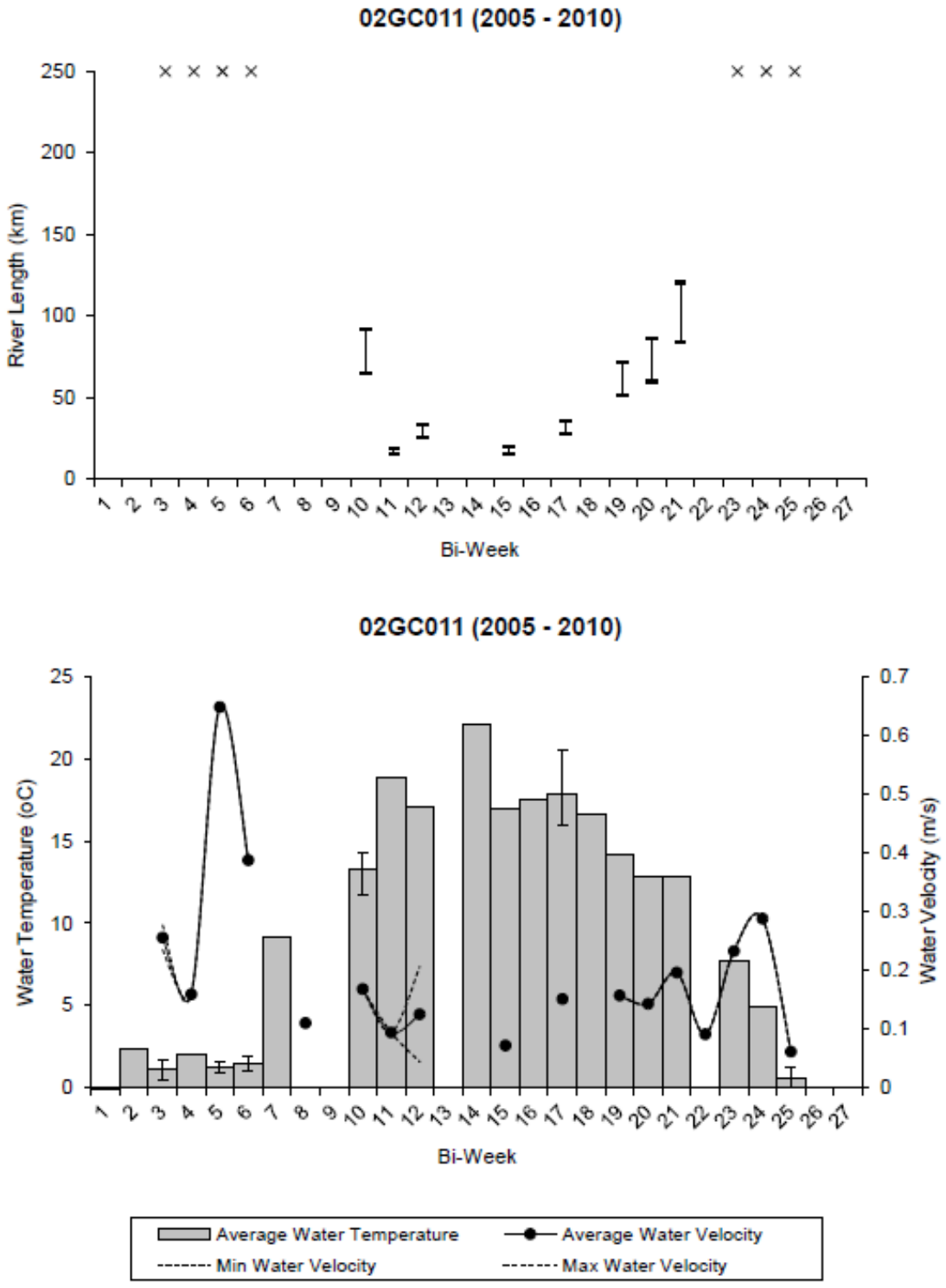


*Figure A1-112. Gauging station 02GC011 data from 2005–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

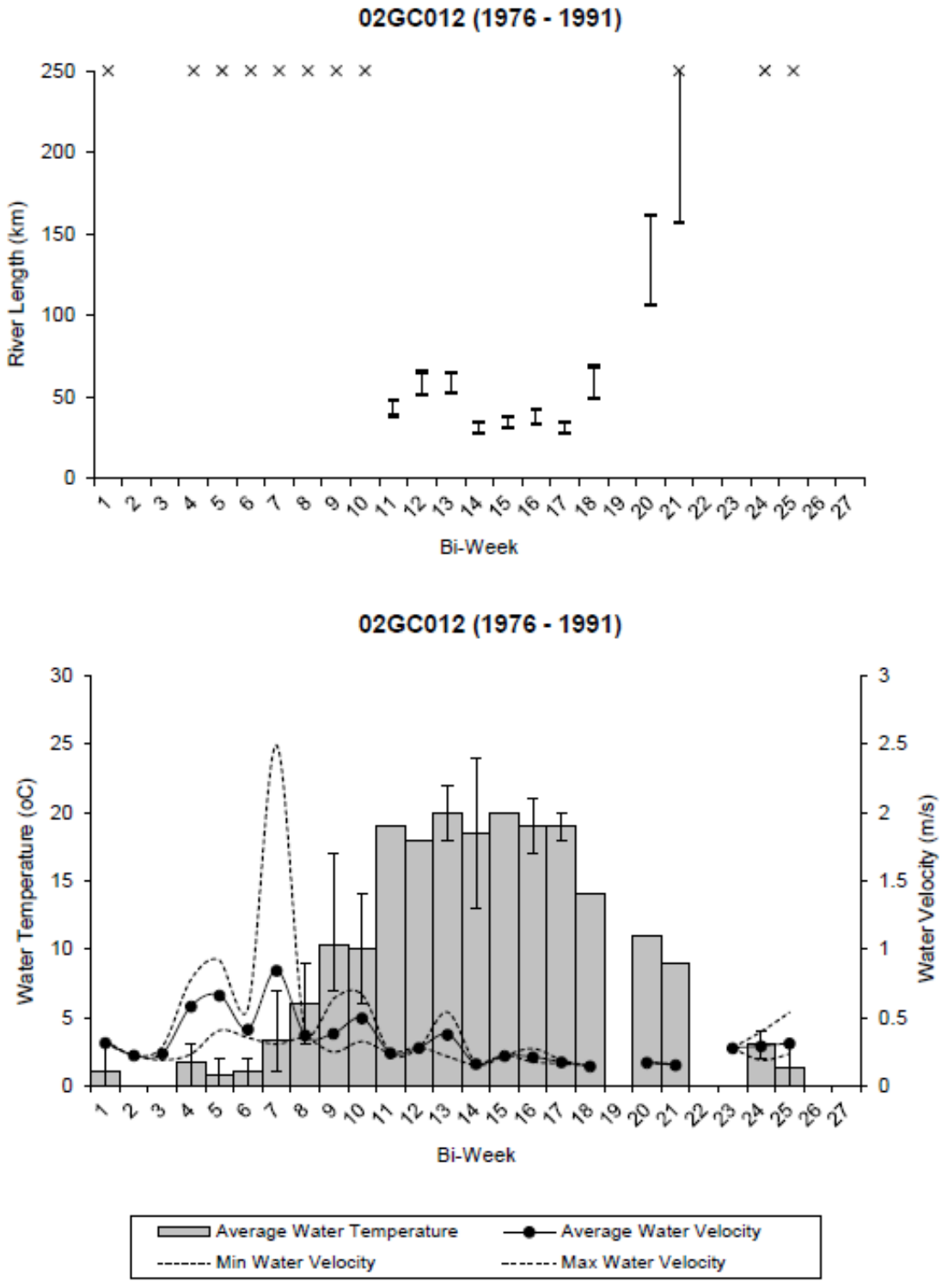


*Figure A1-113. Gauging station 02GC012 data from 1976–1991. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

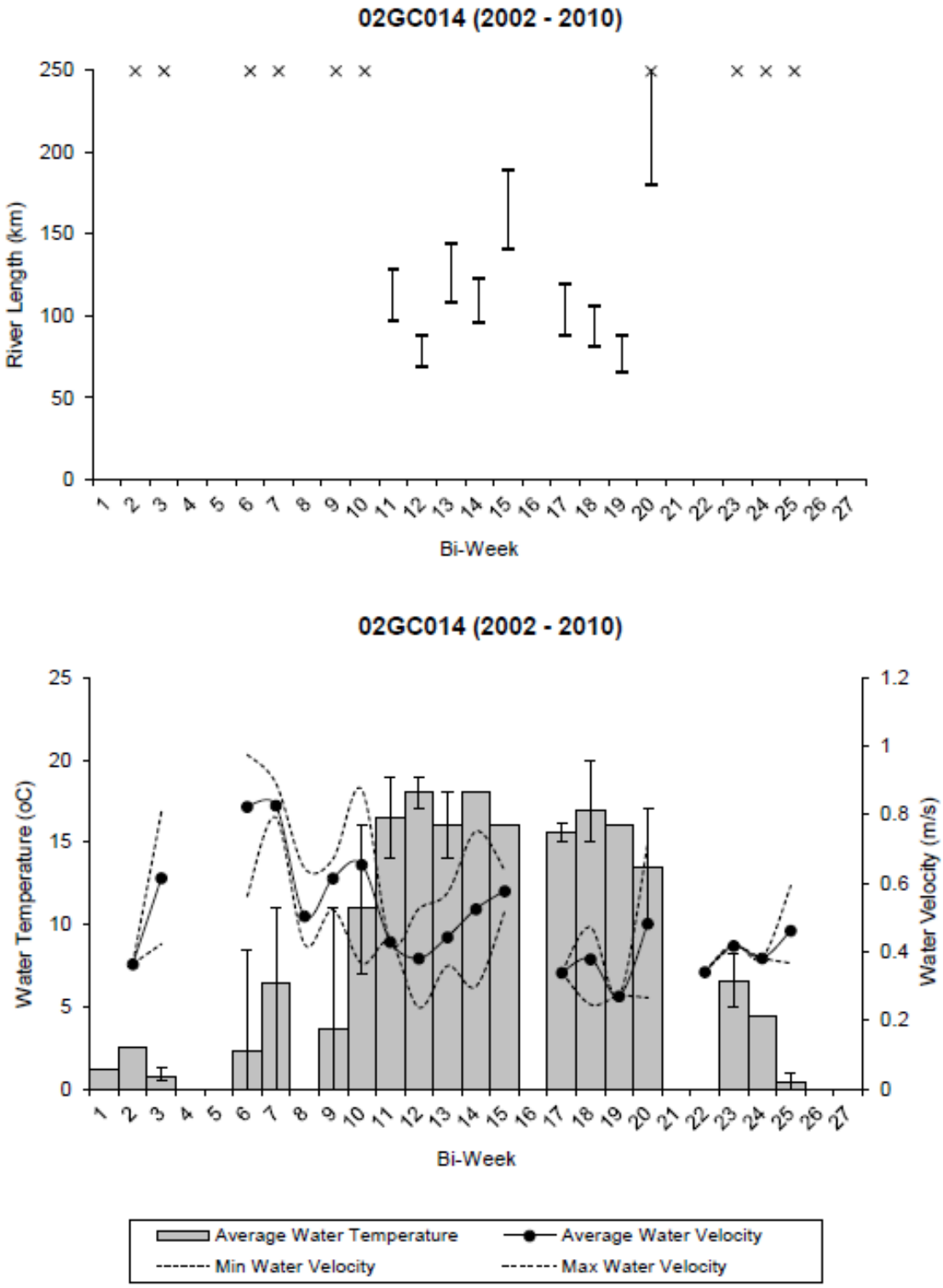


*Figure A1-114. Gauging station 02GC014 data from 2002–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

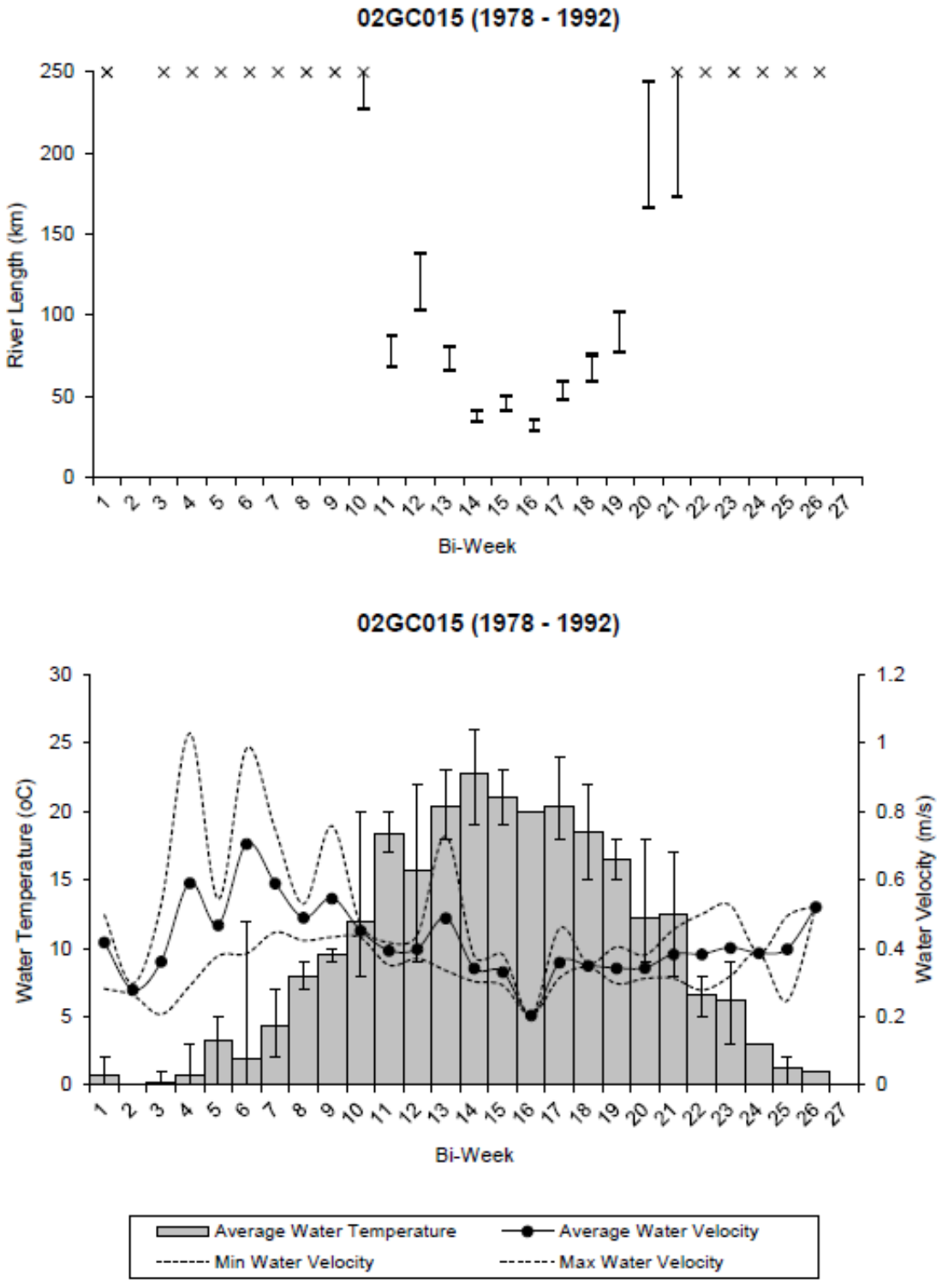


*Figure A1-115. Gauging station 02GC015 data from 1978–1992. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

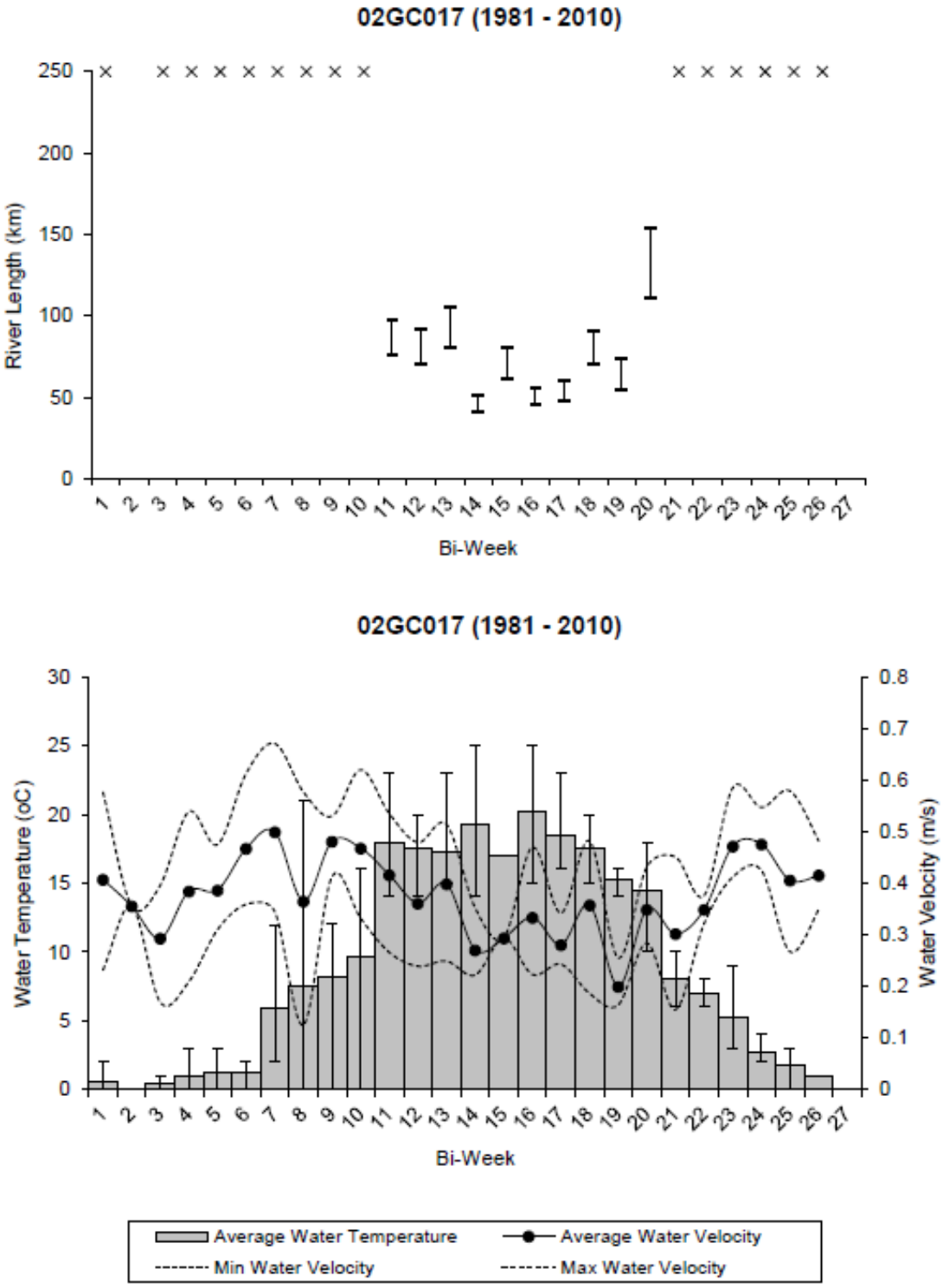


*Figure A1-116. Gauging station 02GC017 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

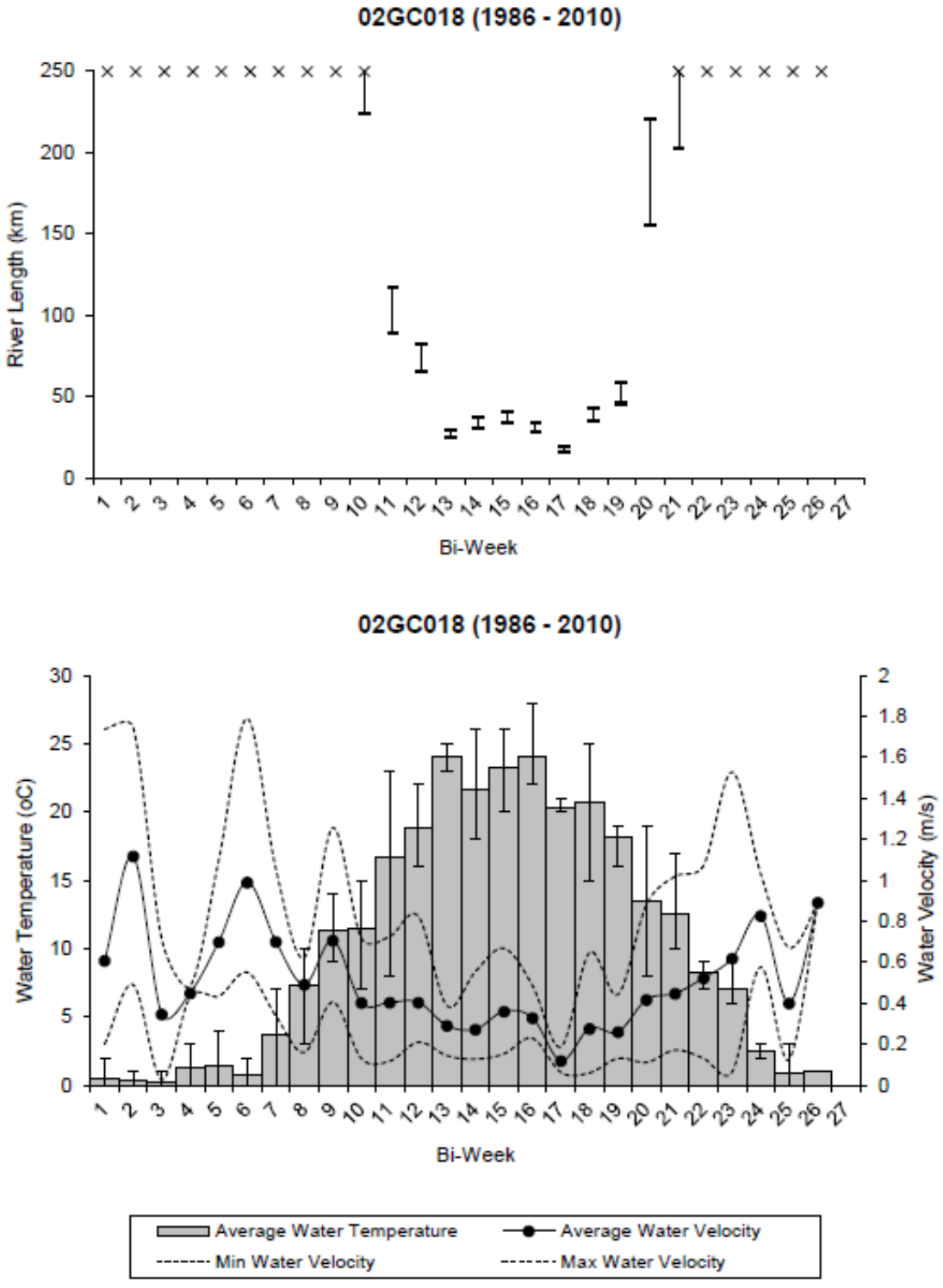


*Figure A1-117. Gauging station 02GC018 data from 1986–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

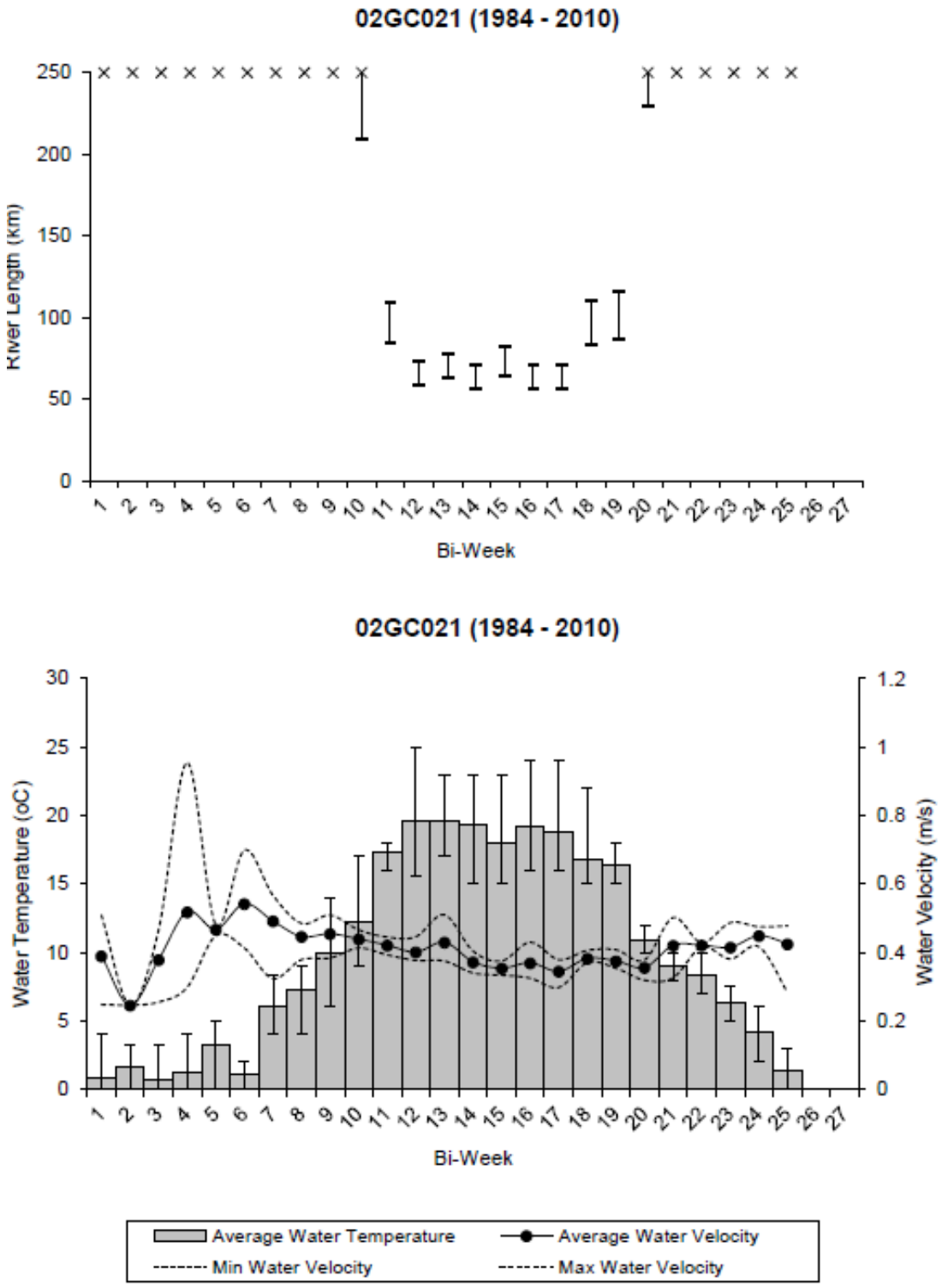


*Figure A1-118. Gauging station 02GC021 data from 1984–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

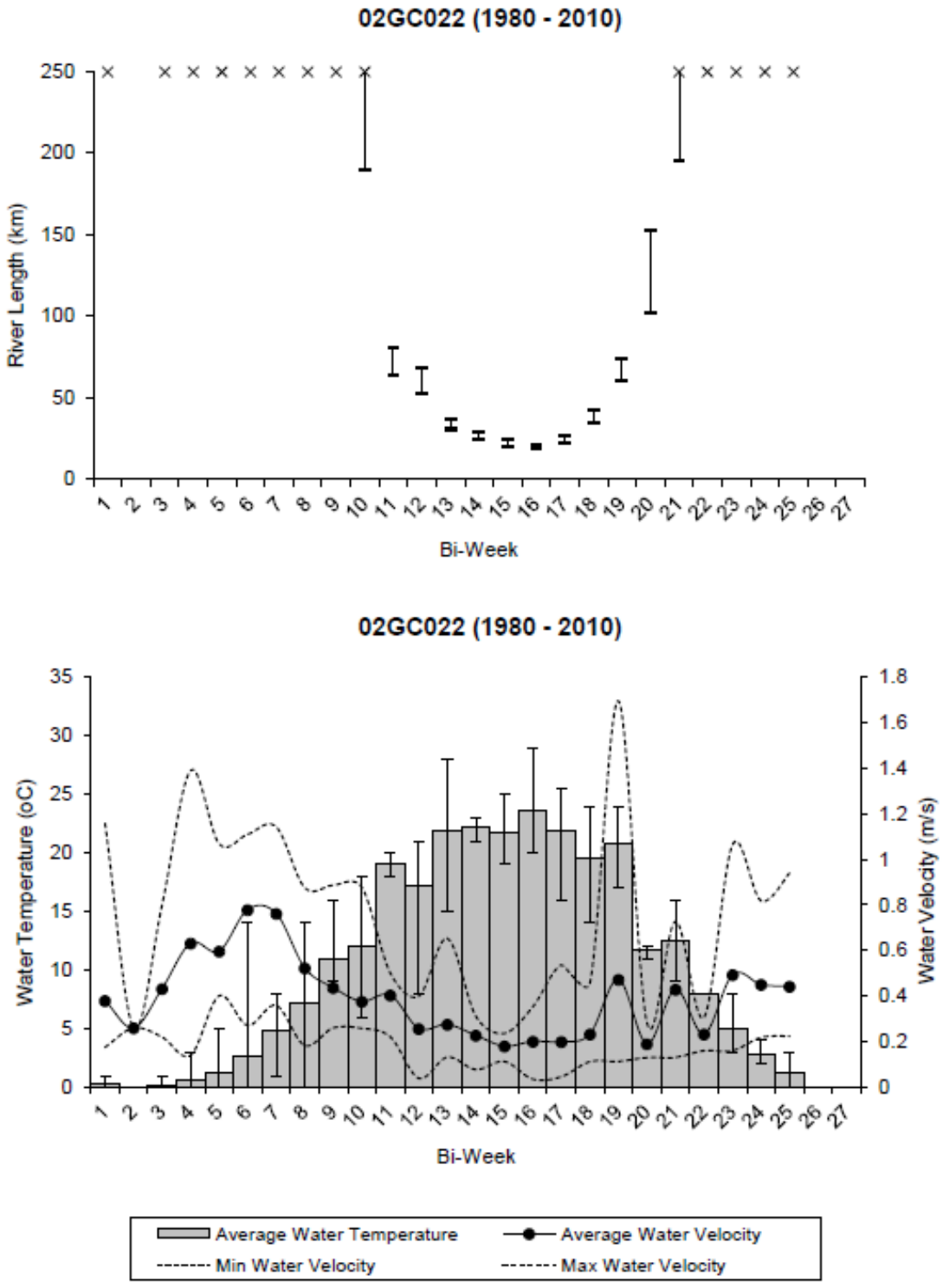


*Figure A1-119. Gauging station 02GC022 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

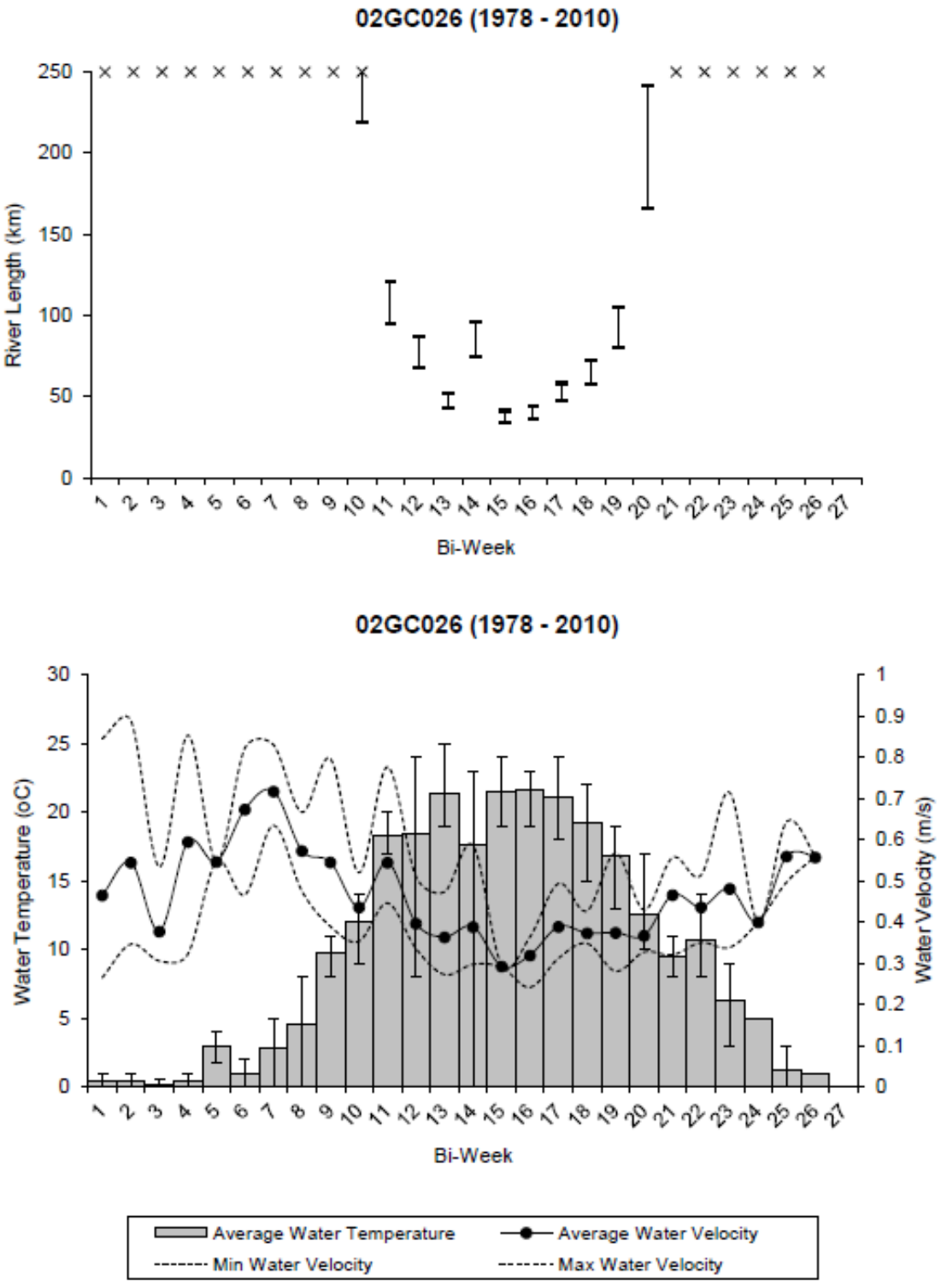


*Figure A1-120. Gauging station 02GC026 data from 1978–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

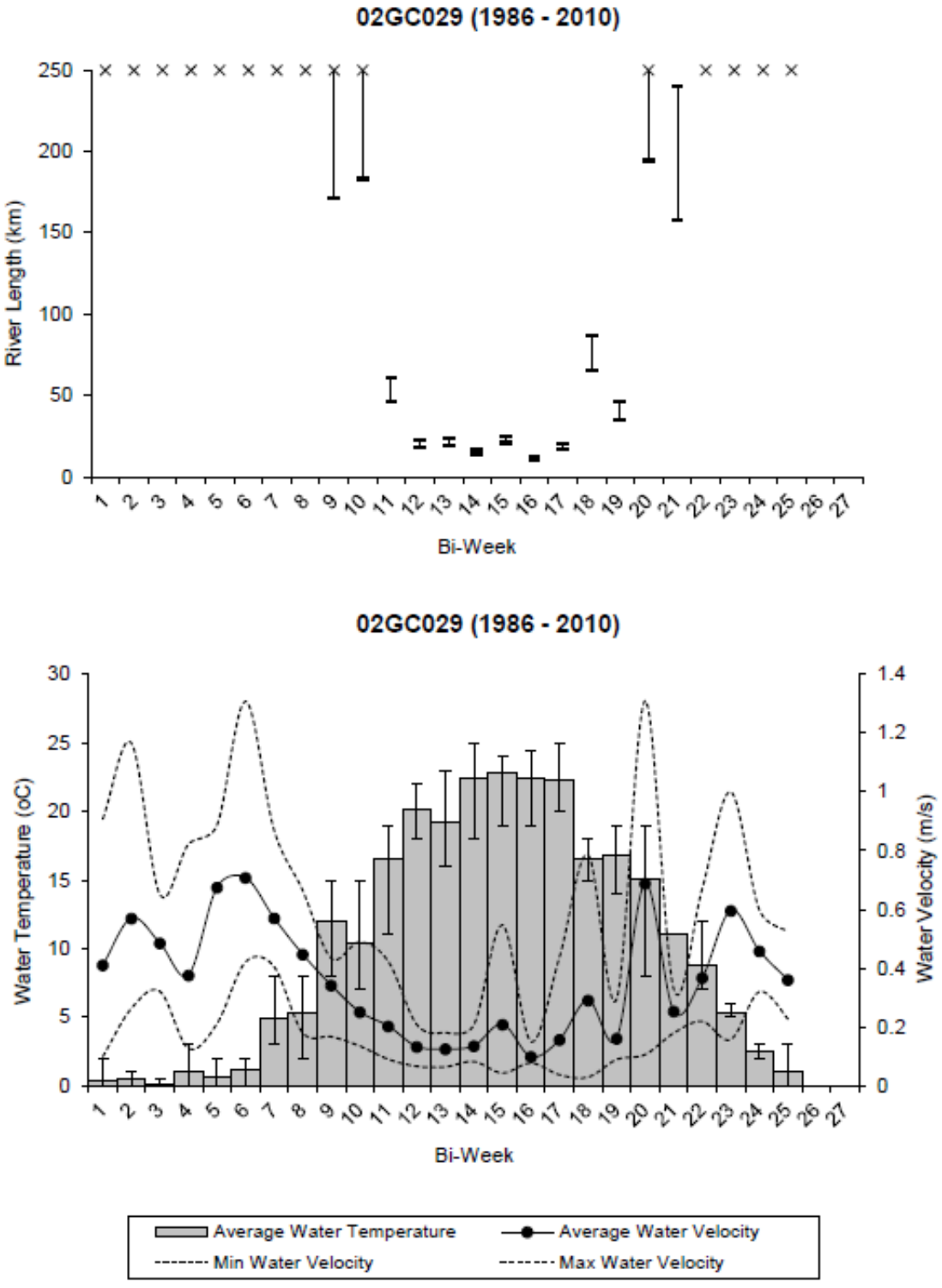


*Figure A1-121. Gauging station 02GC029 data from 1986–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

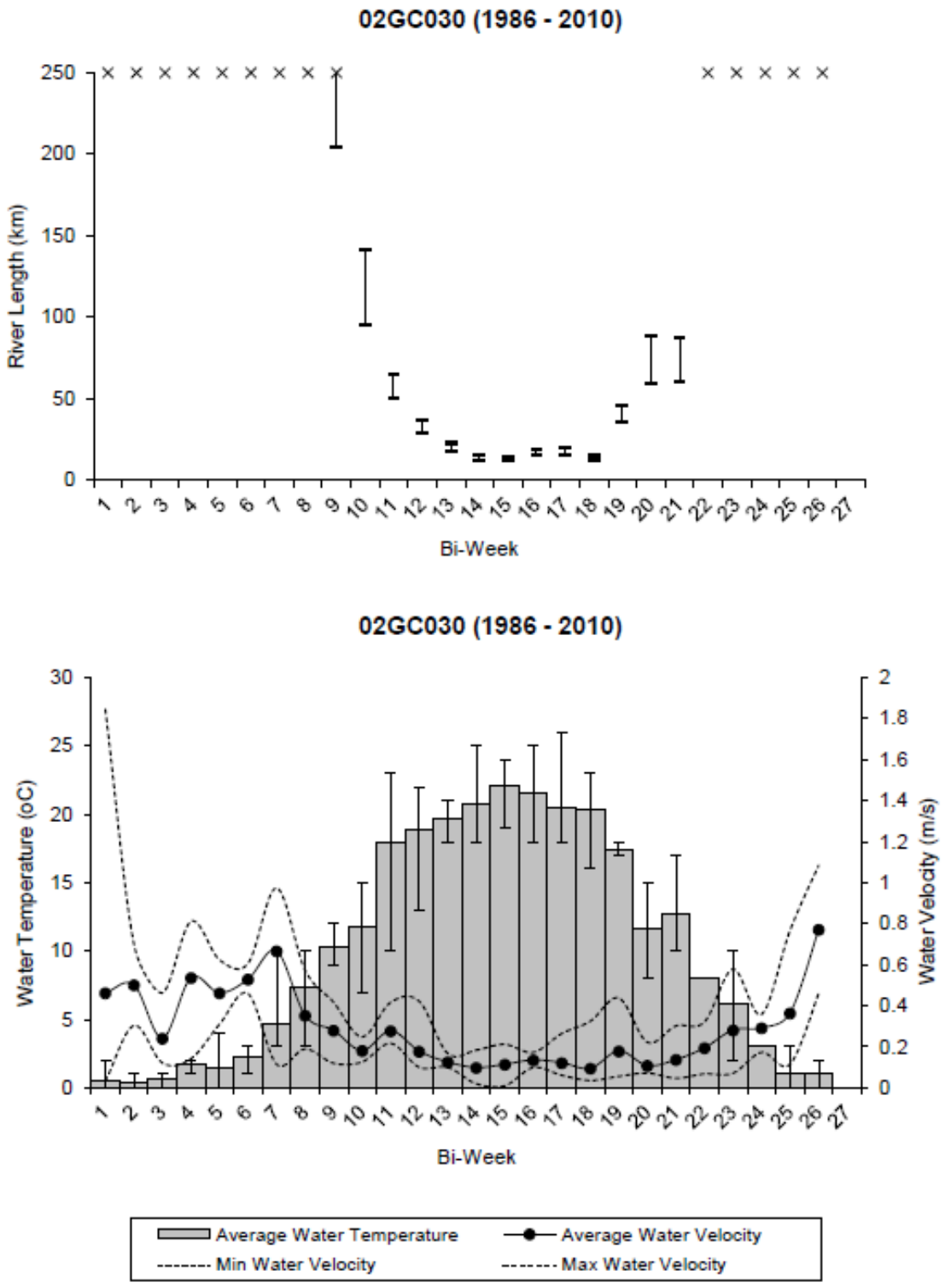


*Figure A1-122. Gauging station 02GC030 data from 1986–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

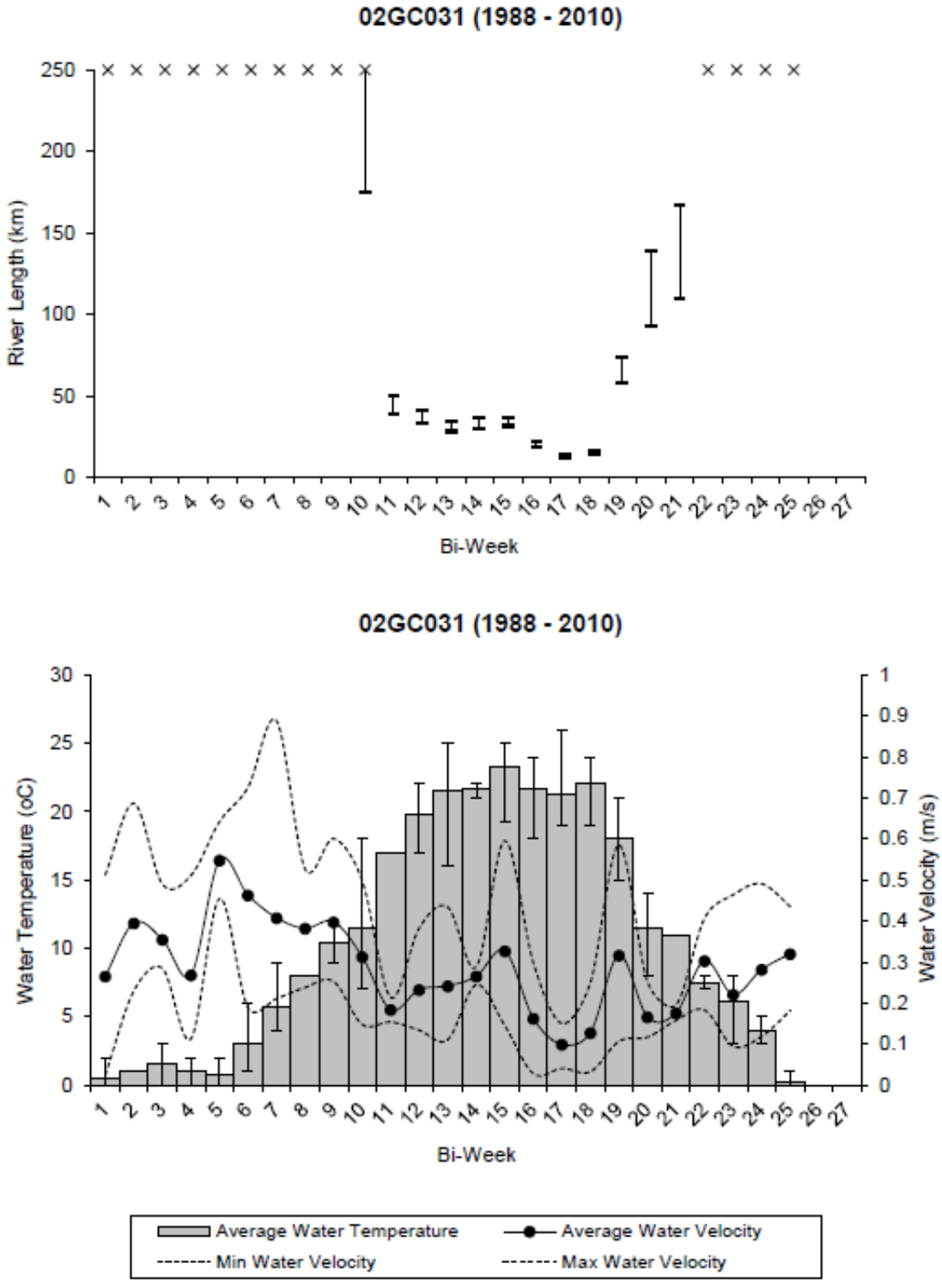


*Figure A1-123. Gauging station 02GC031 data from 1988–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

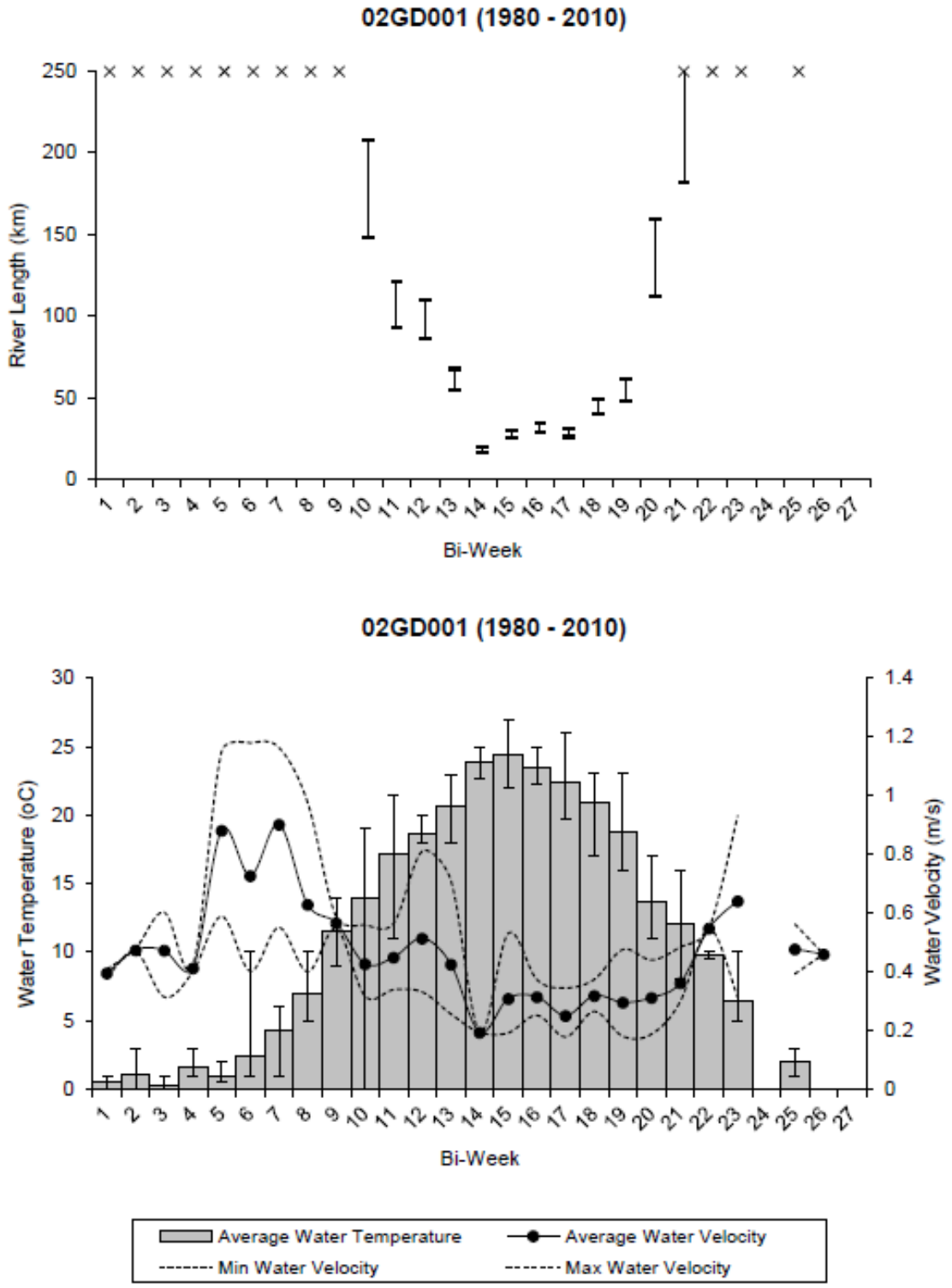


*Figure A1-124. Gauging station 02GD001 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

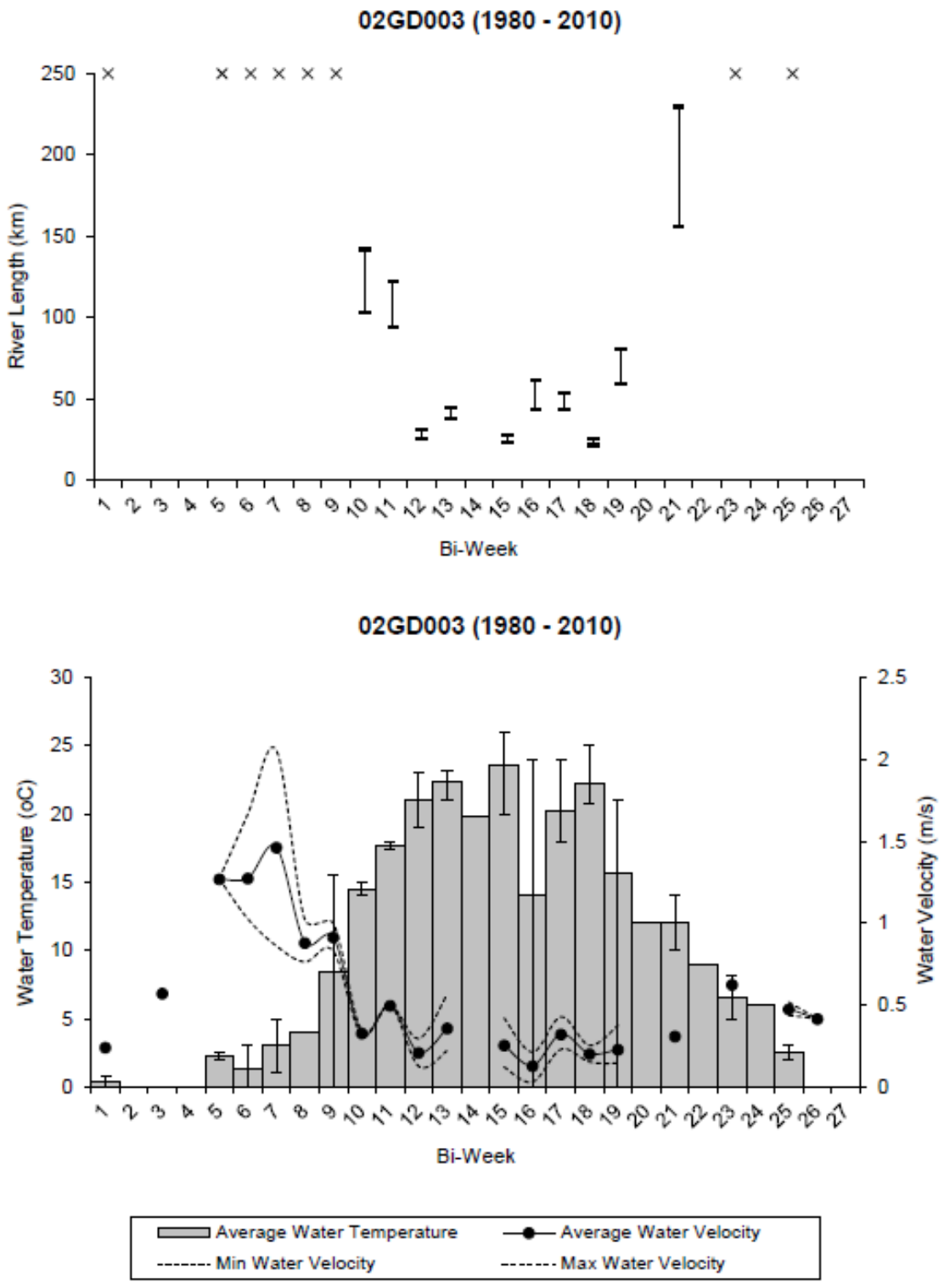


*Figure A1-125. Gauging station 02GD003 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

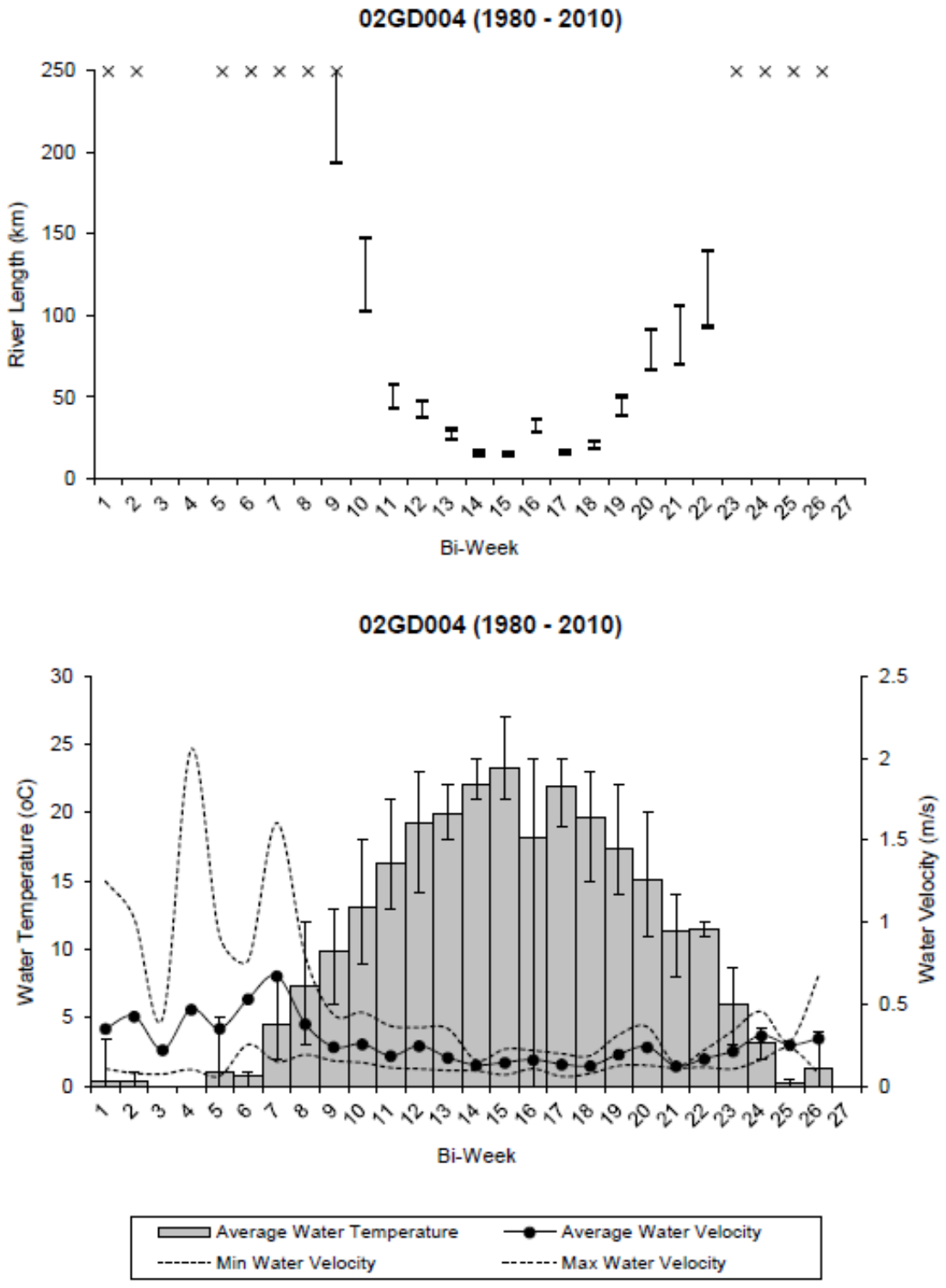


*Figure A1-126. Gauging station 02GD004 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

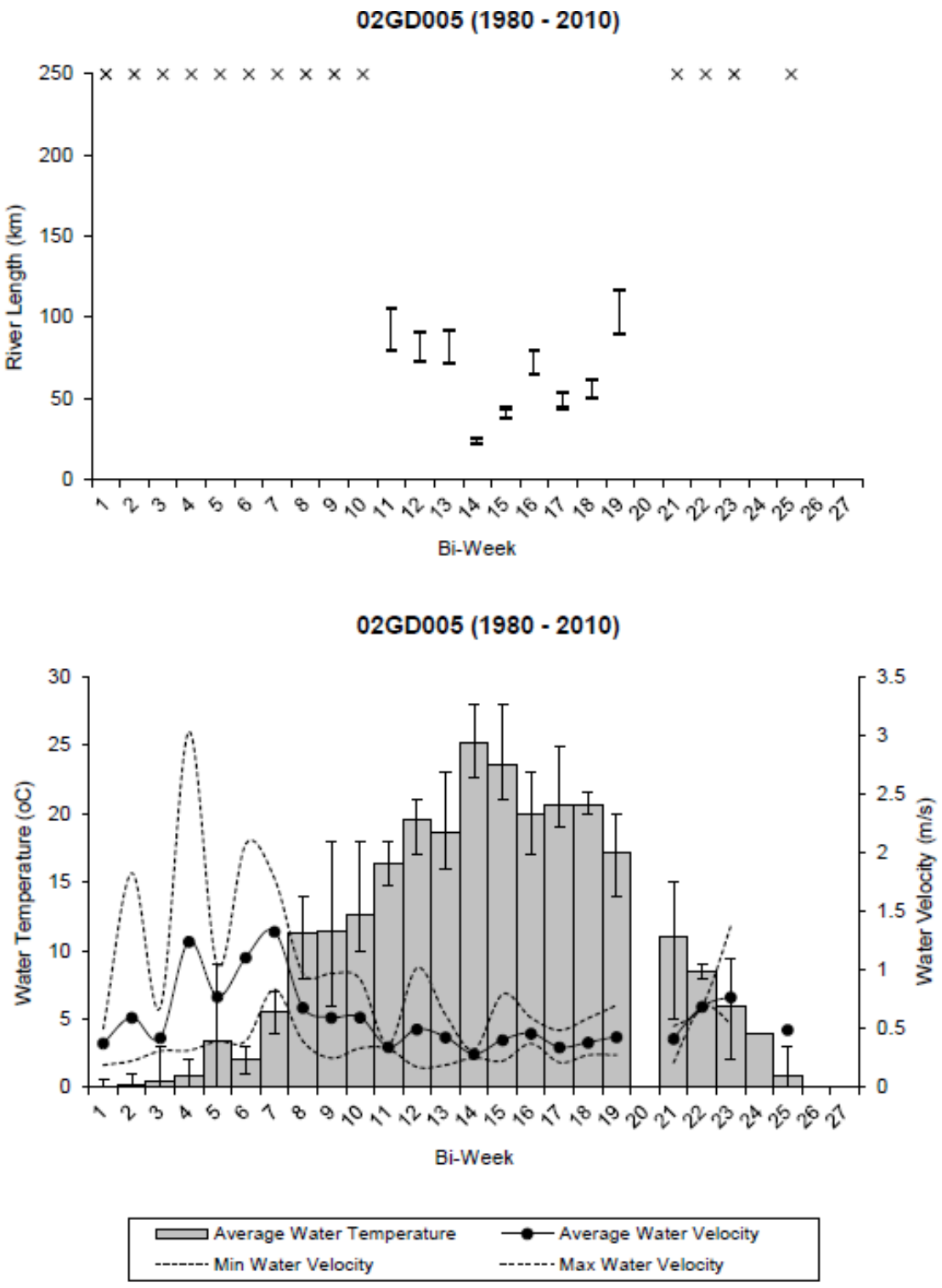


*Figure A1-127. Gauging station 02GD005 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

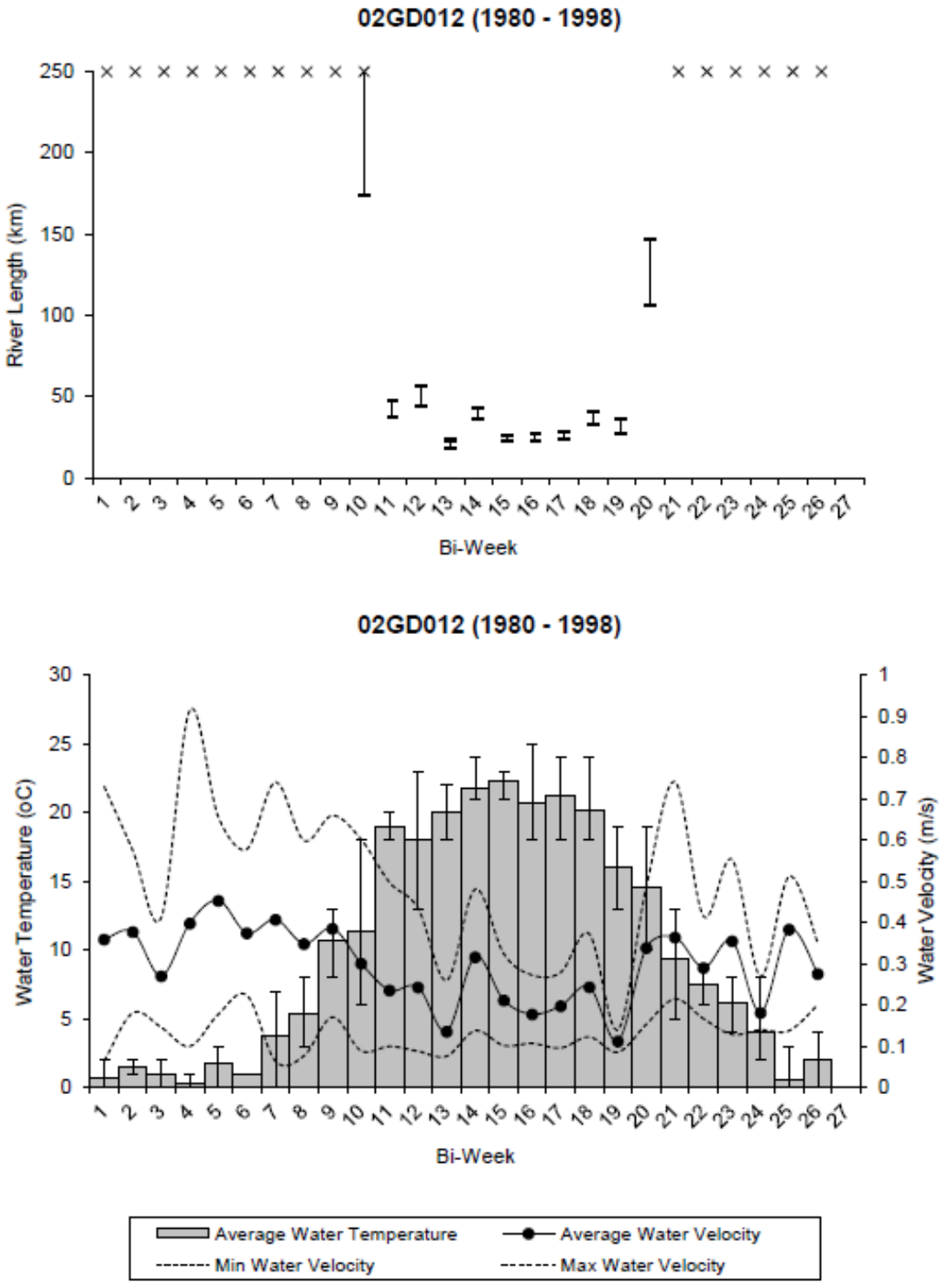


*Figure A1-128. Gauging station 02GD012 data from 1980–1998. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

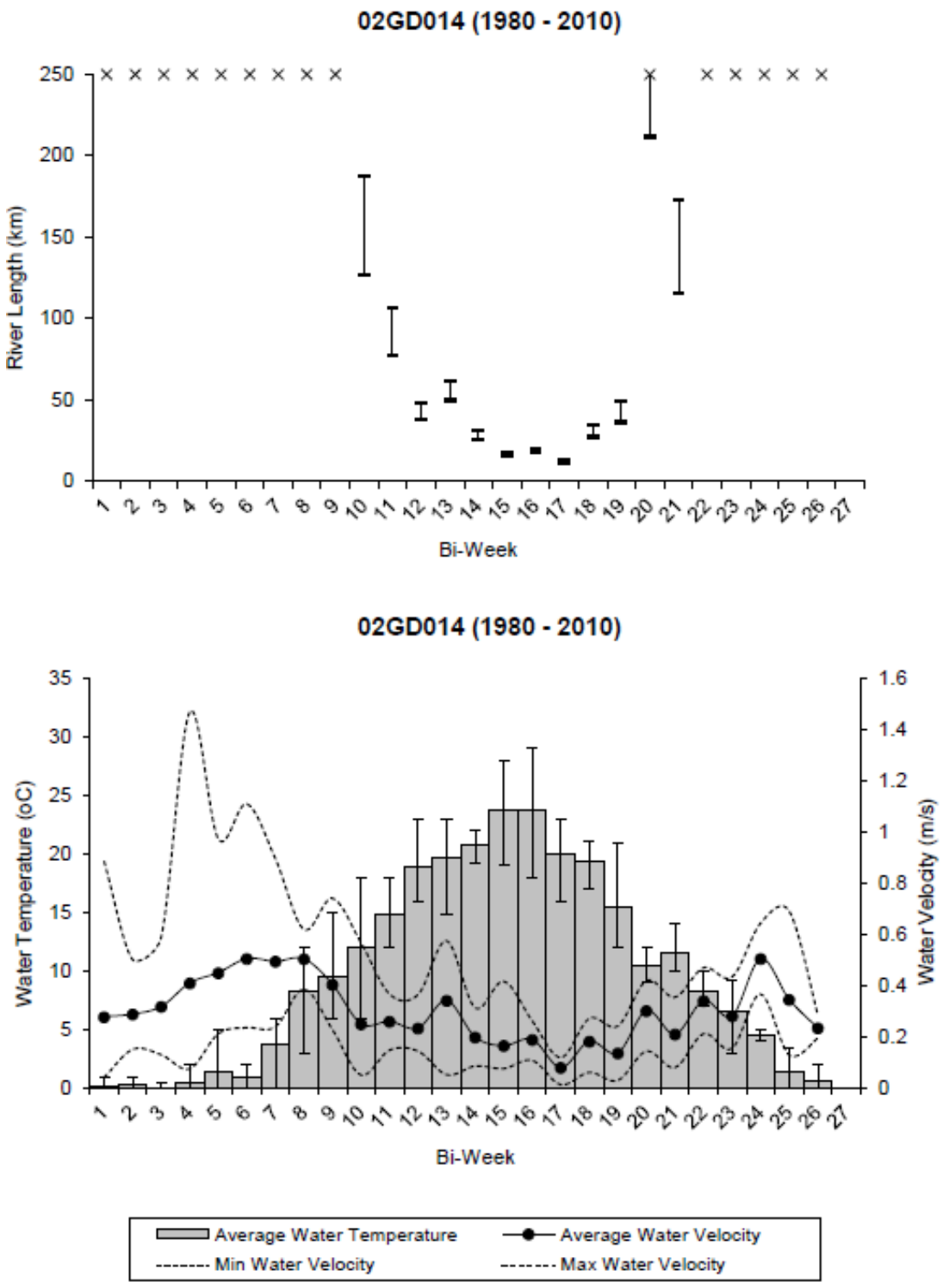


*Figure A1-129. Gauging station 02GD014 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

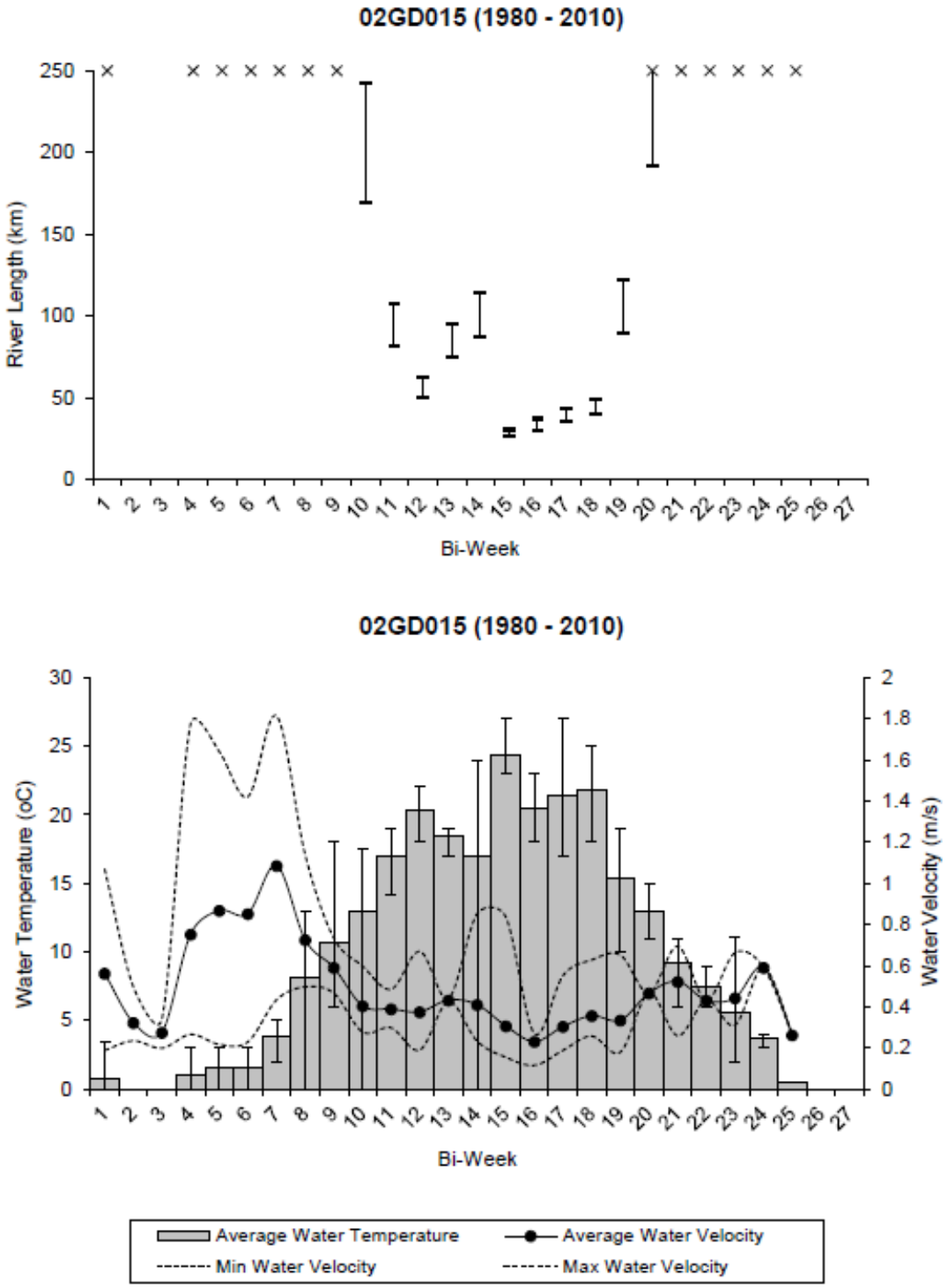


*Figure A1-130. Gauging station 02GD015 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

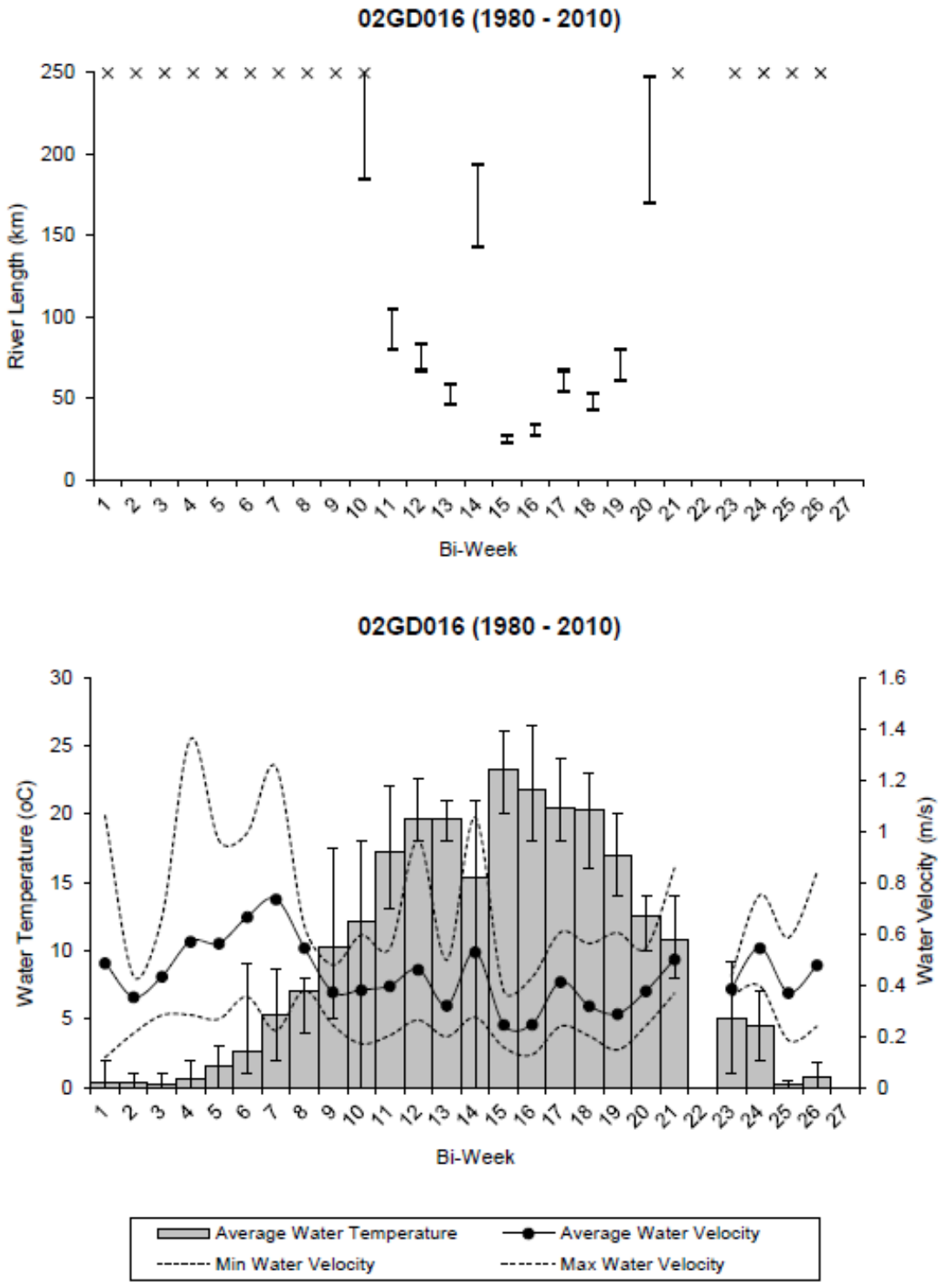


*Figure A1-131. Gauging station 02GD016 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

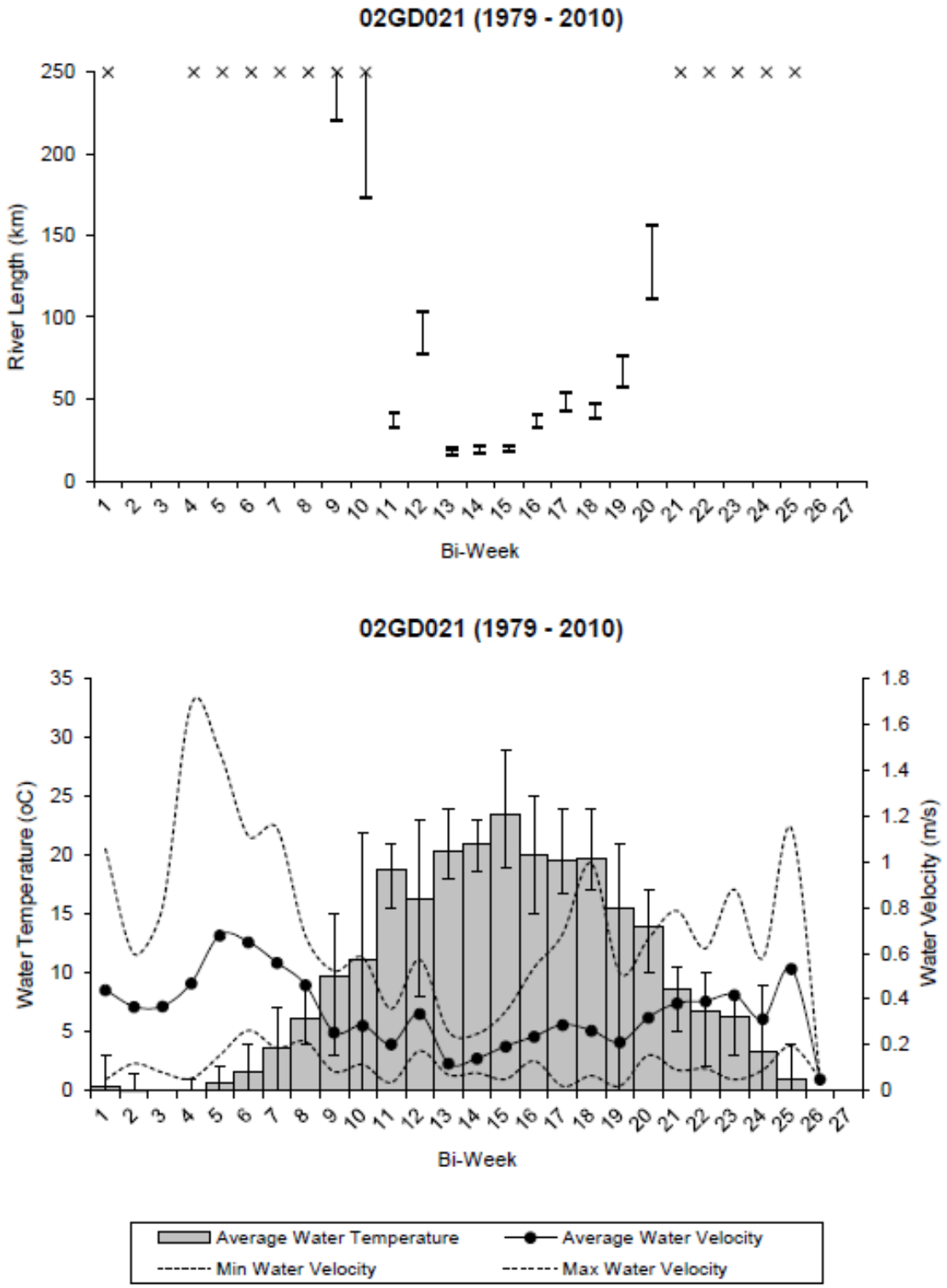


*Figure A1-132. Gauging station 02GD021 data from 1979–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

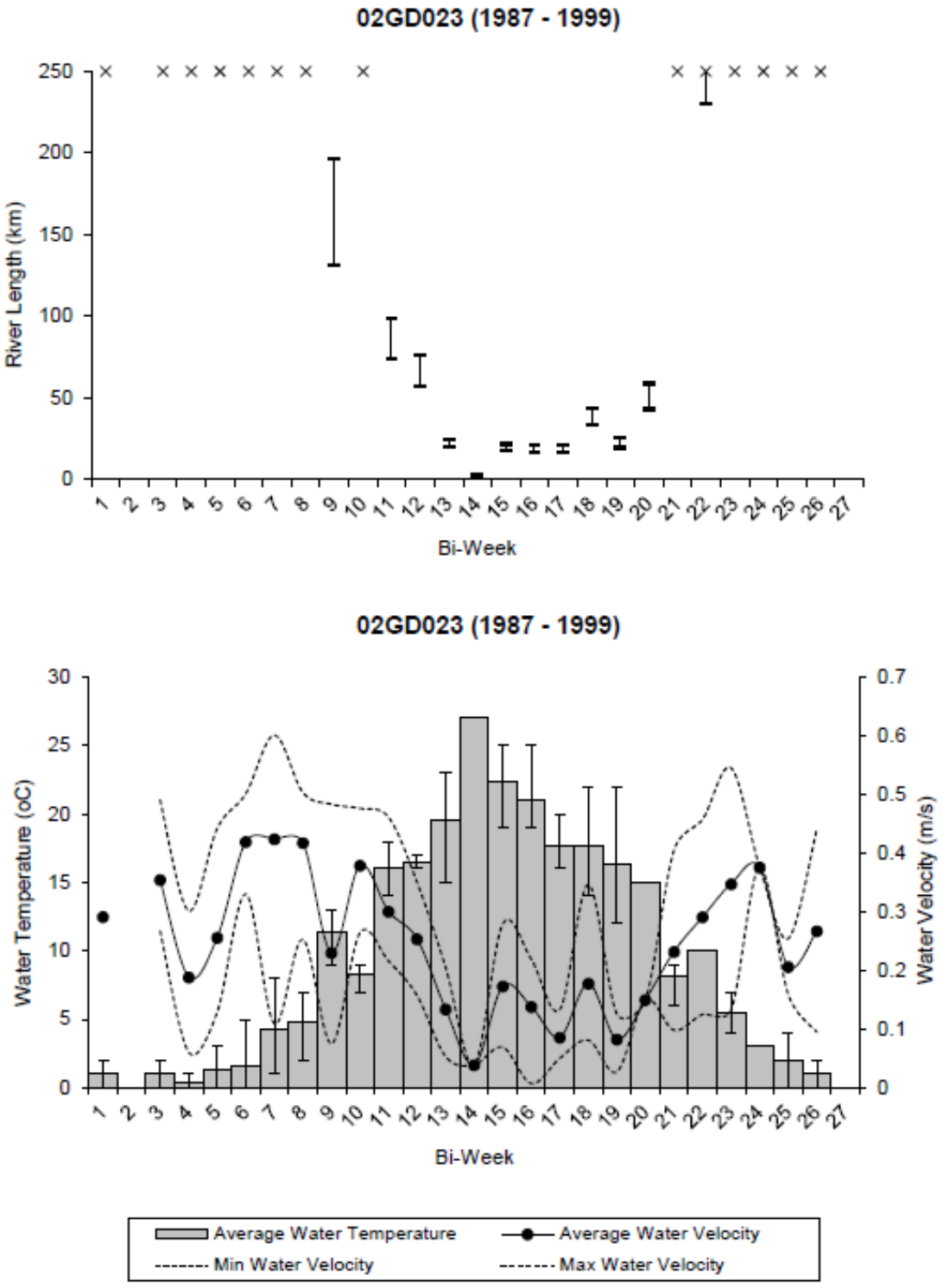


*Figure A1-133. Gauging station 02GD023 data from 1987–1999. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

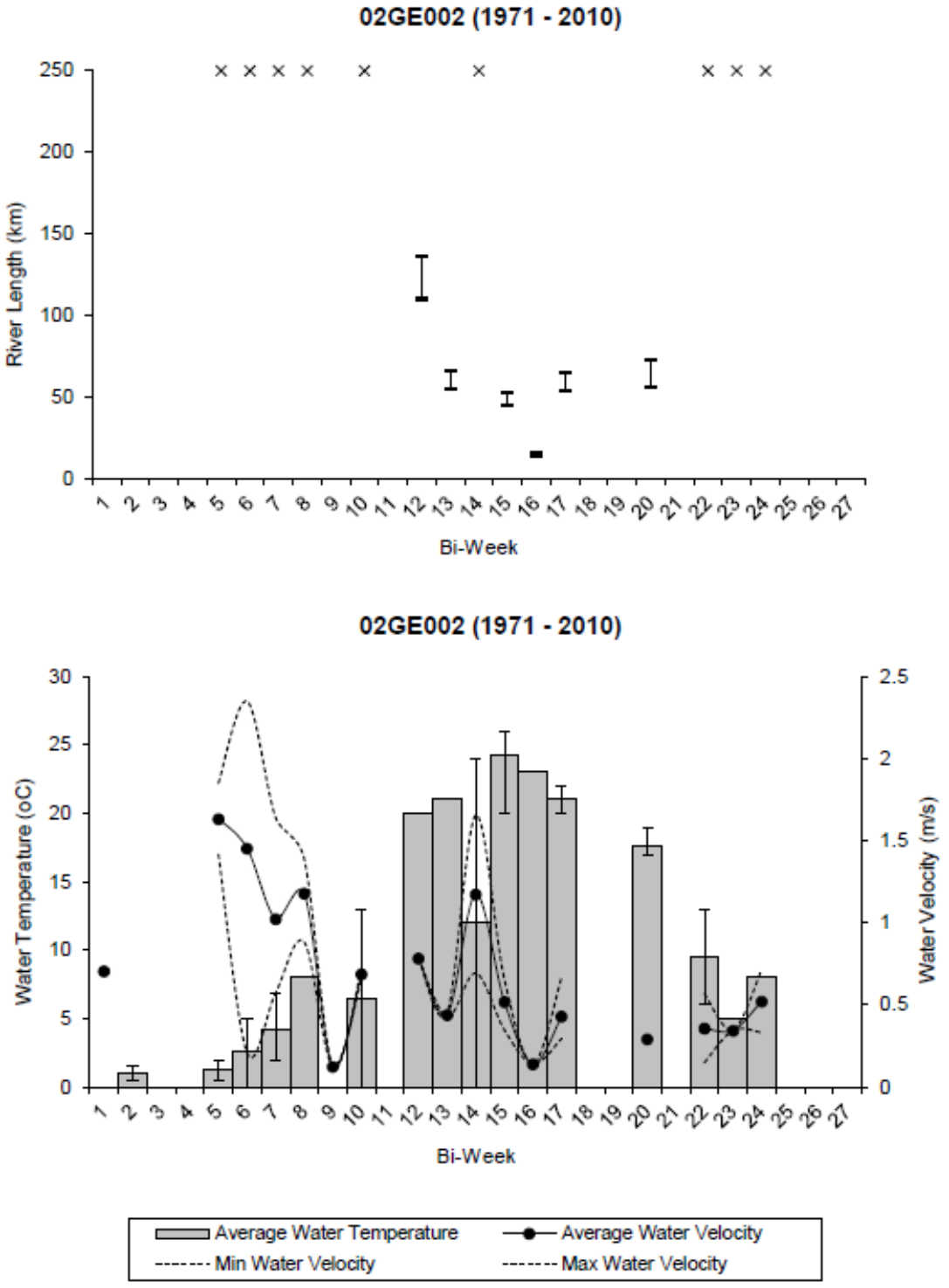


*Figure A1-134. Gauging station 02GE002 data from 1971–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

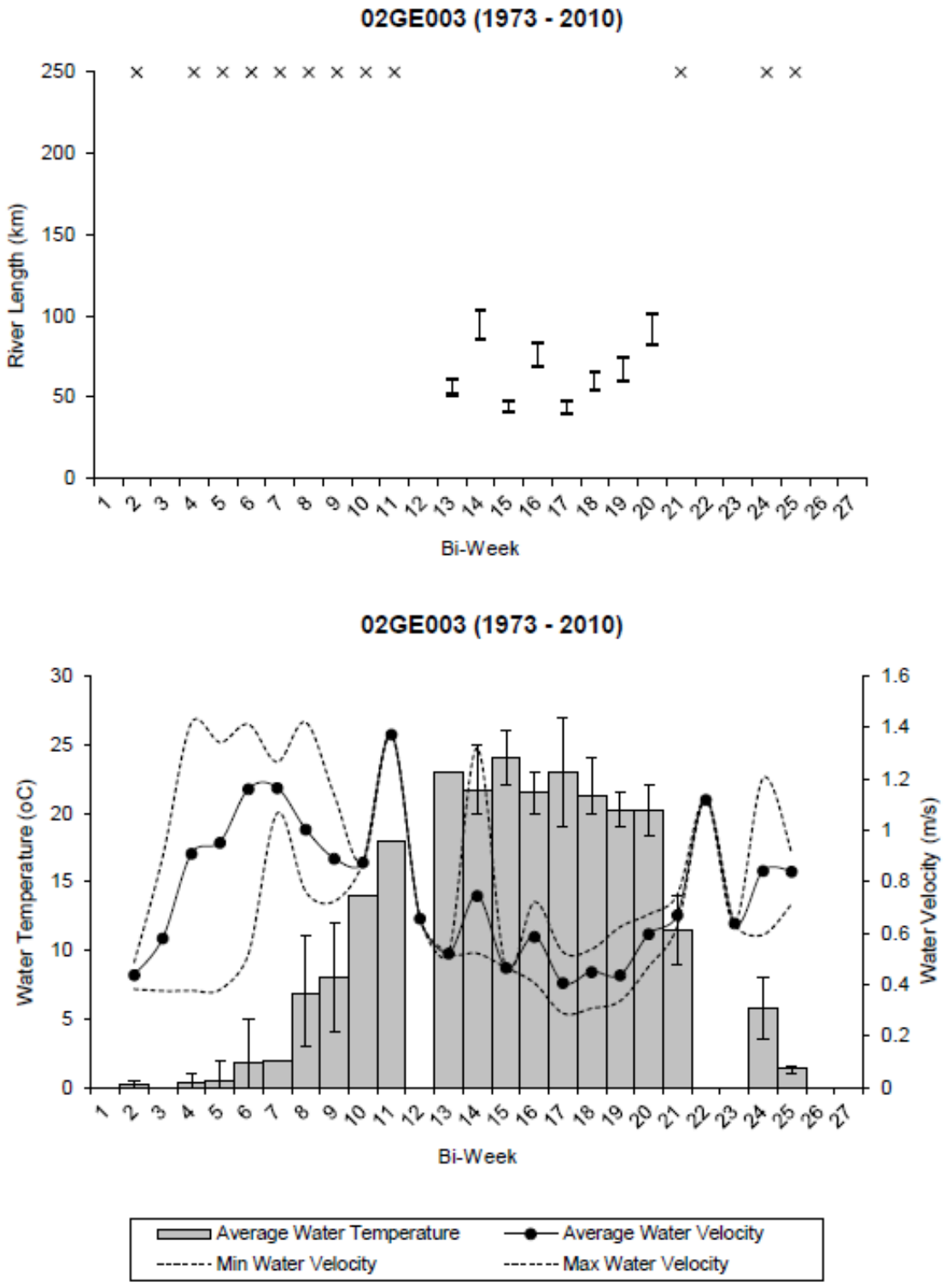


*Figure A1-135. Gauging station 02GE003 data from 1973–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

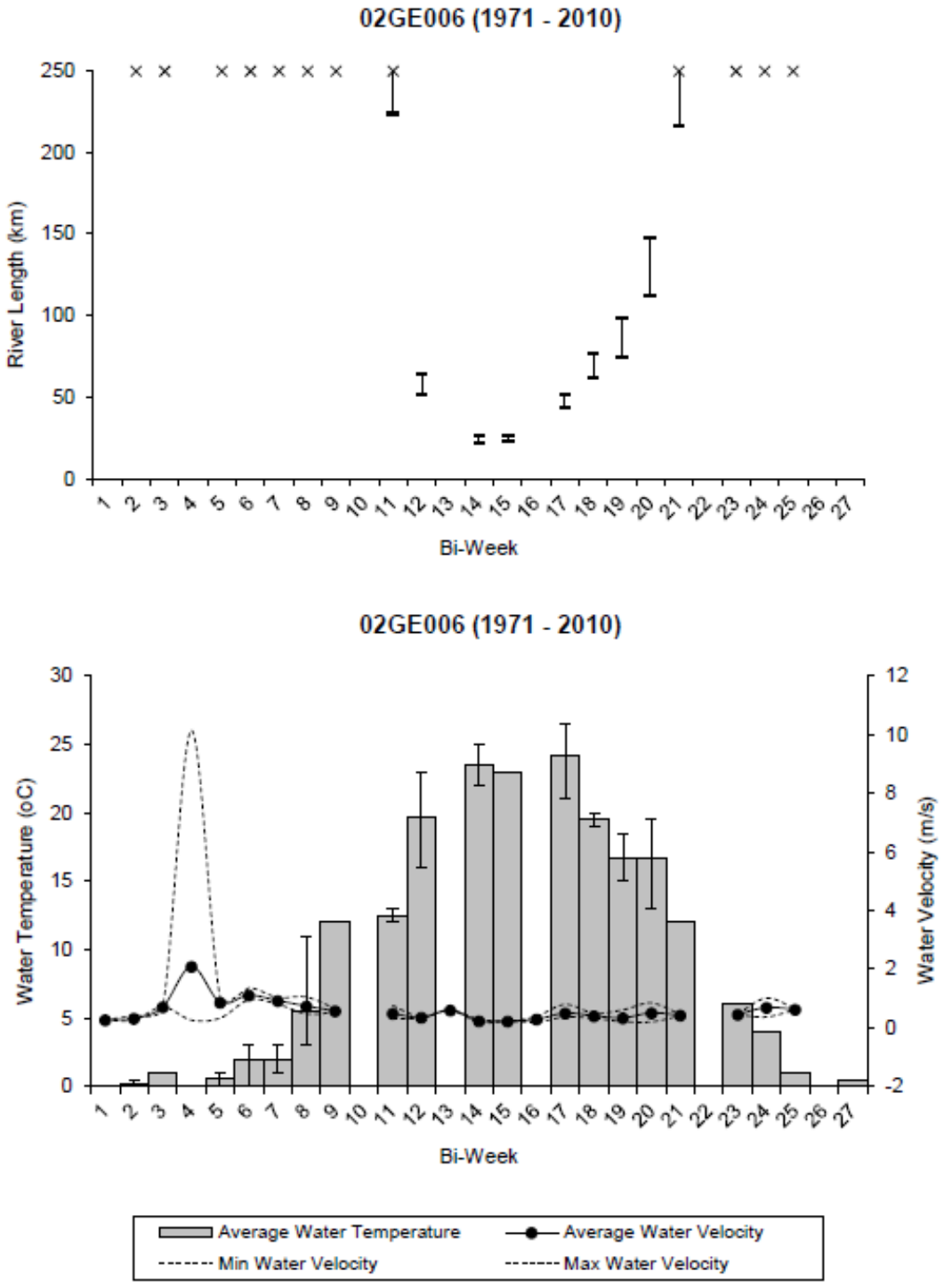


*Figure A1-136. Gauging station 02GE006 data from 1971–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

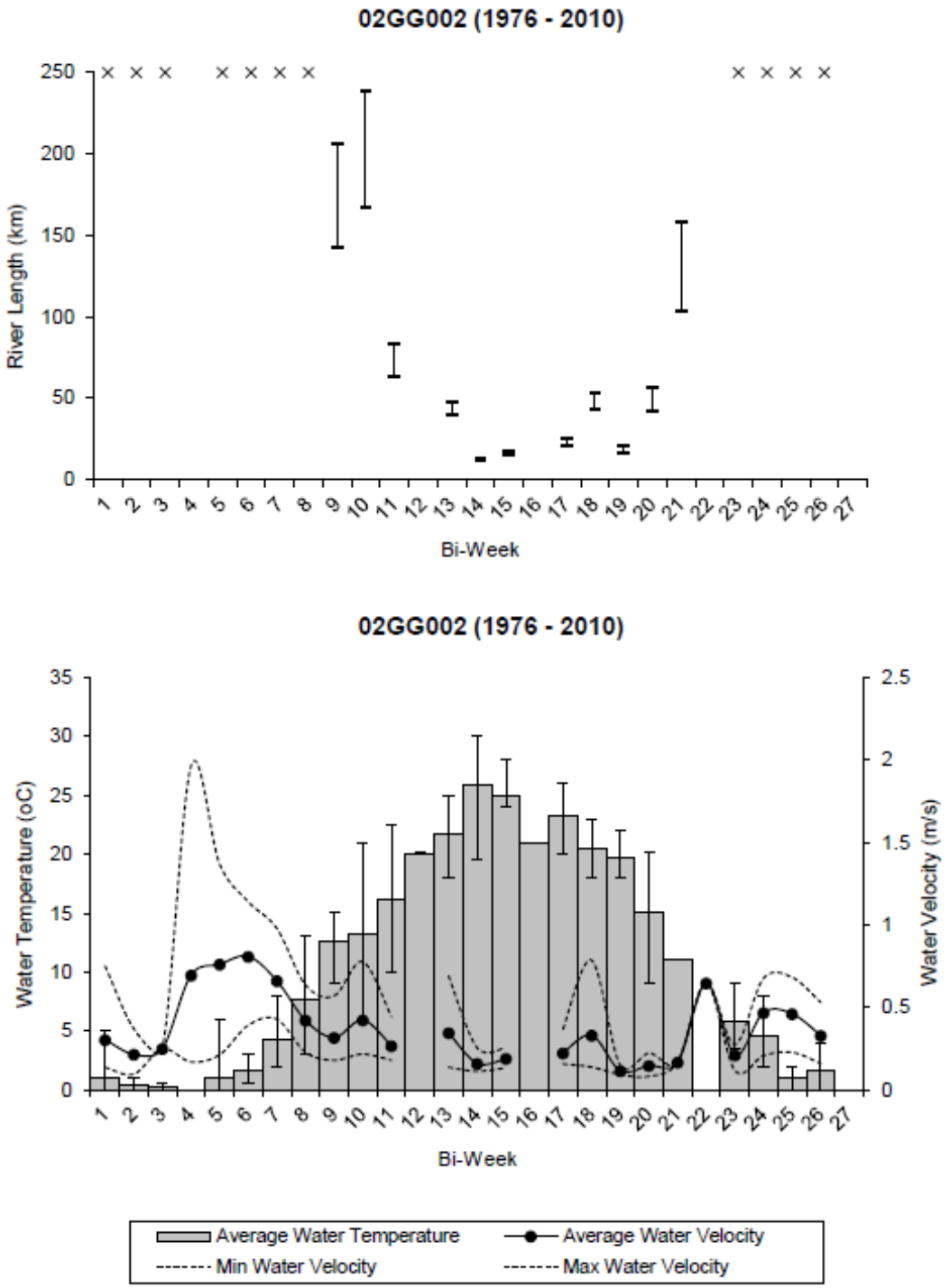


*Figure A1-137. Gauging station 02GG002 data from 1976–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

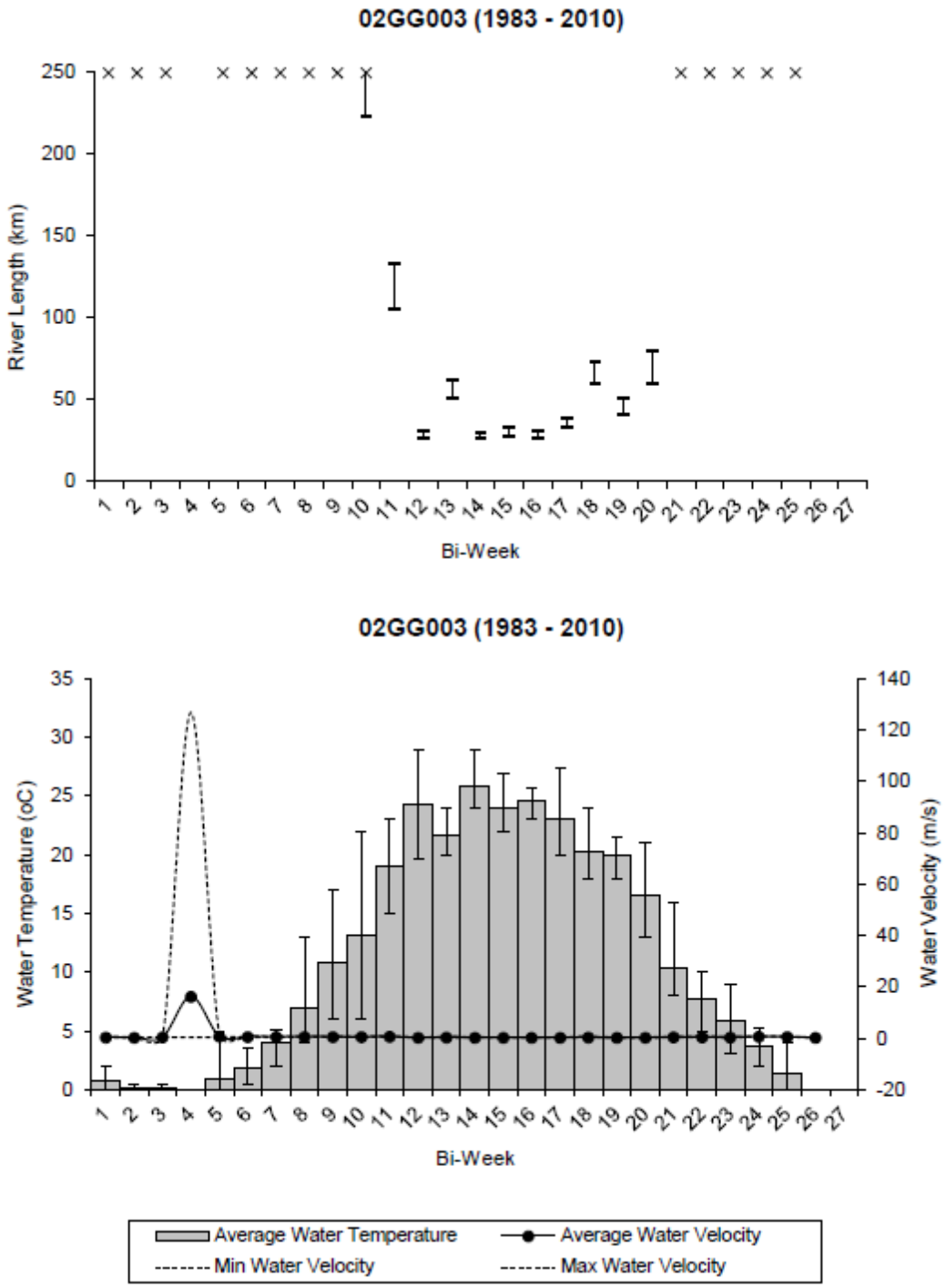


*Figure A1-138. Gauging station 02GG003 data from 1983–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

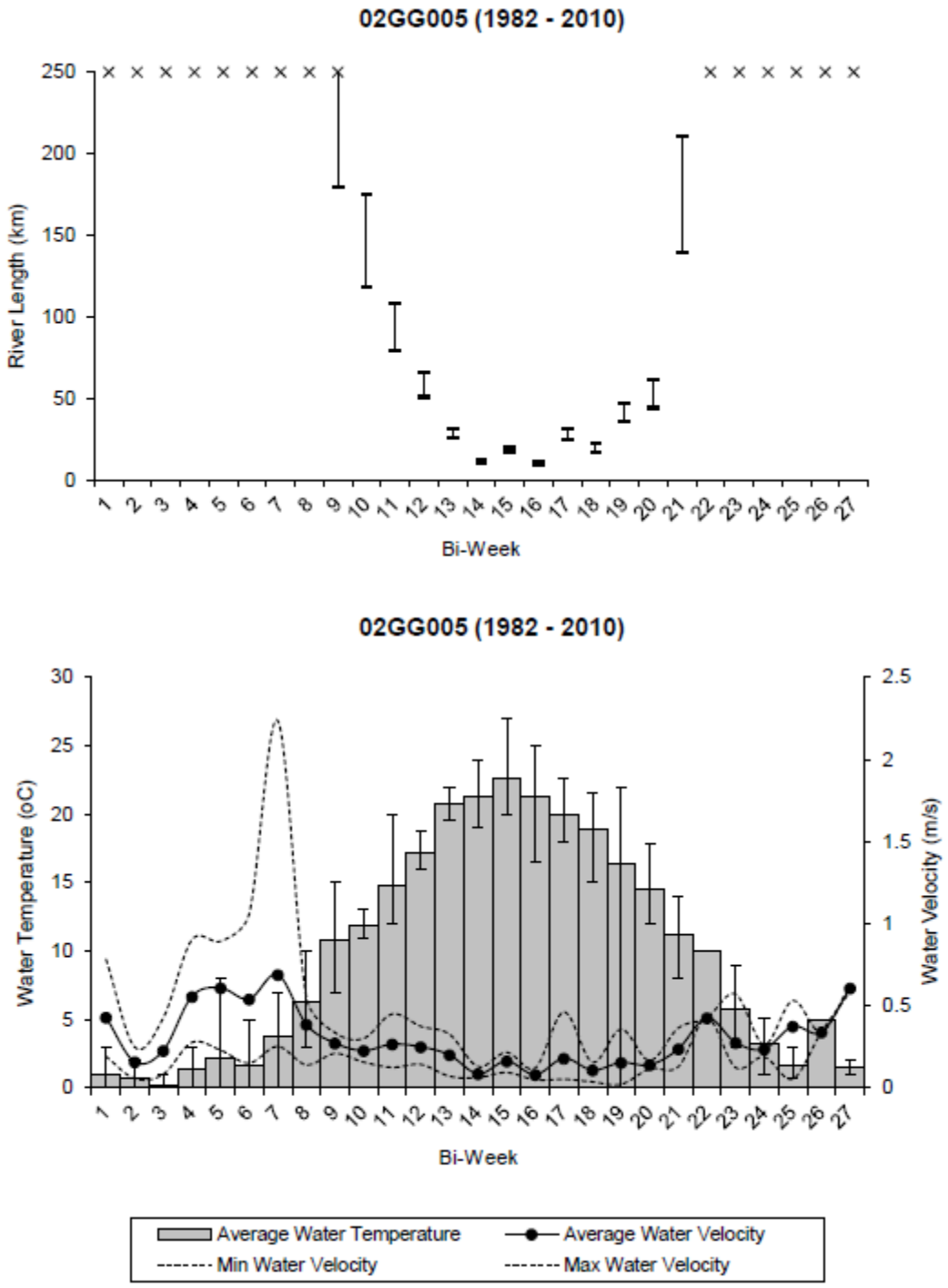


*Figure A1-139. Gauging station 02GG005 data from 1982–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

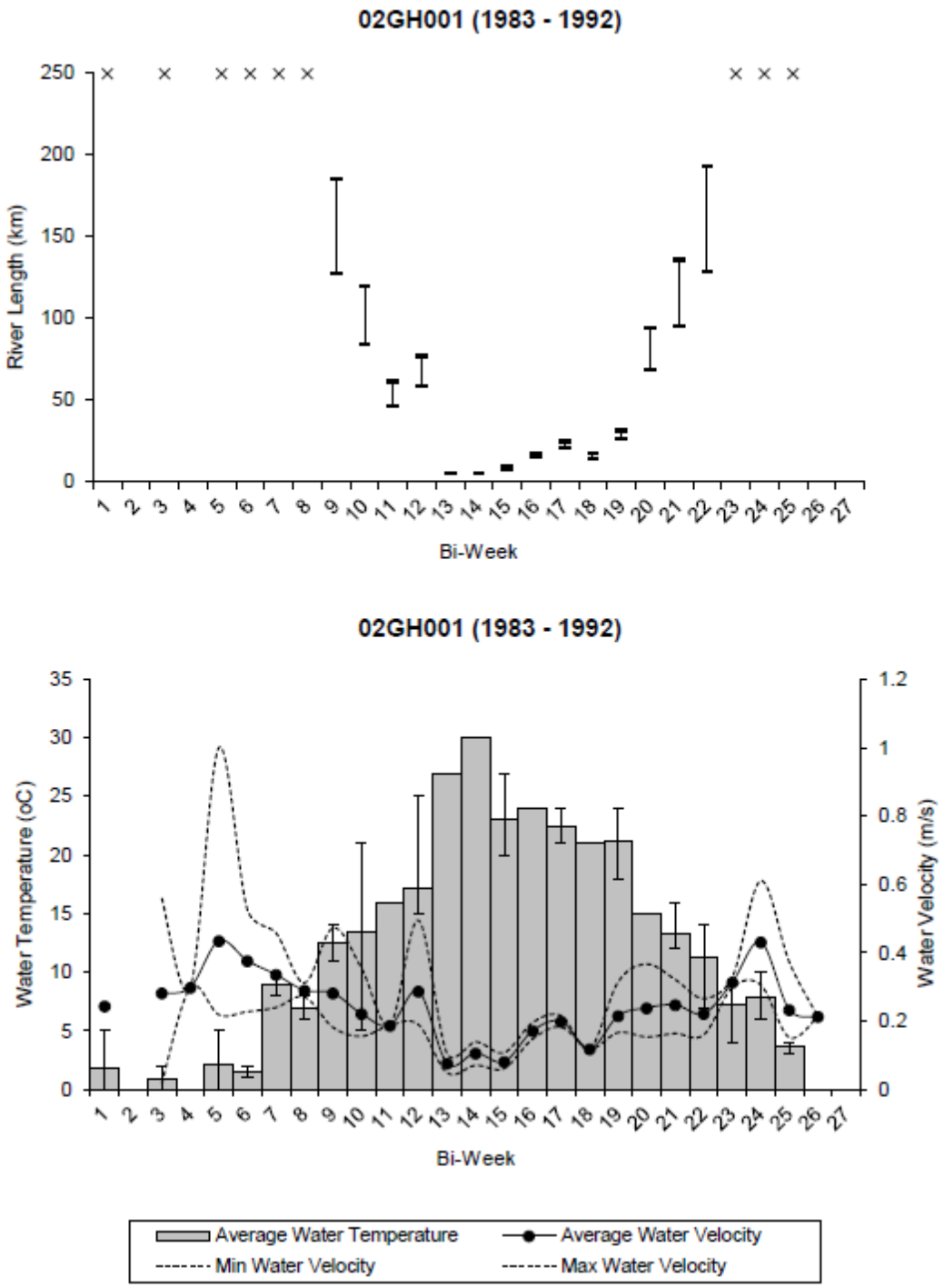


*Figure A1-140. Gauging station 02GH001 data from 1983–1992. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

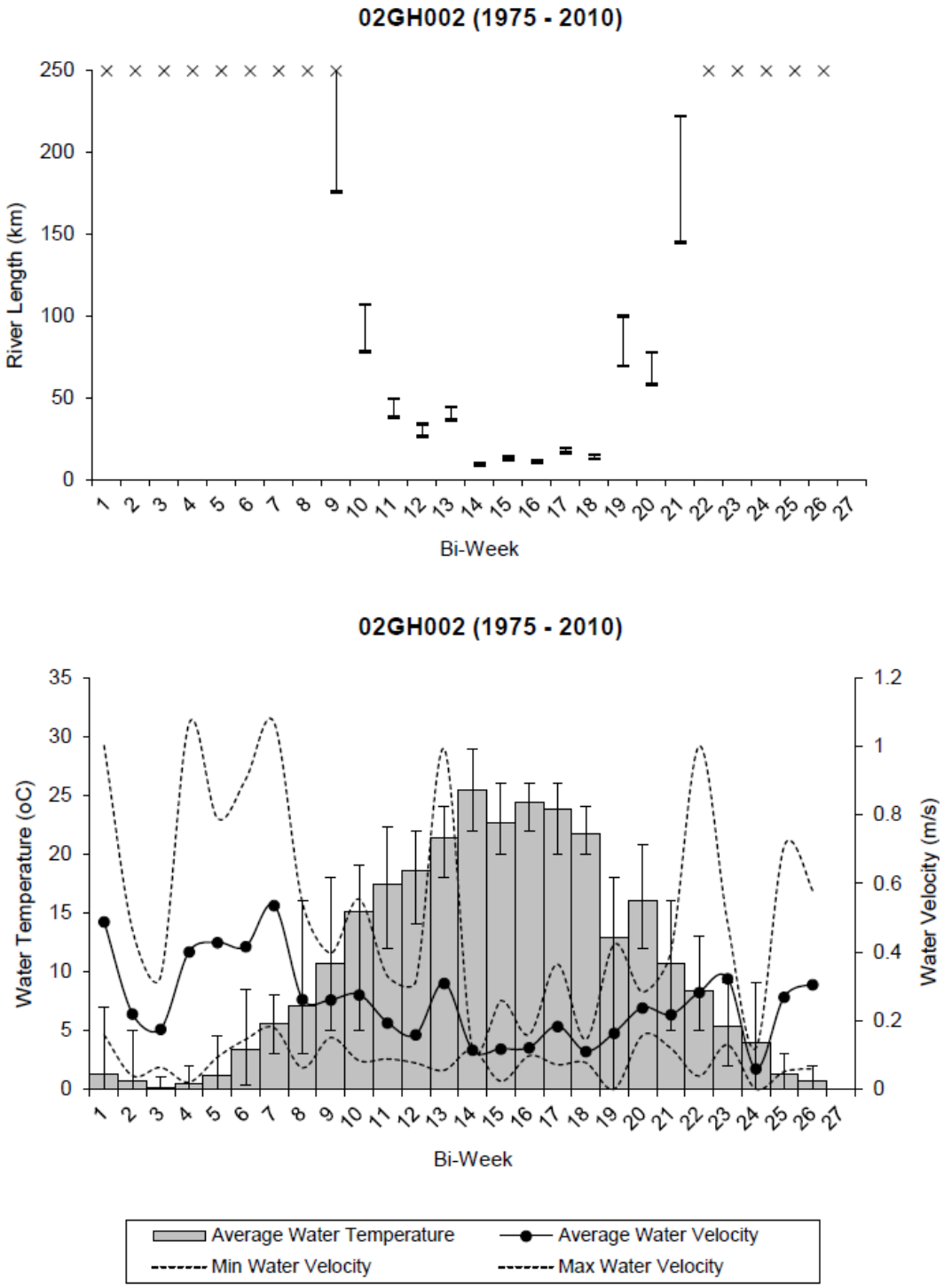


*Figure A1-141. Gauging station 02GH002 data from 1975–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

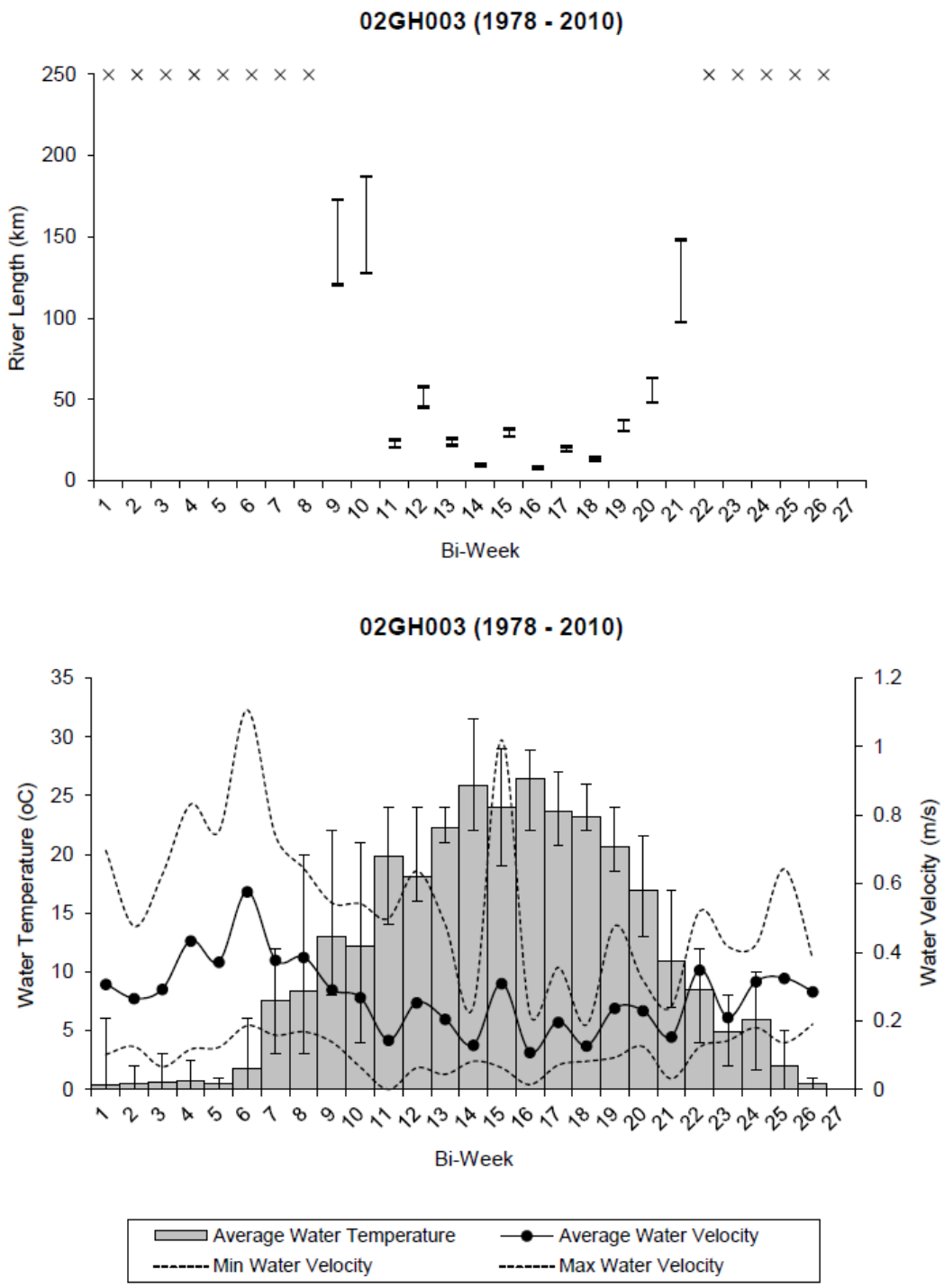


*Figure A1-142. Gauging station 02GH003 data from 1978–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

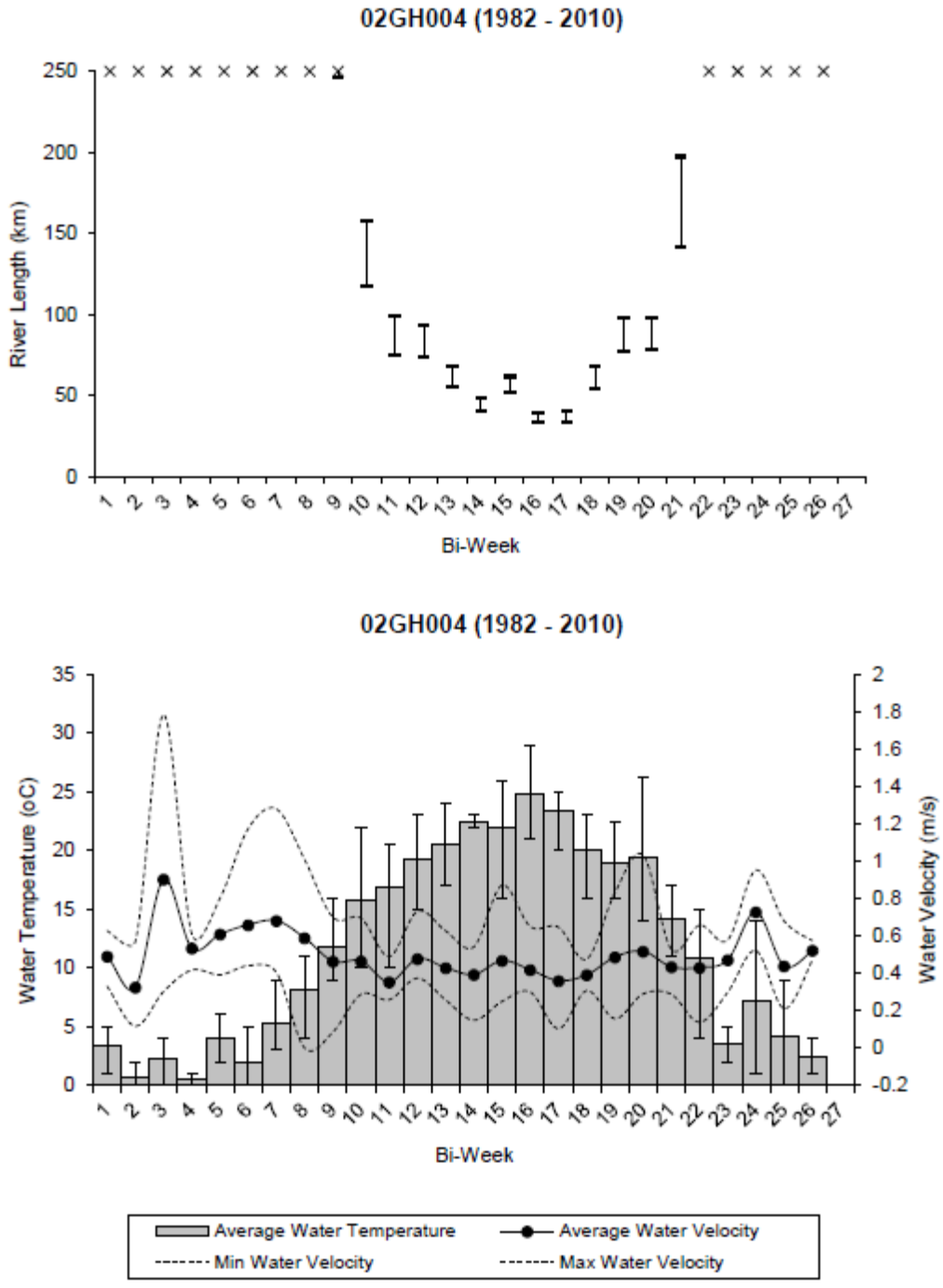


*Figure A1-143. Gauging station 02GH004 data from 1982–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

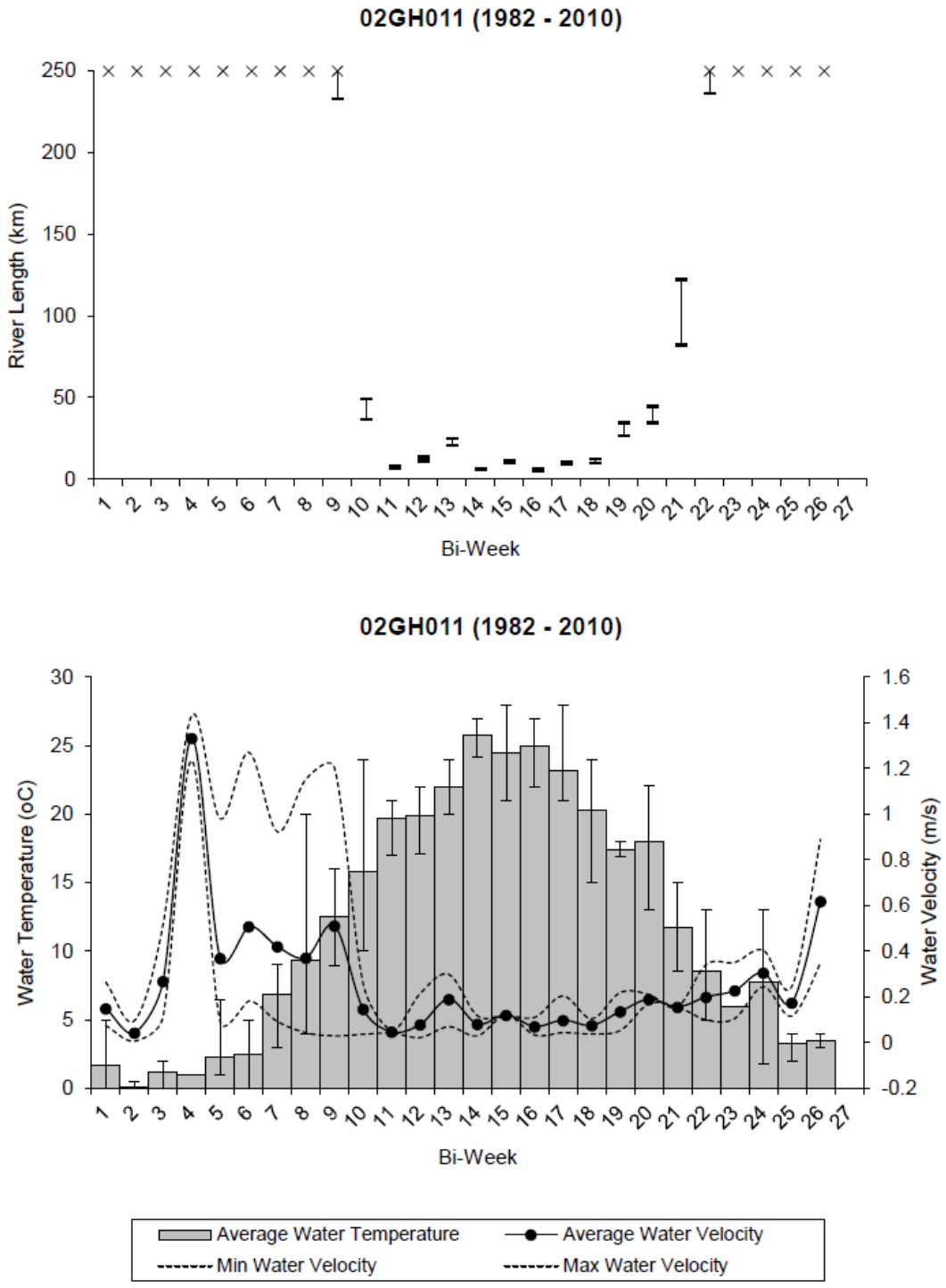


*Figure A1-144. Gauging station 02GH011 data from 1982–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

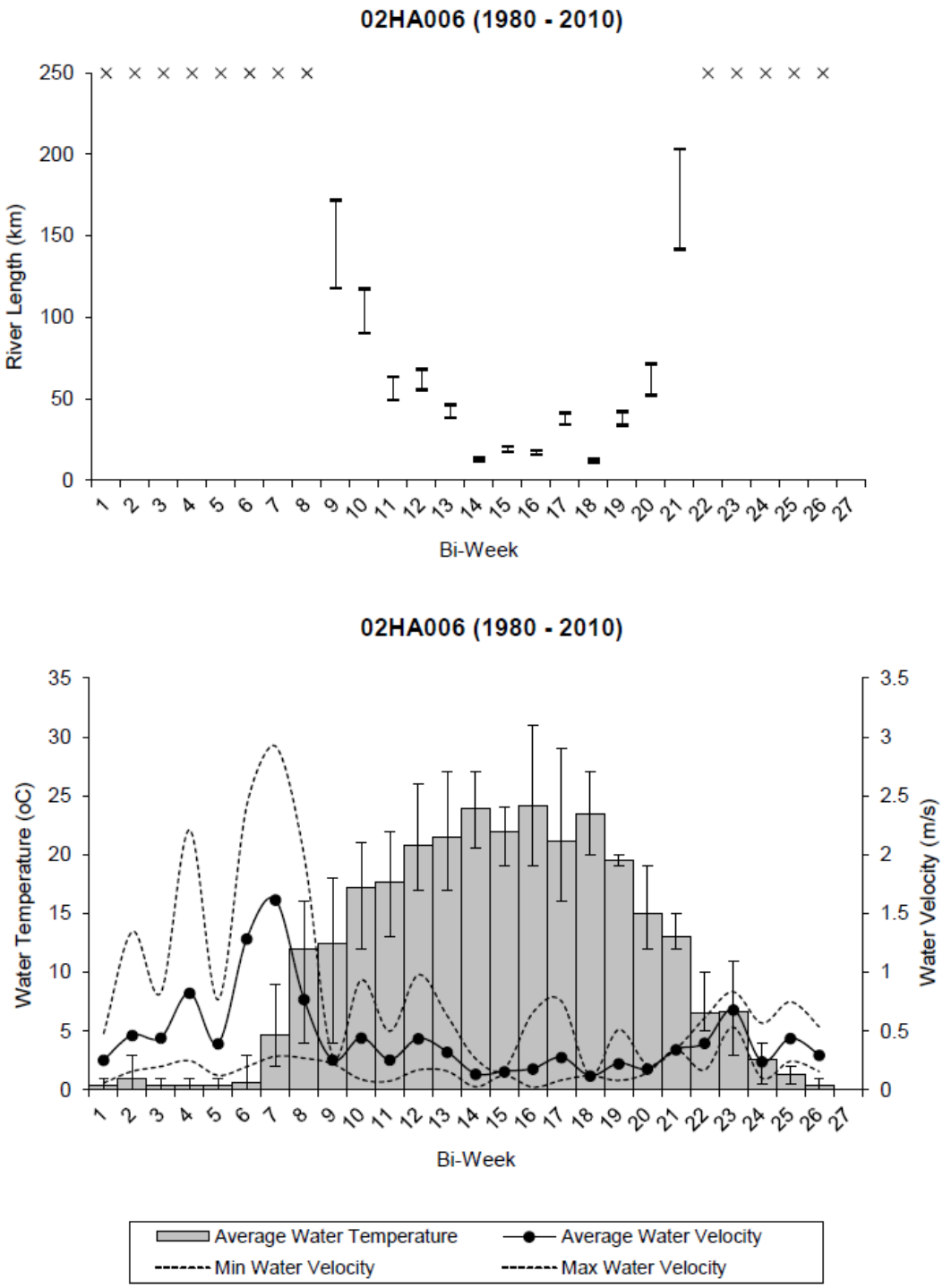


*Figure A1-145. Gauging station 02HA006 data from 1982–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

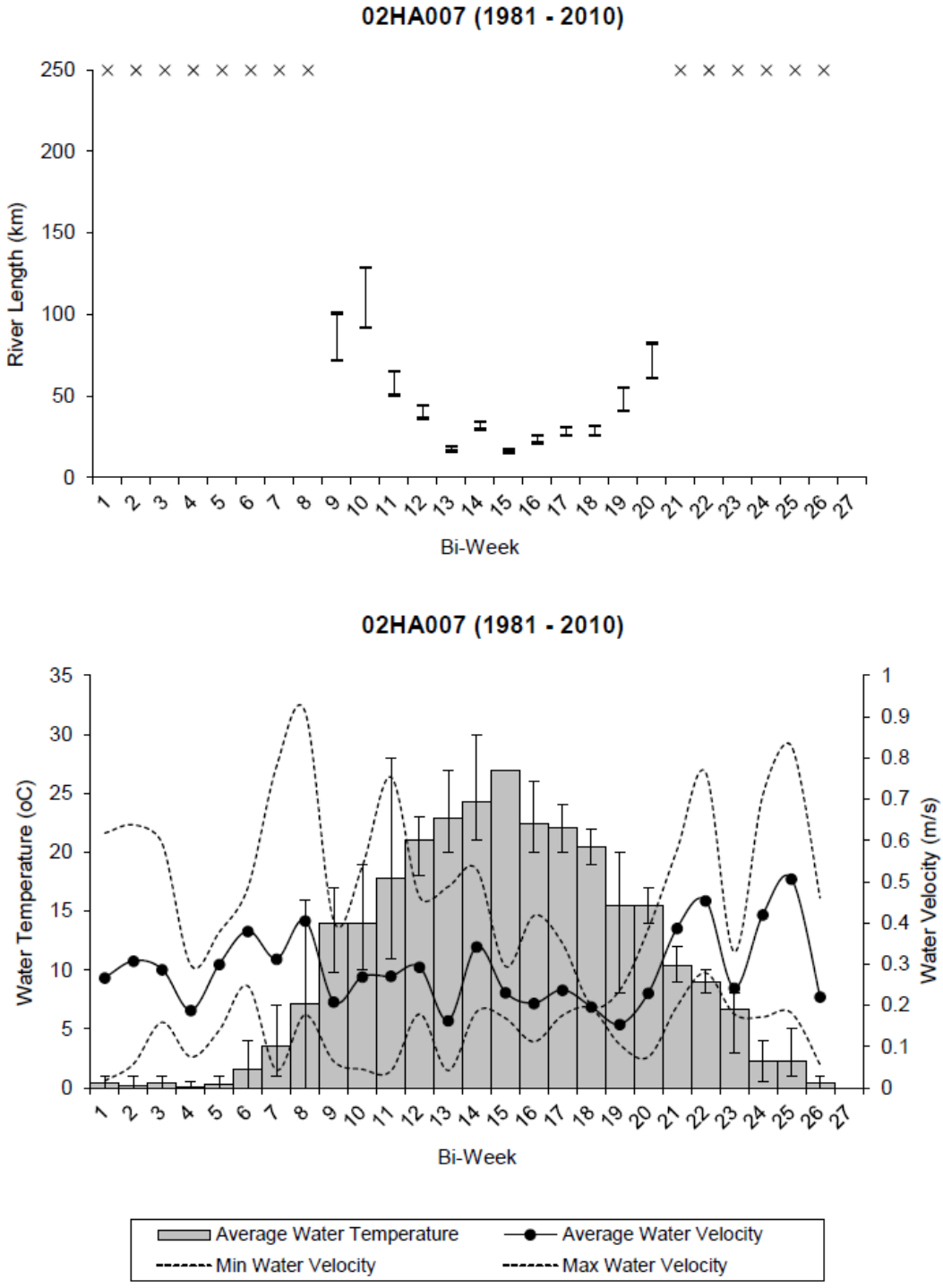


*Figure A1-146. Gauging station 02HA007 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

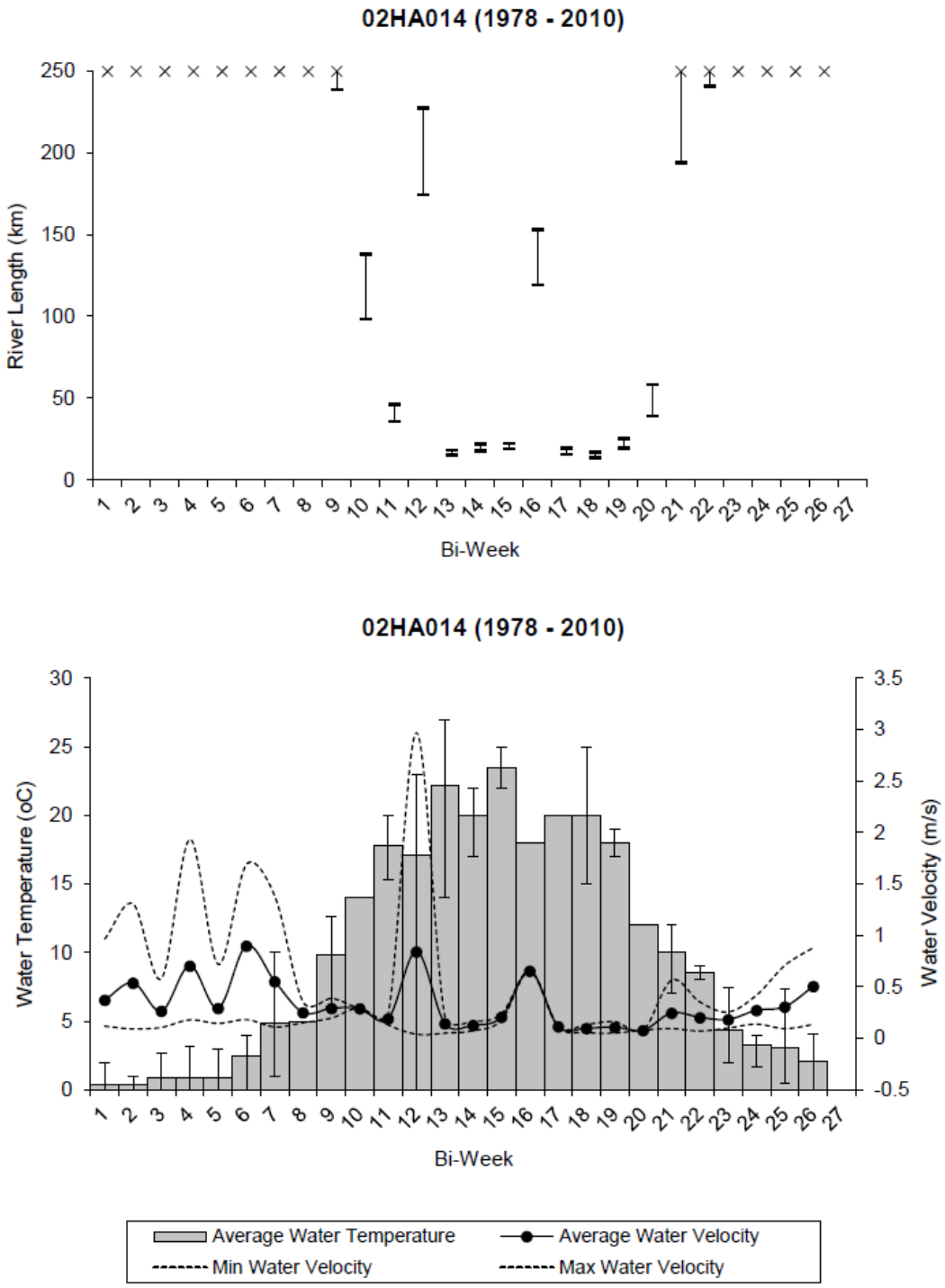


*Figure A1-147. Gauging station 02HA014 data from 1978–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

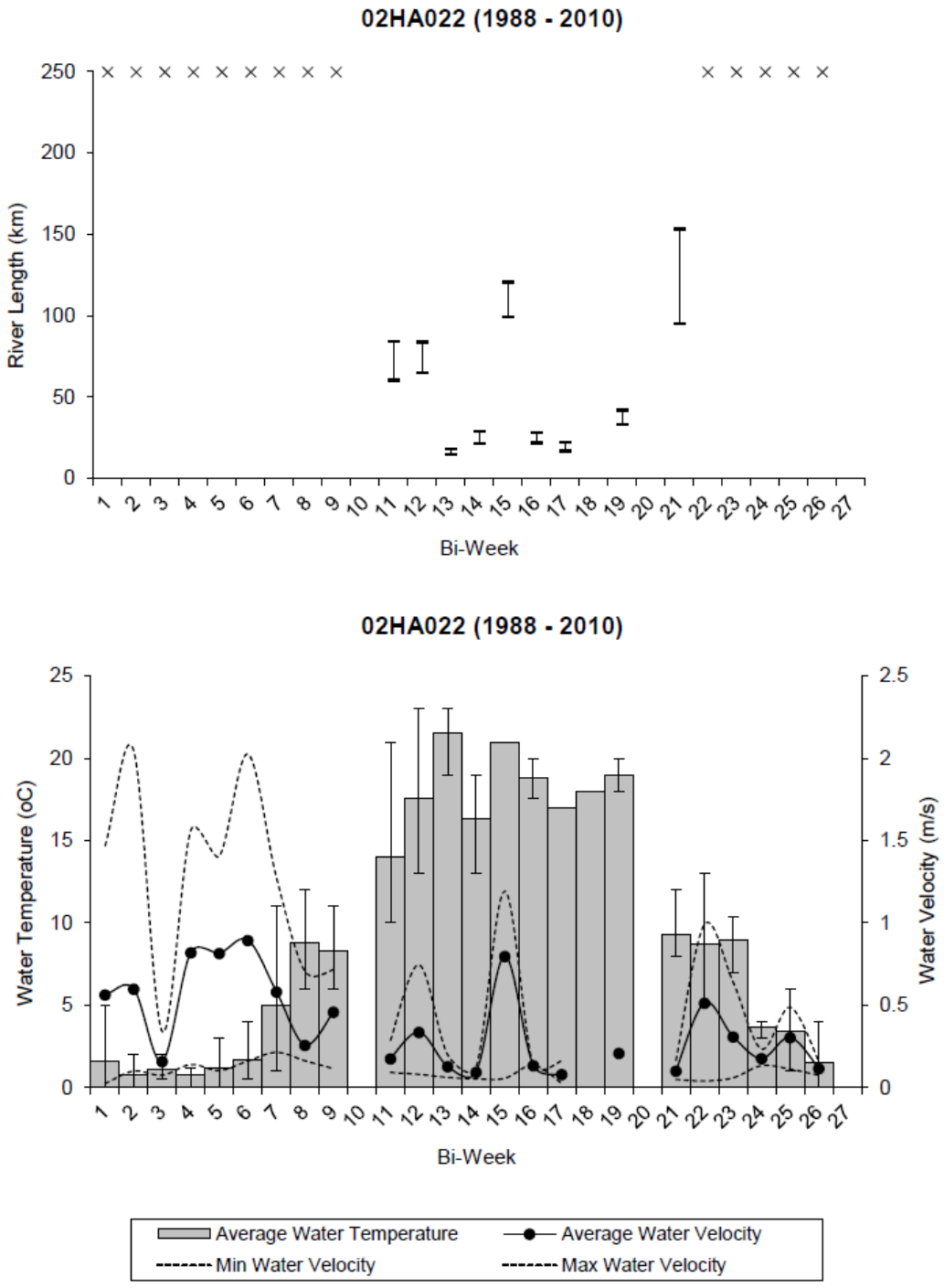


*Figure A1-148. Gauging station 02HA022 data from 1988–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

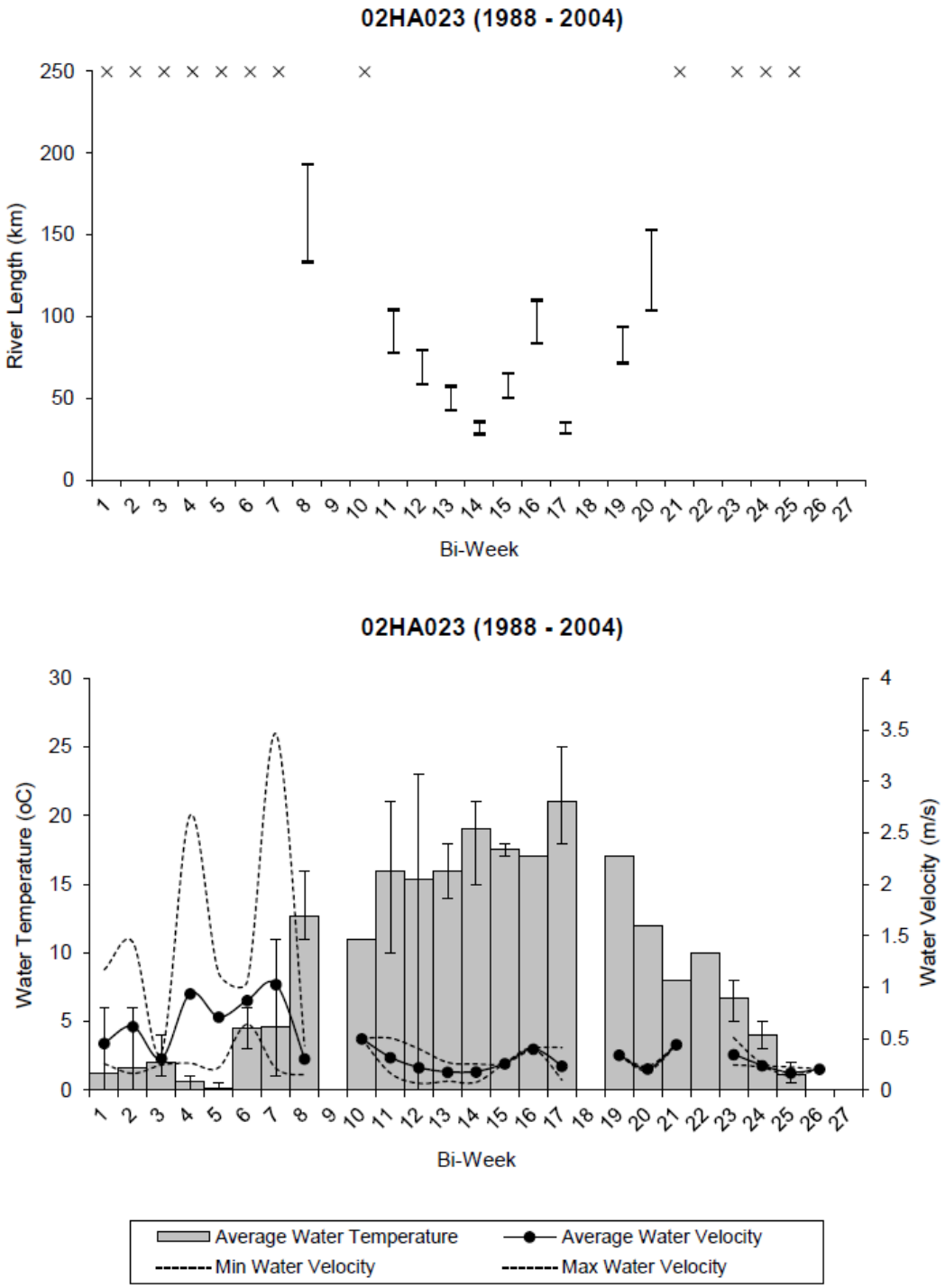


*Figure A1-149. Gauging station 02HA023 data from 1988–2004. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

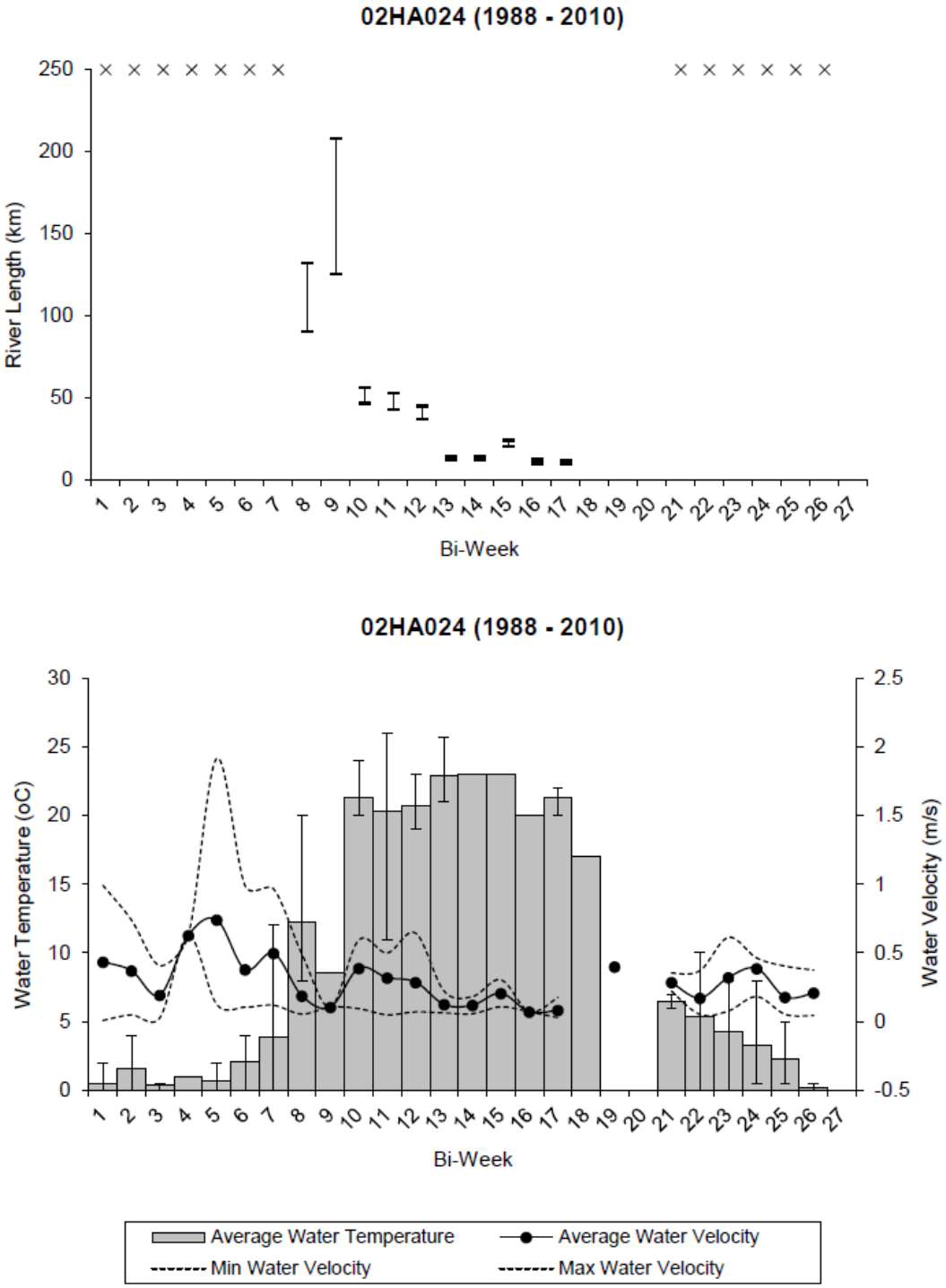


*Figure A1-150. Gauging station 02HA024 data from 1988–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

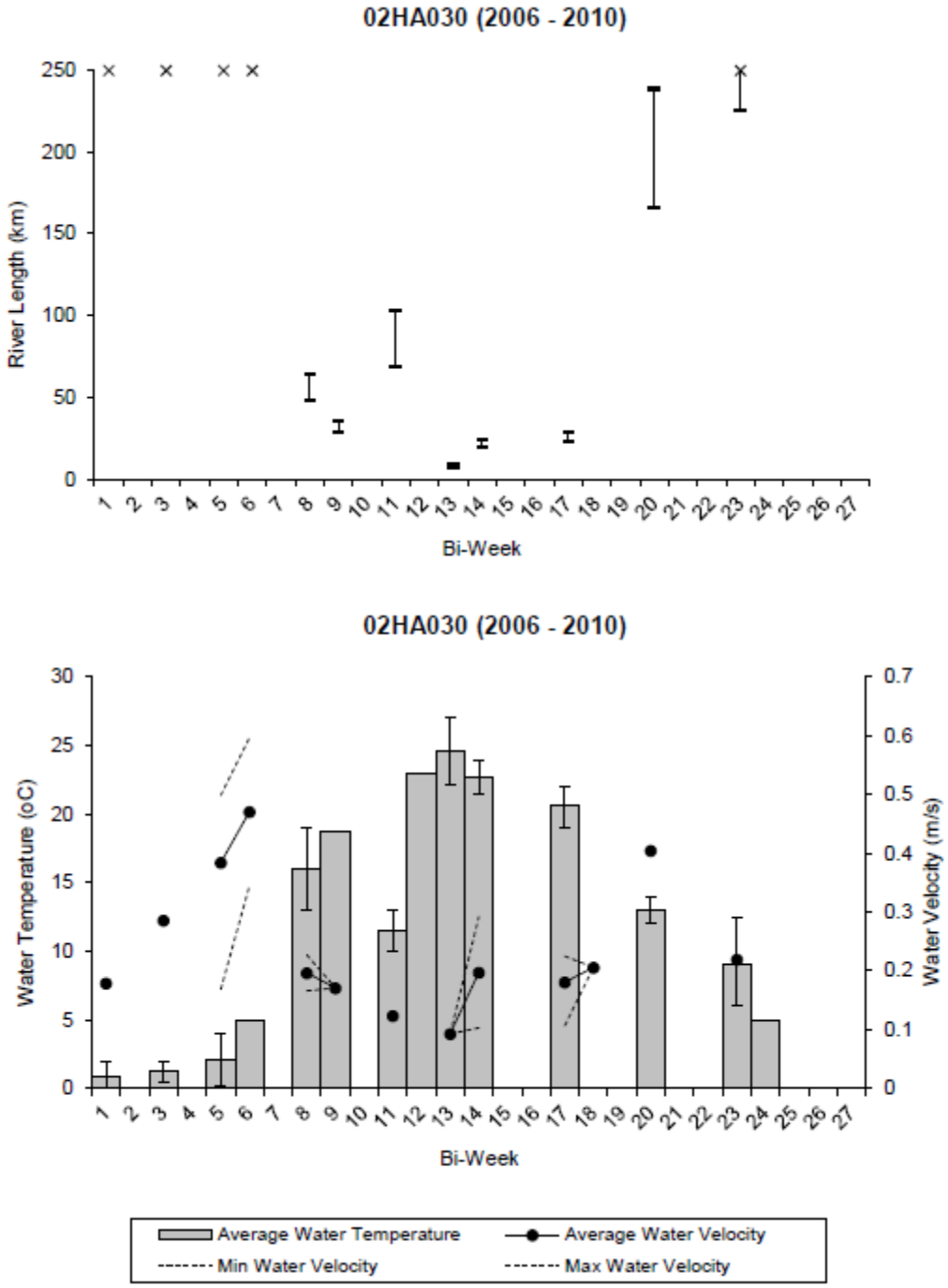


*Figure A1-151. Gauging station 02HA030 data from 2006–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

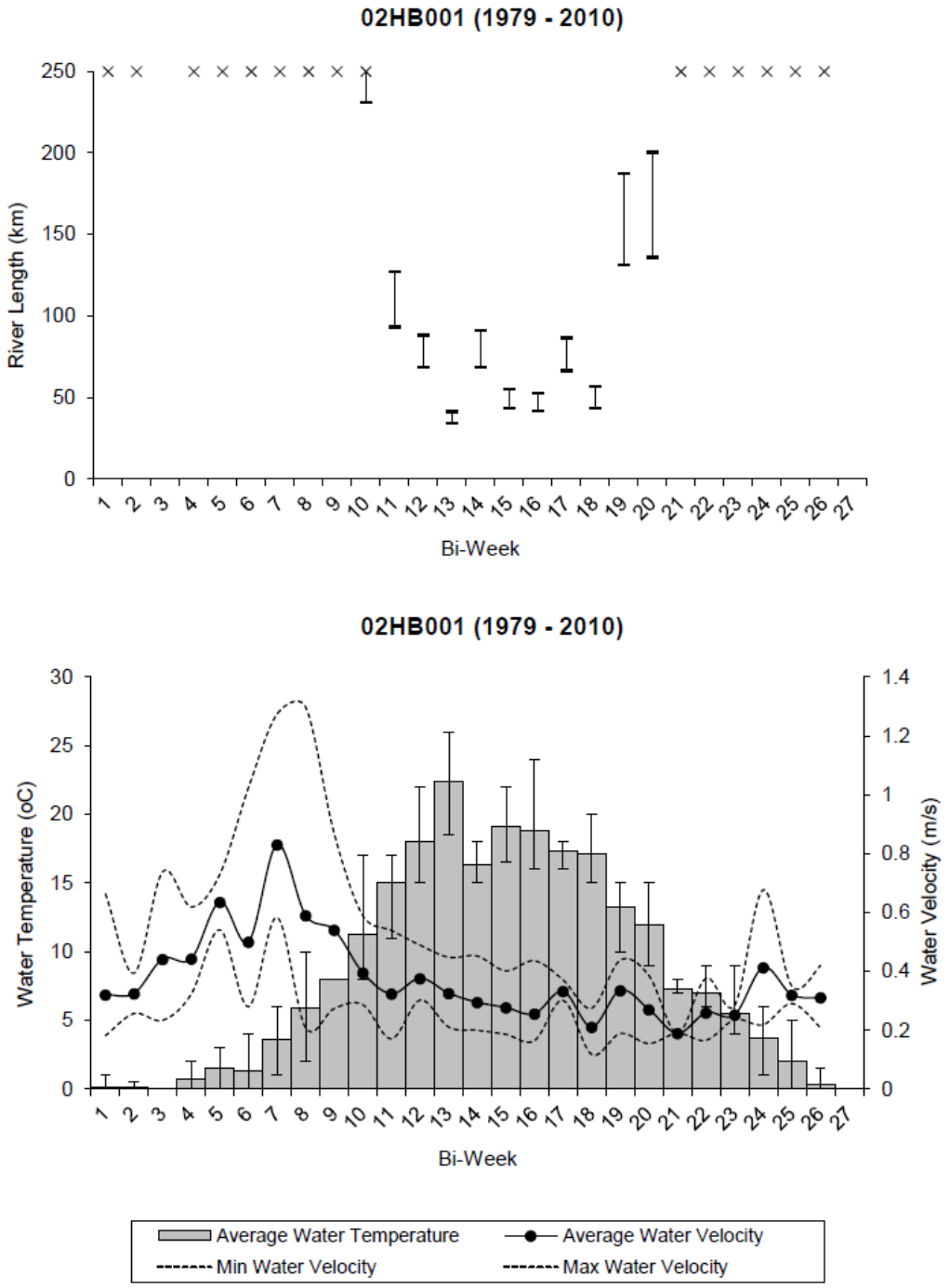


*Figure A1-152. Gauging station 02HB001 data from 1979–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

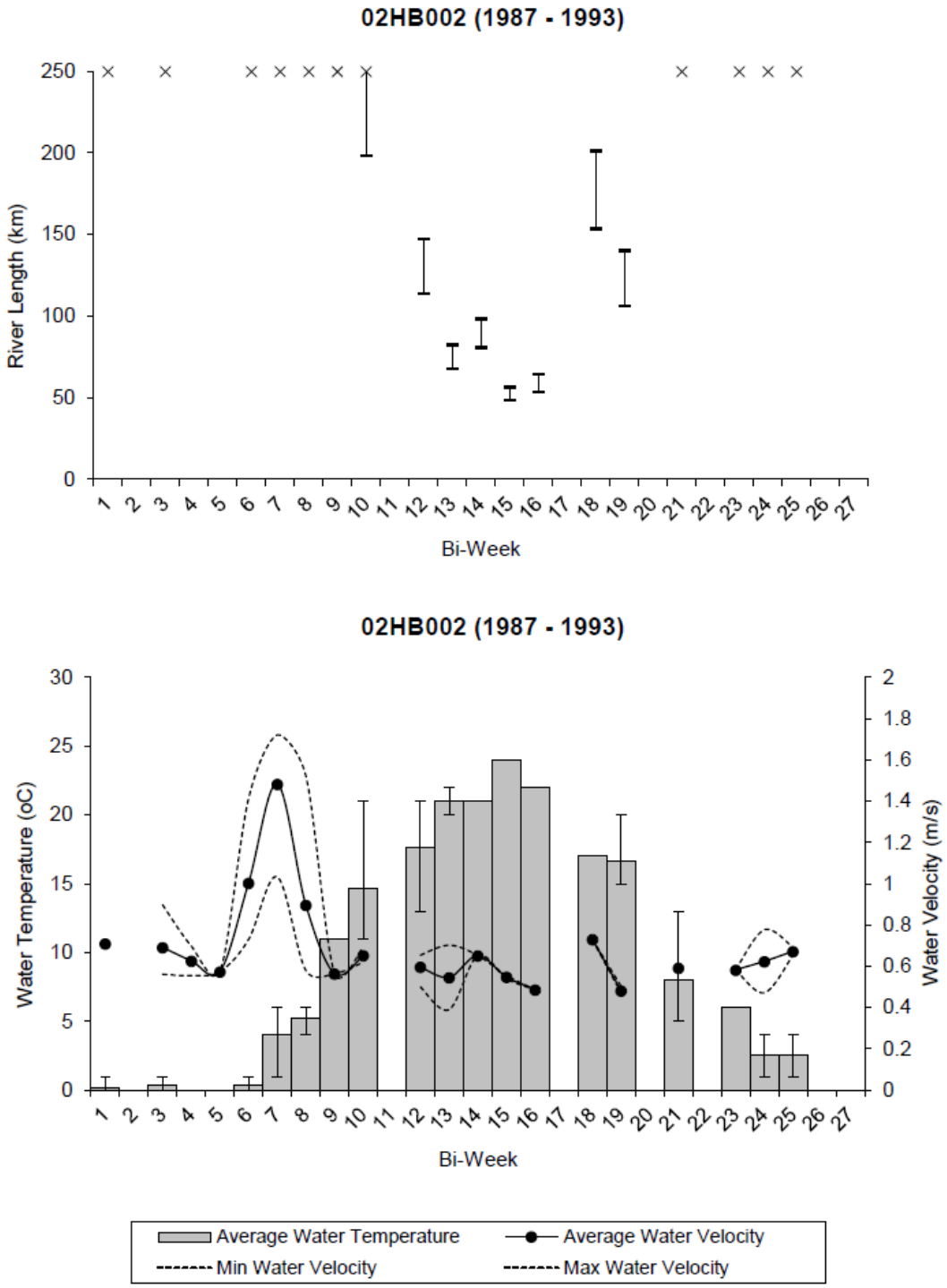


*Figure A1-153. Gauging station 02HB002 data from 1987–1993. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

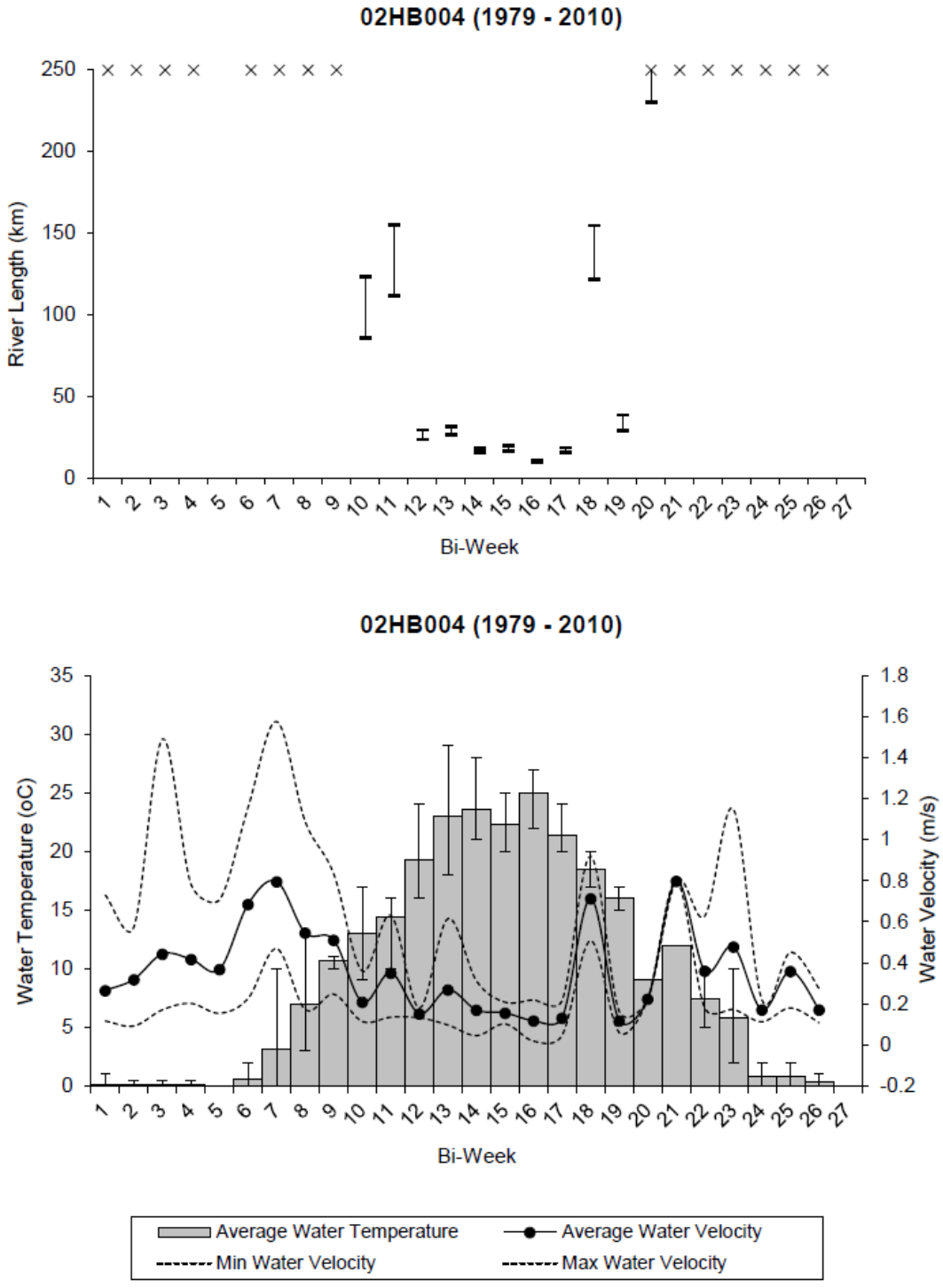


*Figure A1-154. Gauging station 02HB004 data from 1979–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

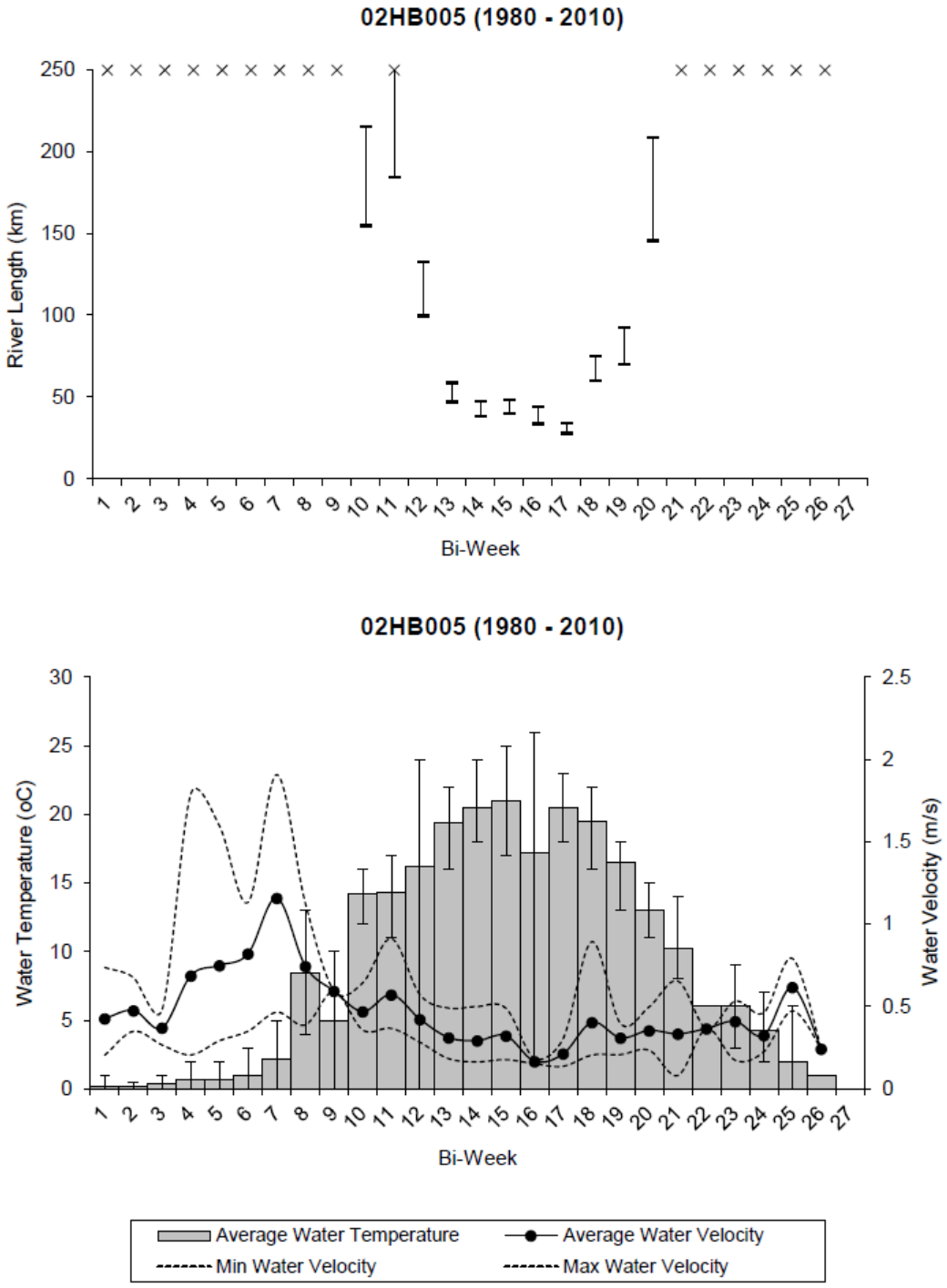


*Figure A1-155. Gauging station 02HB005 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

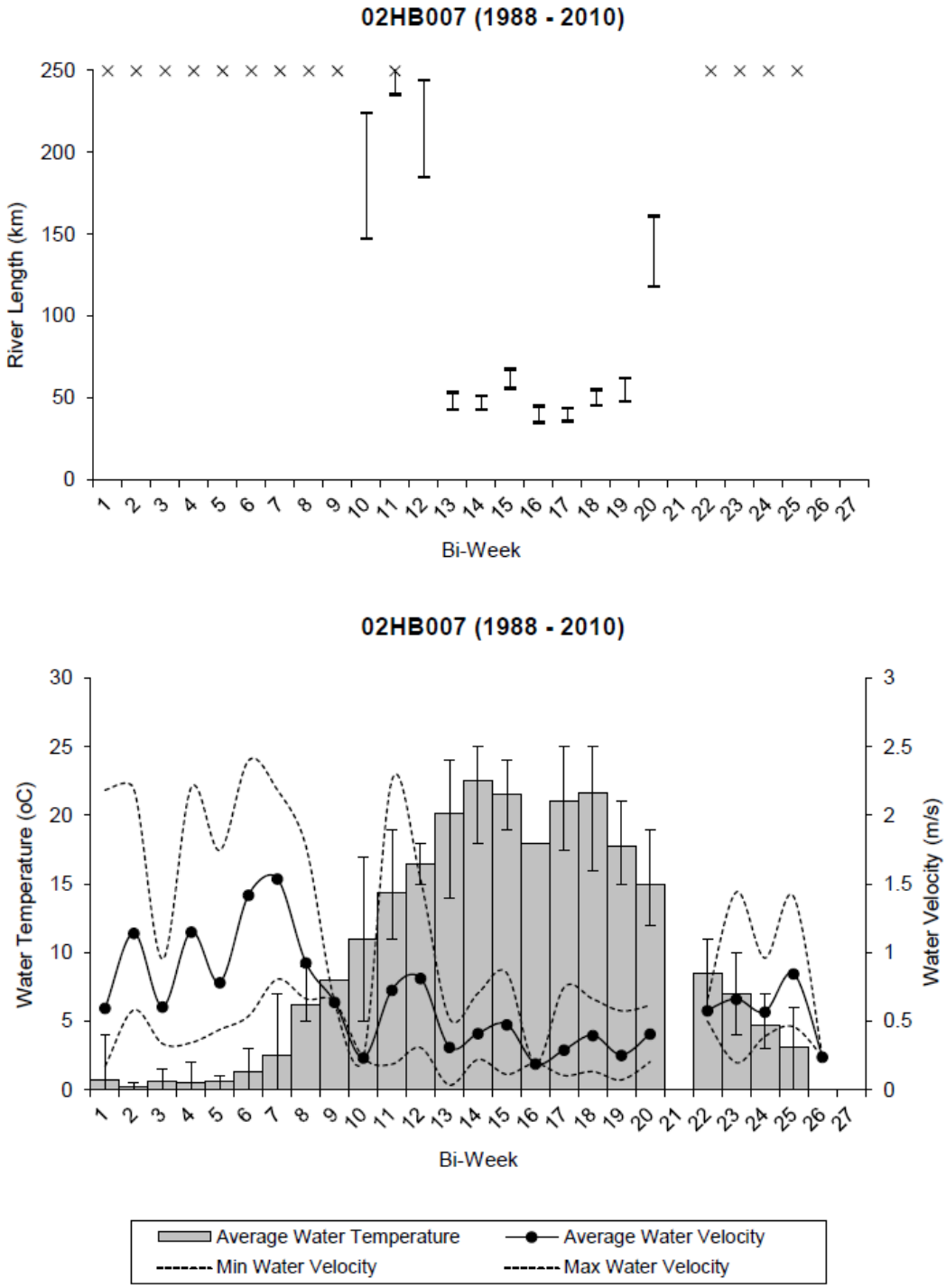


*Figure A1-156. Gauging station 02HB006 data from 1988–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

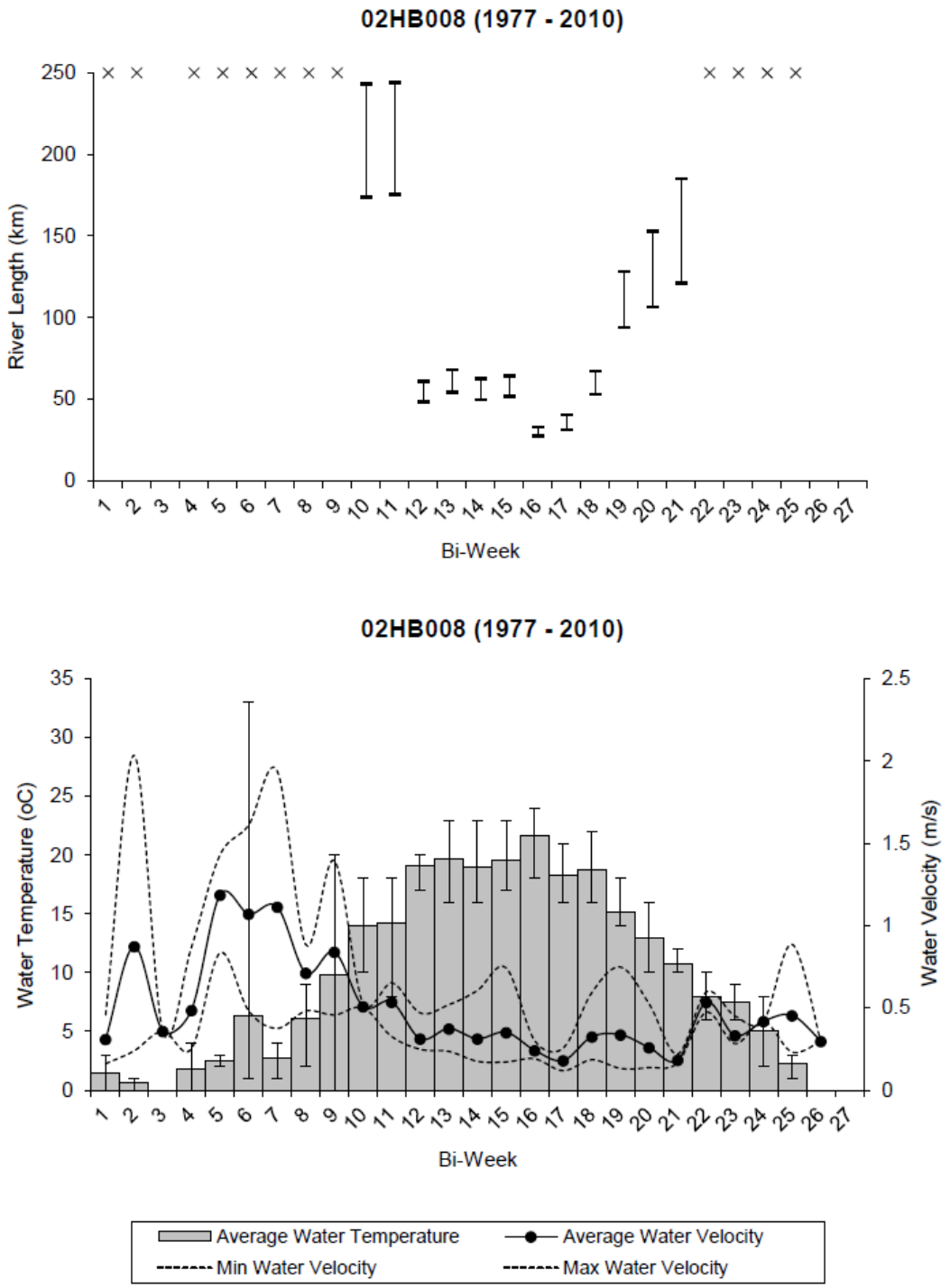


*Figure A1-157. Gauging station 02HB008 data from 1977–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

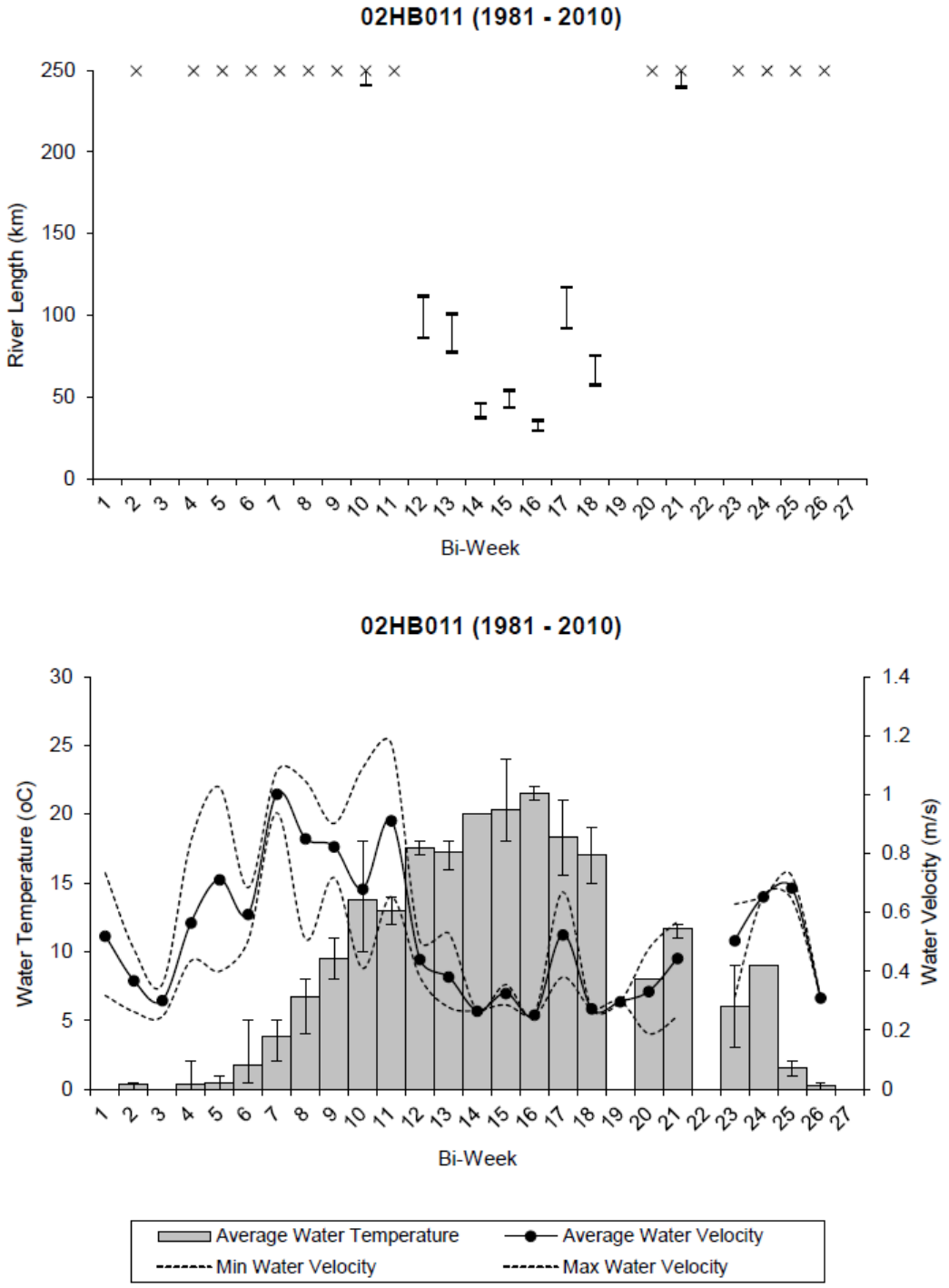


*Figure A1-158. Gauging station 02HB011 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

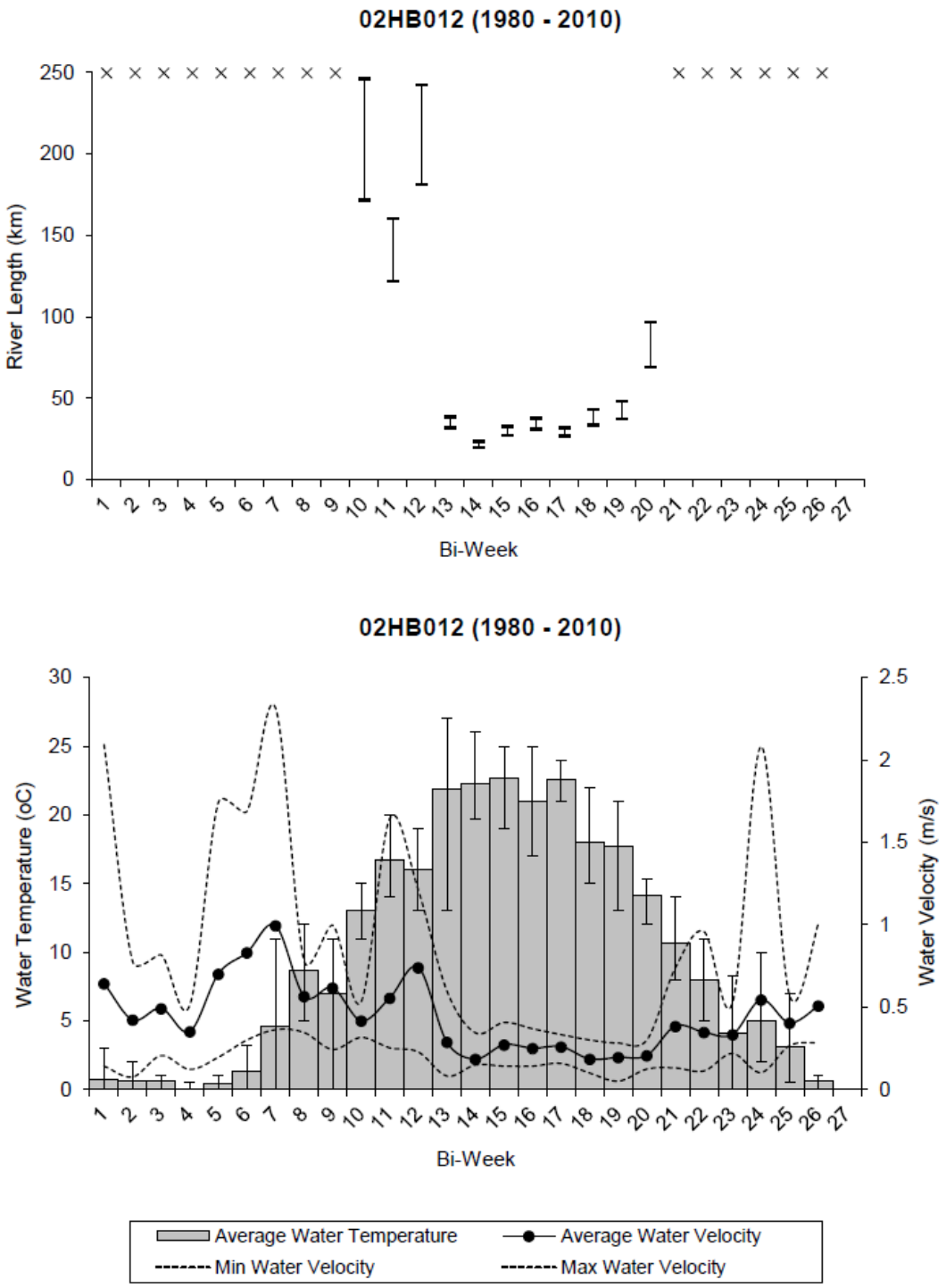


*Figure A1-159. Gauging station 02HB012 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

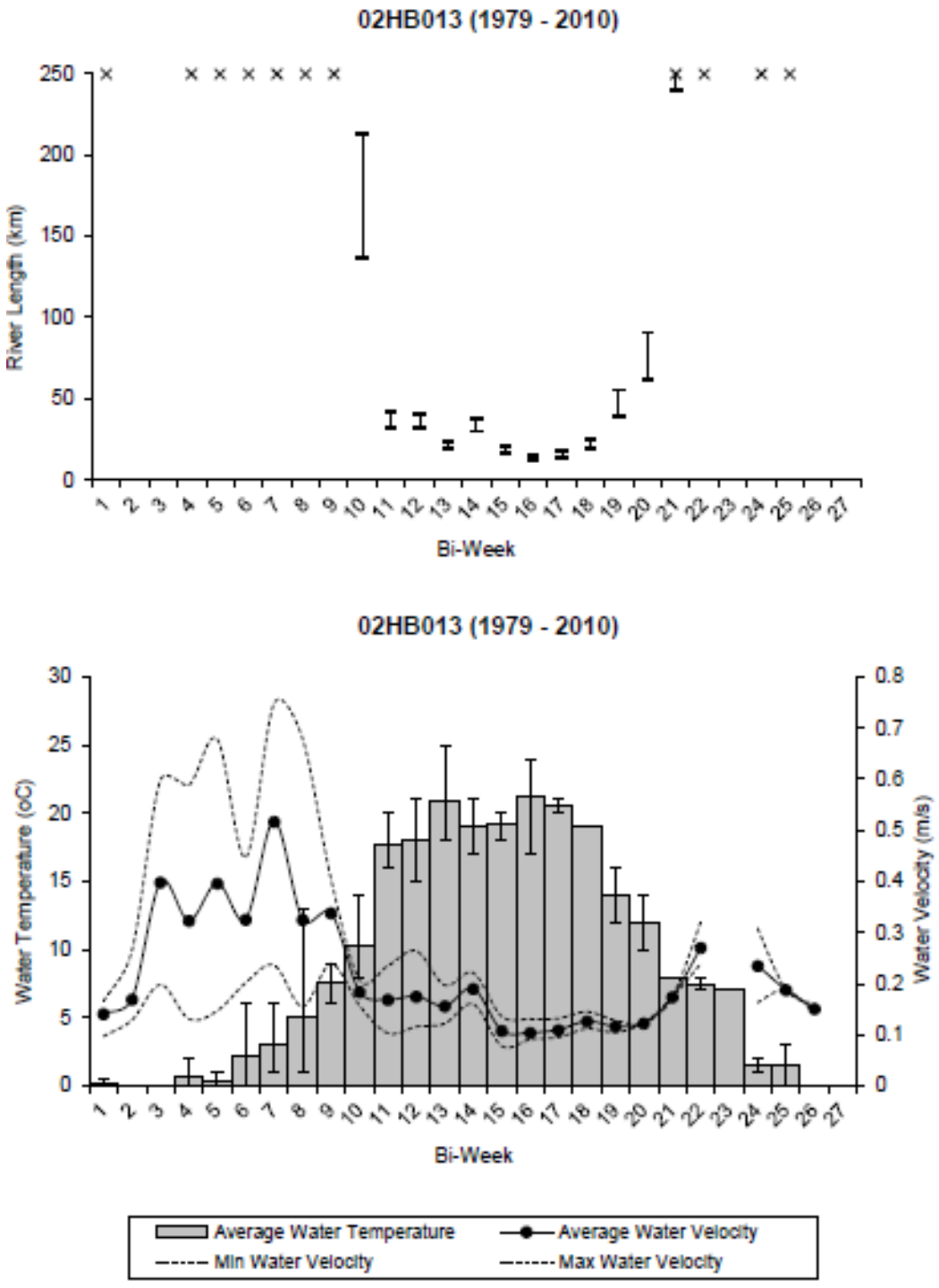


*Figure A1-160. Gauging station 02HB013 data from 1979–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

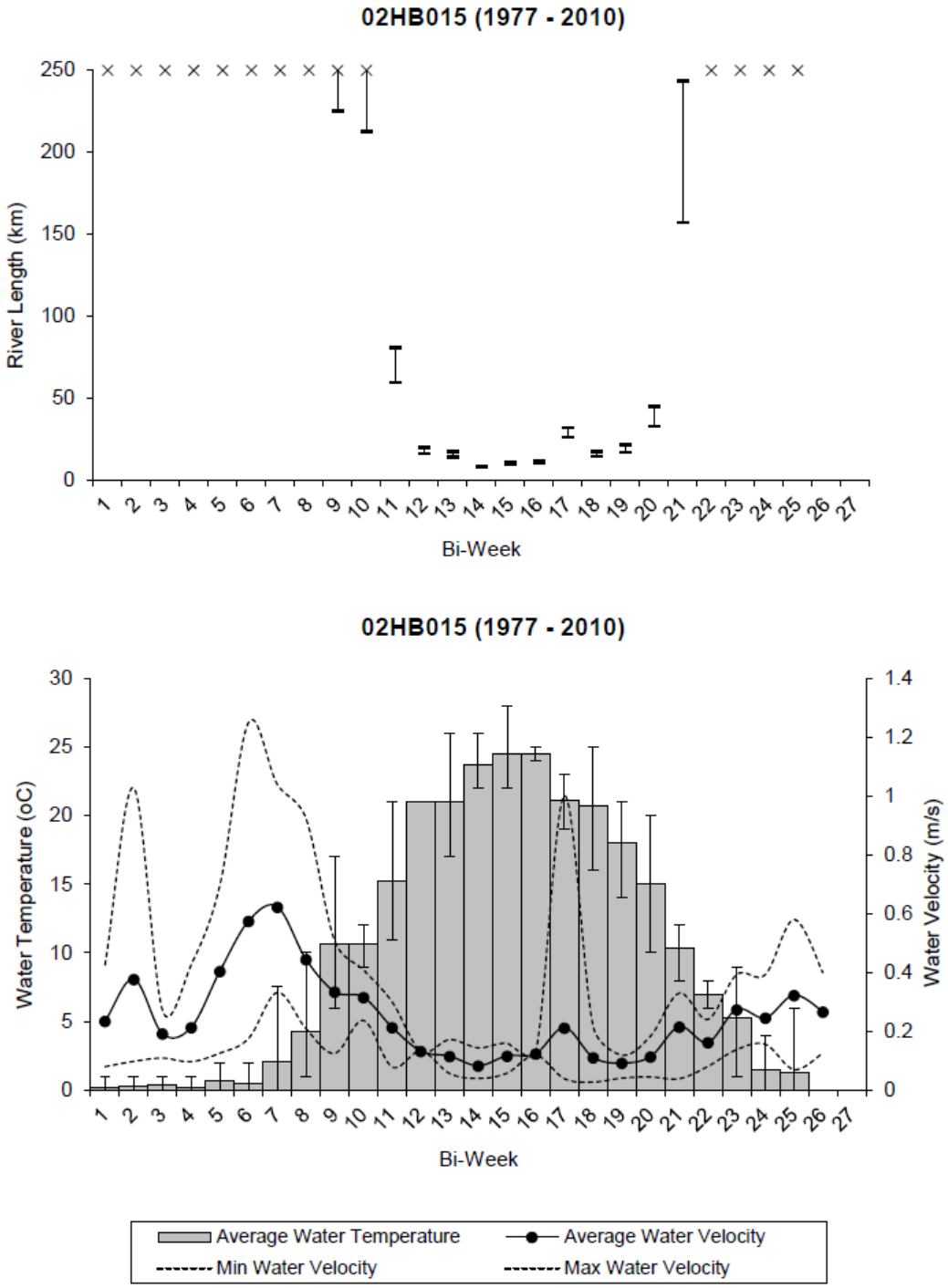


*Figure A1-161. Gauging station 02HB015 data from 1977–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

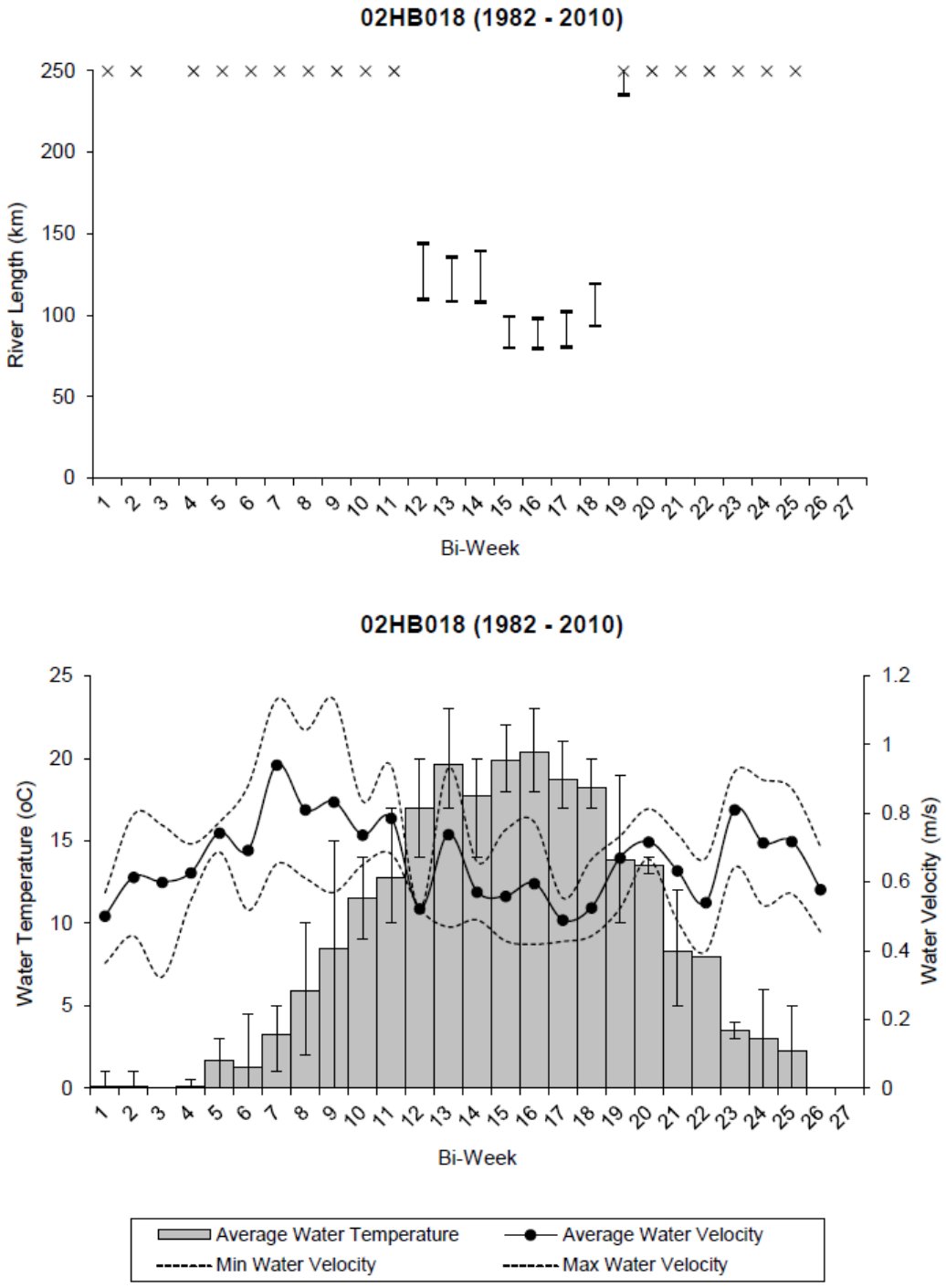


*Figure A1-162. Gauging station 02HB018 data from 1982–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

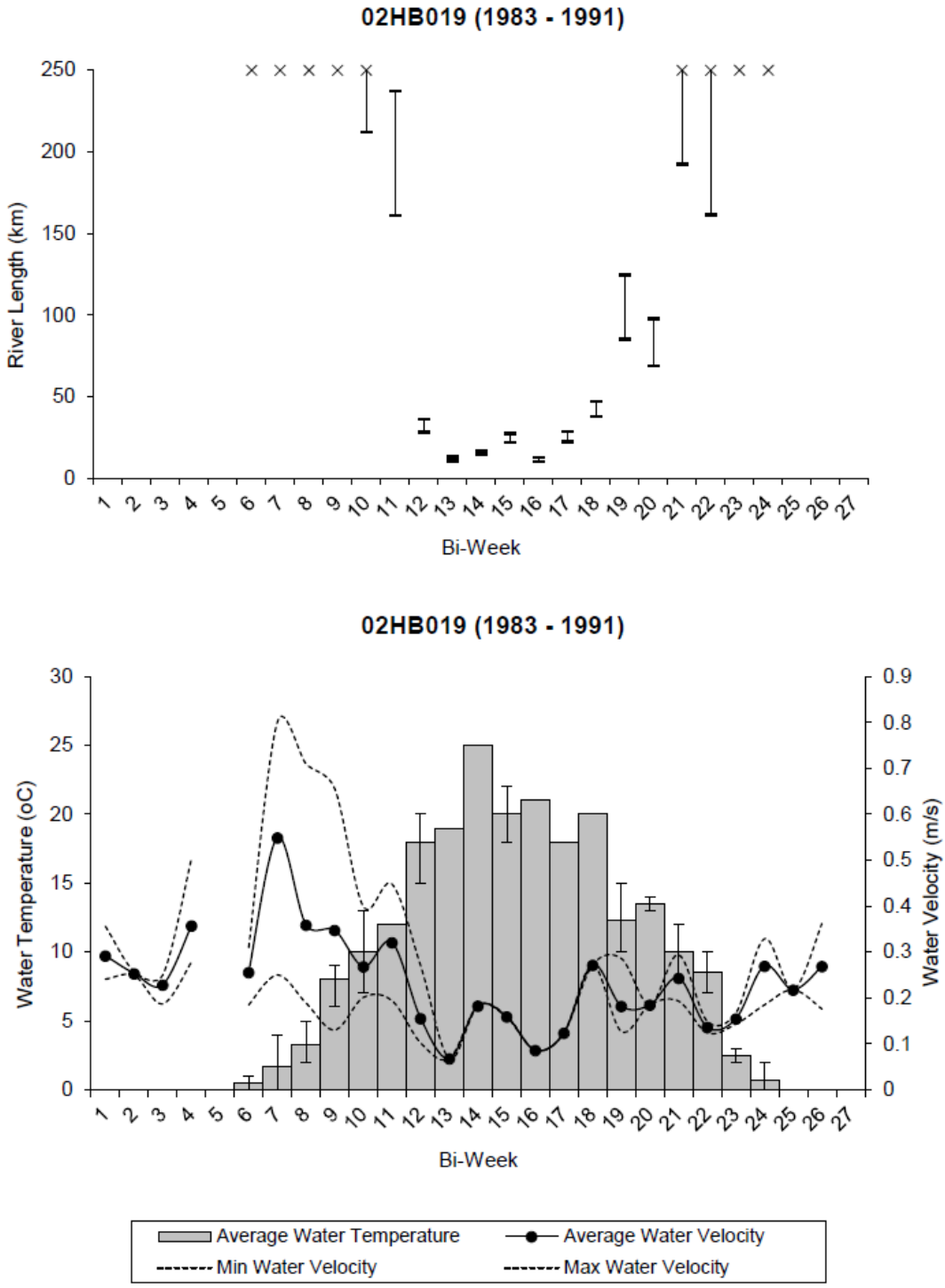


*Figure A1-163. Gauging station 02HB019 data from 1983–1991. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

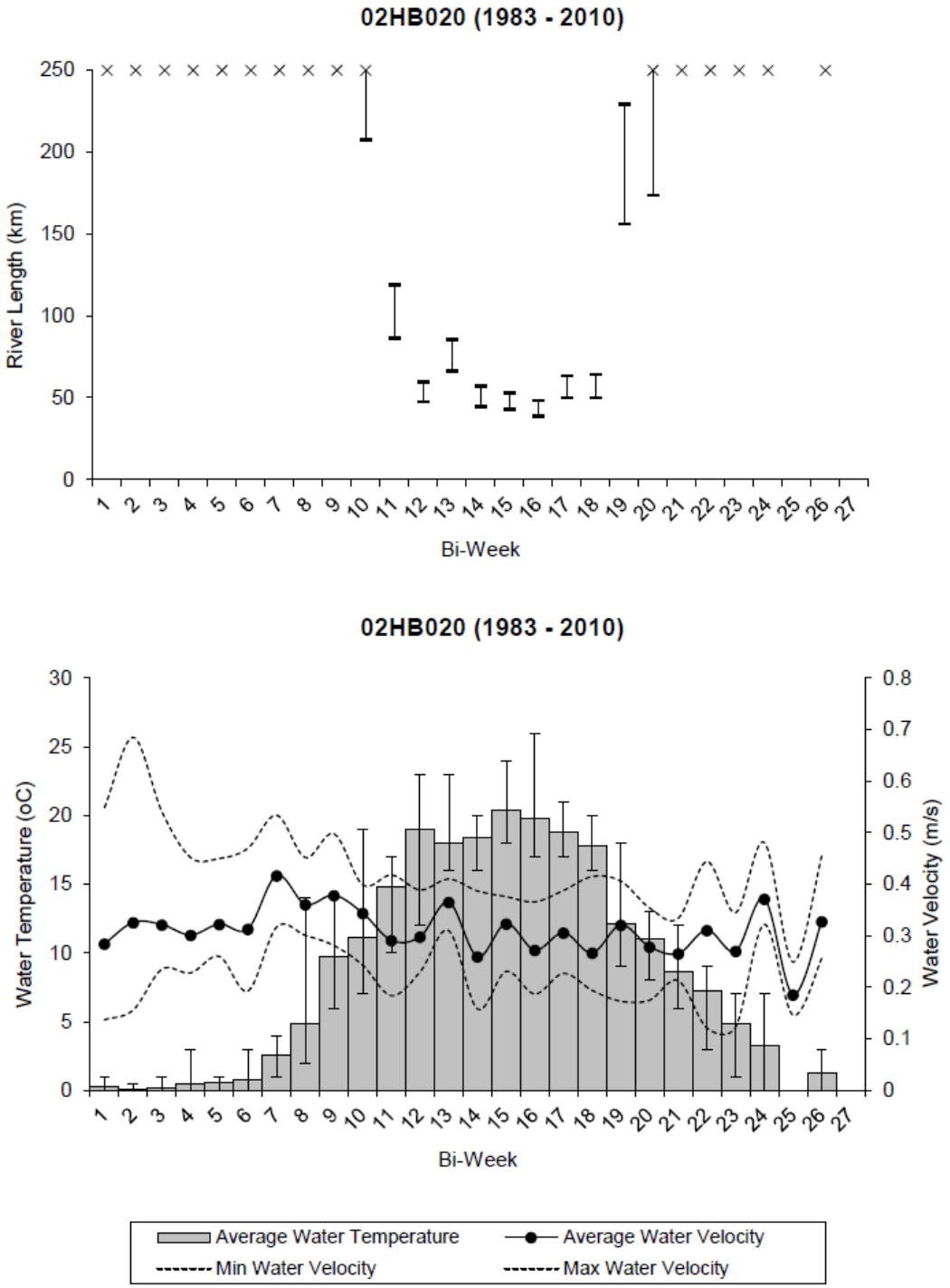


*Figure A1-164. Gauging station 02HB020 data from 1983–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

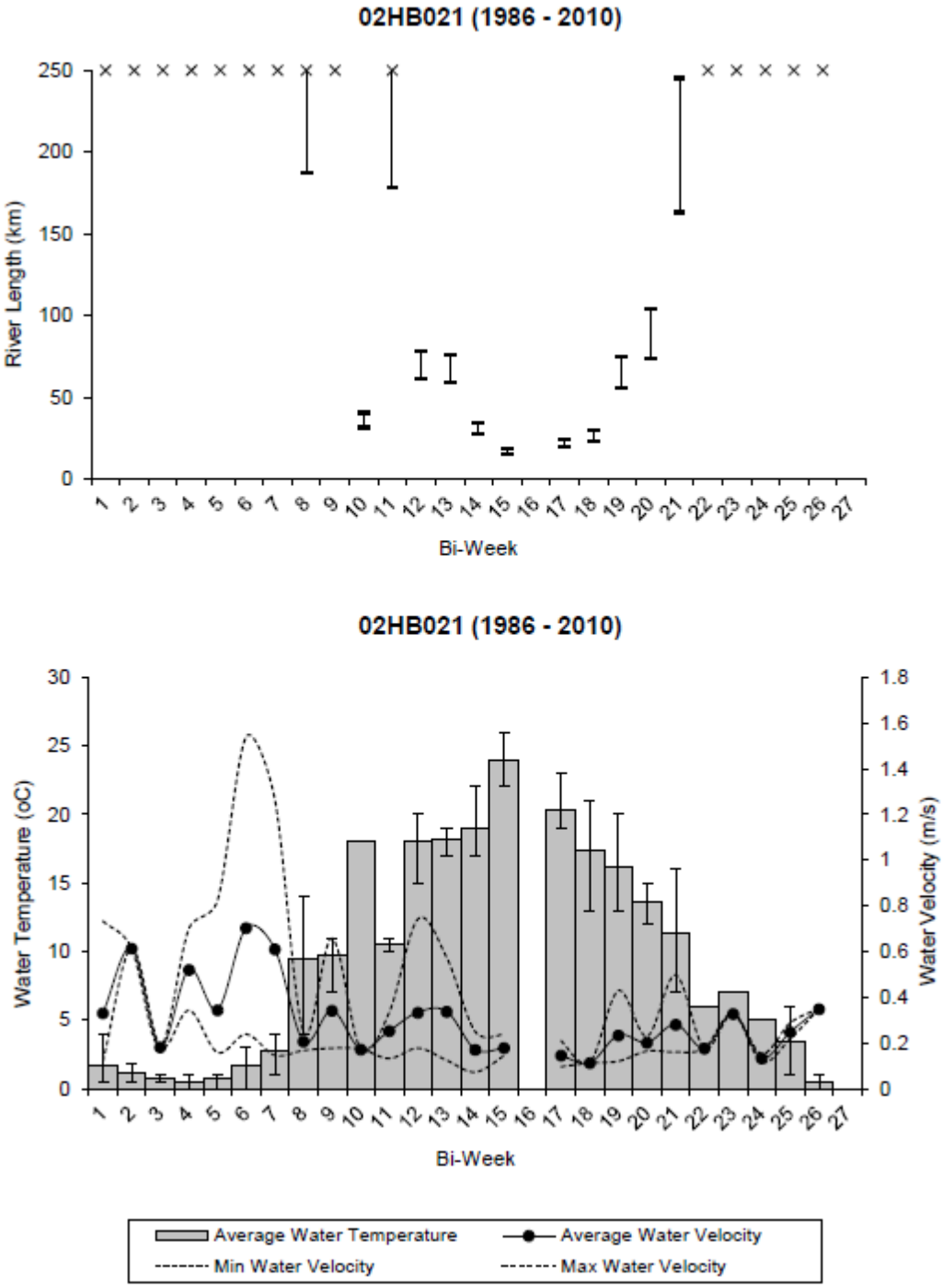


*Figure A1-165. Gauging station 02HB021 data from 1986–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

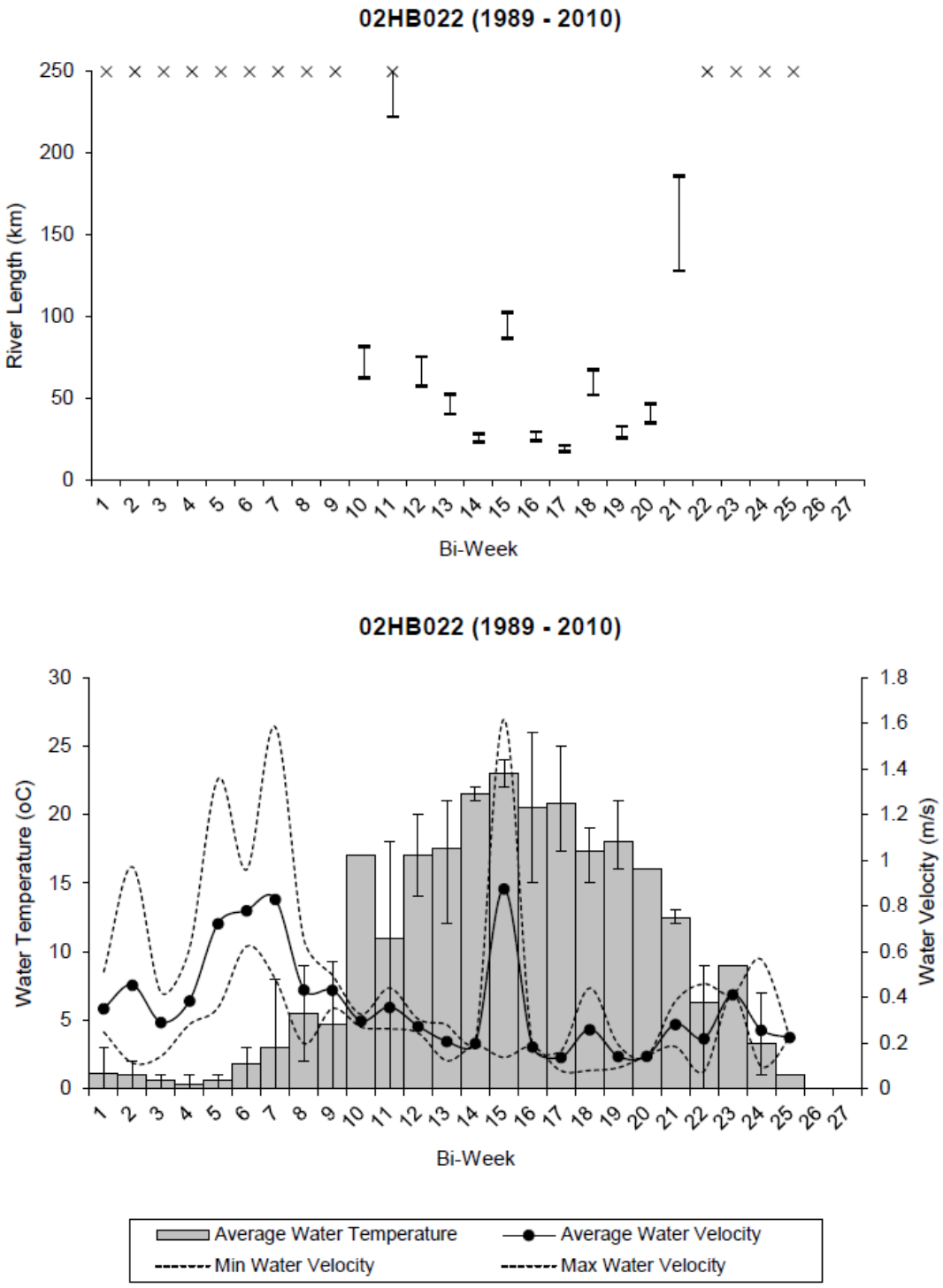


*Figure A1-166. Gauging station 02HB022 data from 1989–2001. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

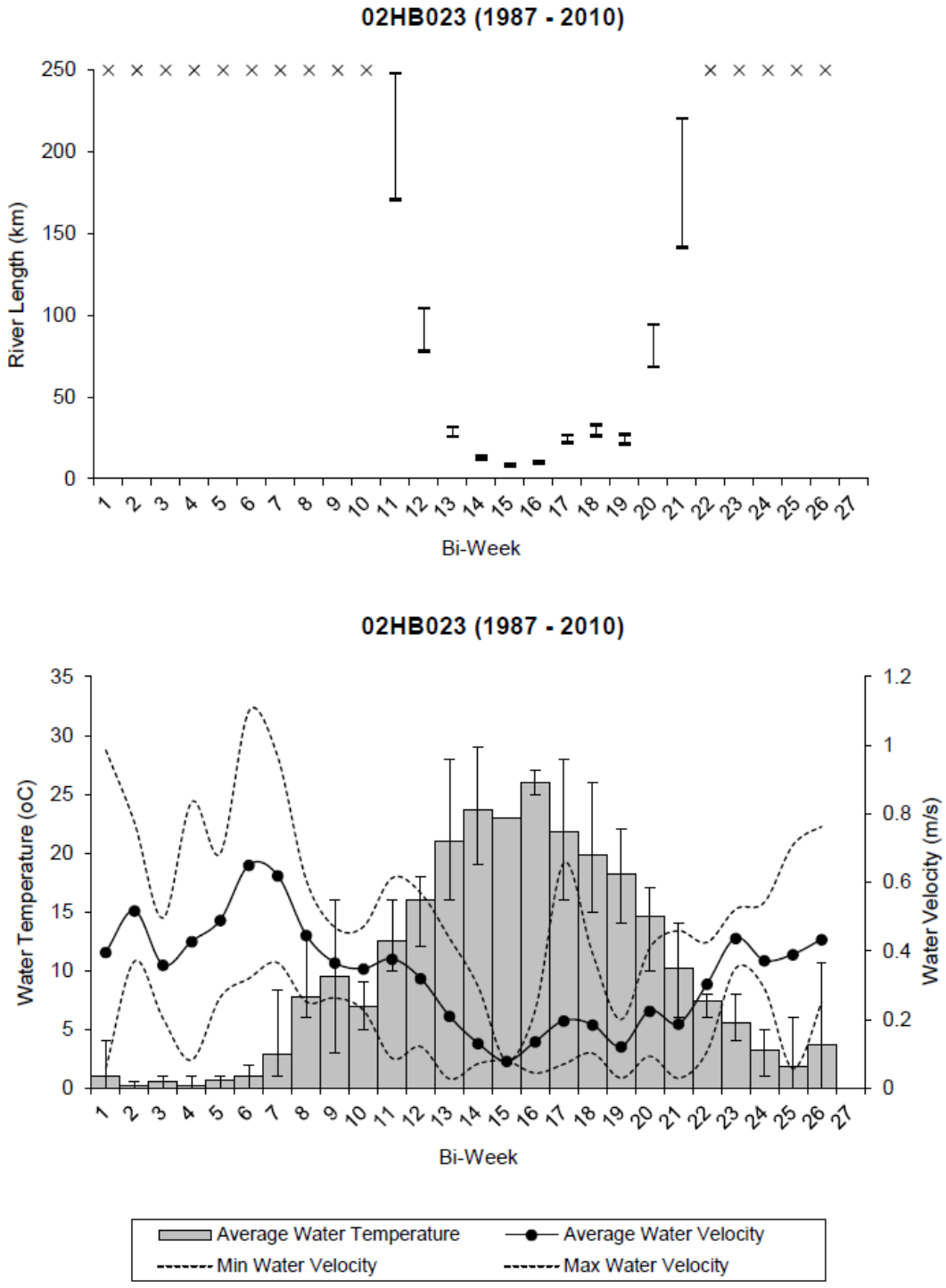


*Figure A1-167. Gauging station 02HB032 data from 1987–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

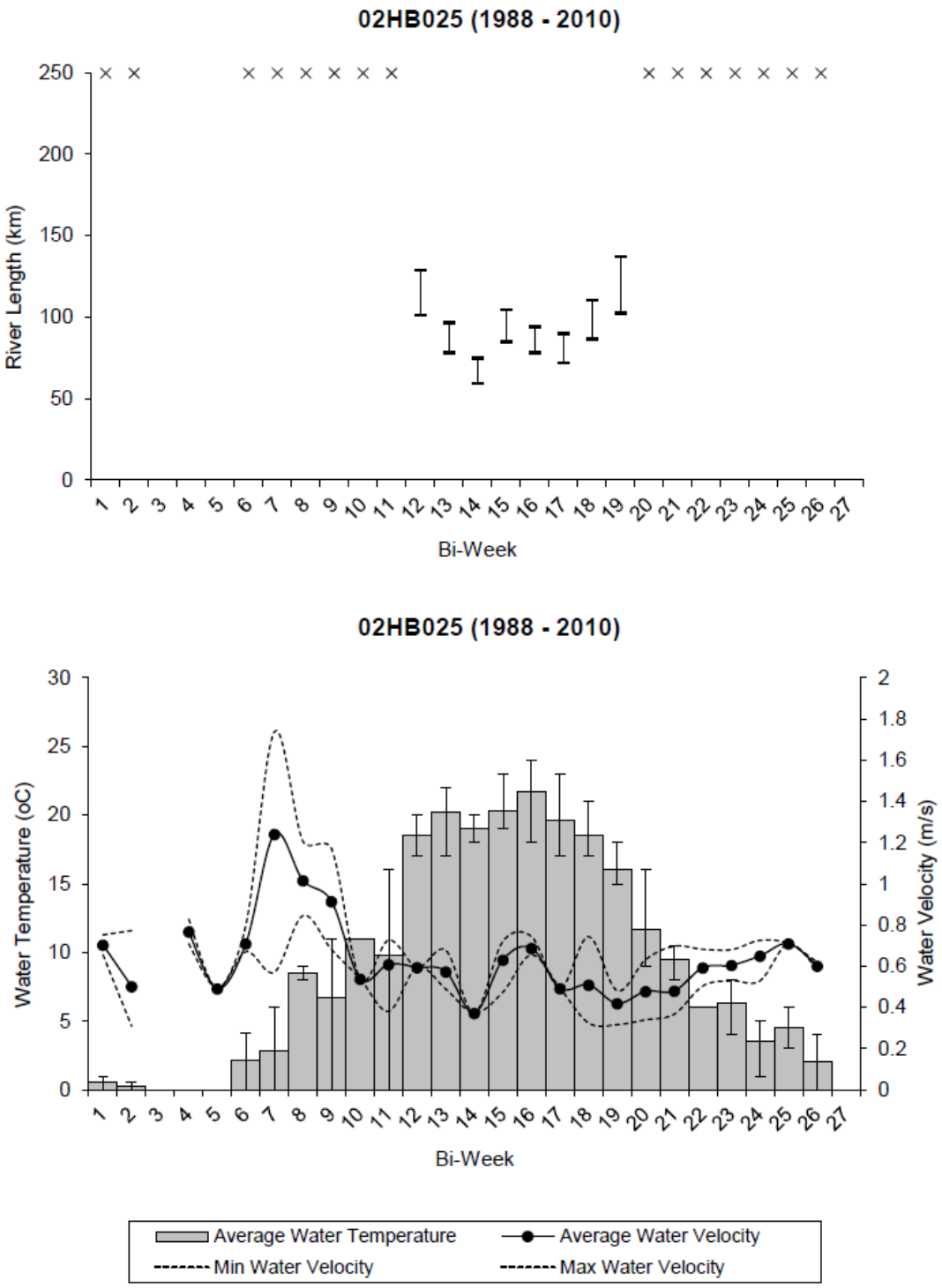


*Figure A1-168. Gauging station 02HB025 data from 1988–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

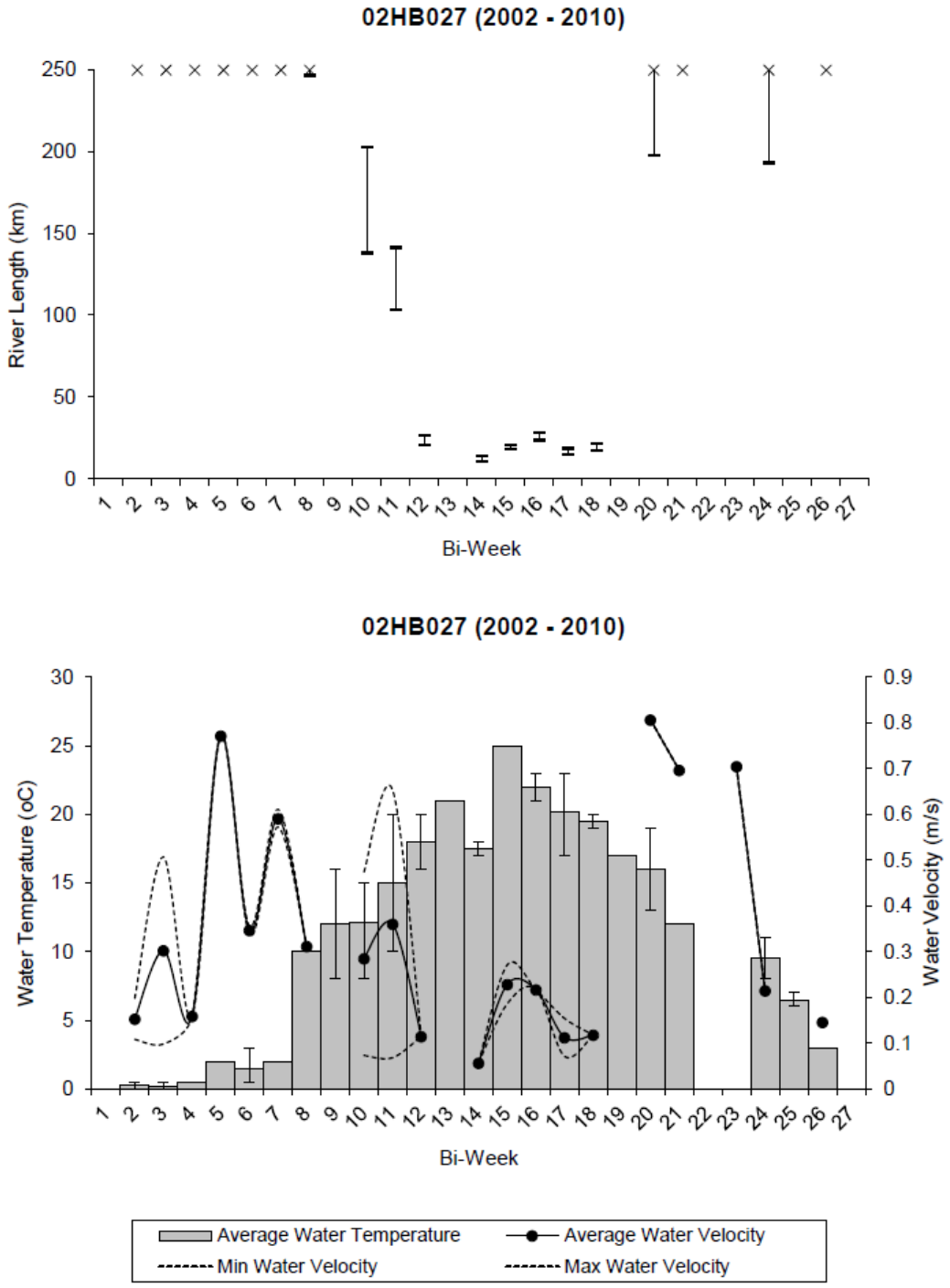


*Figure A1-169. Gauging station 02HB027 data from 2002–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

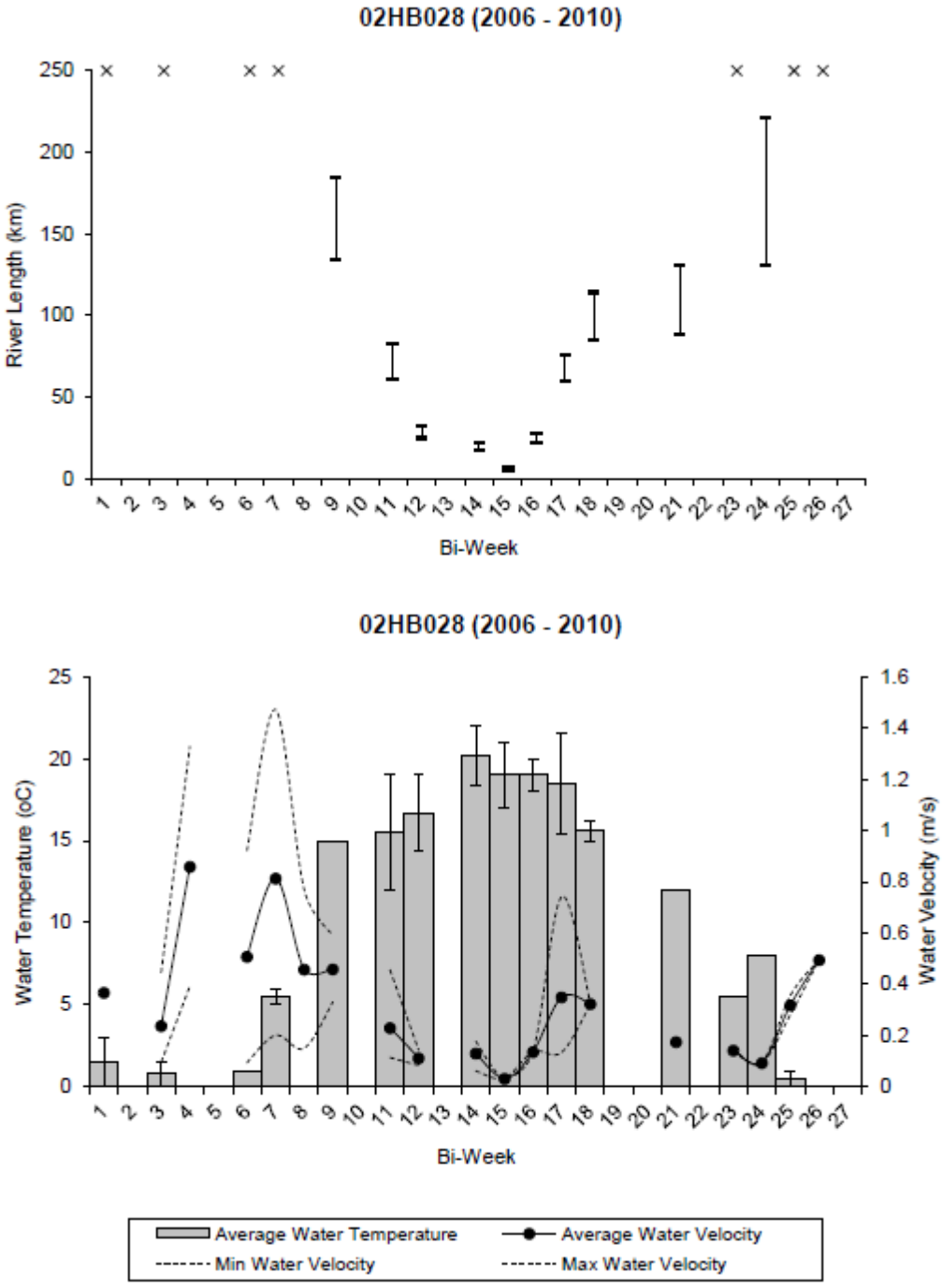


*Figure A1-170. Gauging station 02HB028 data from 2006–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

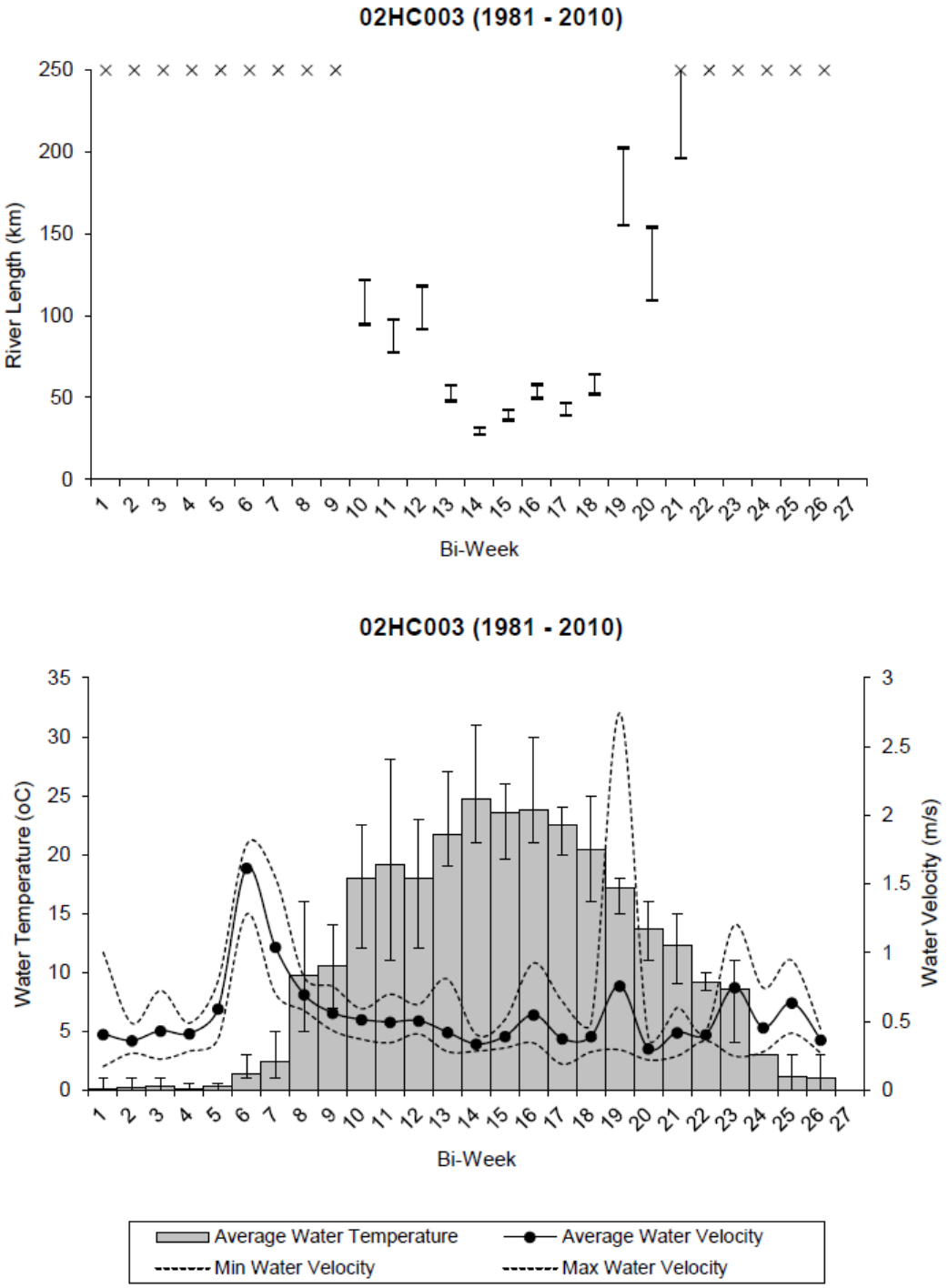


*Figure A1-171. Gauging station 02HC003 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

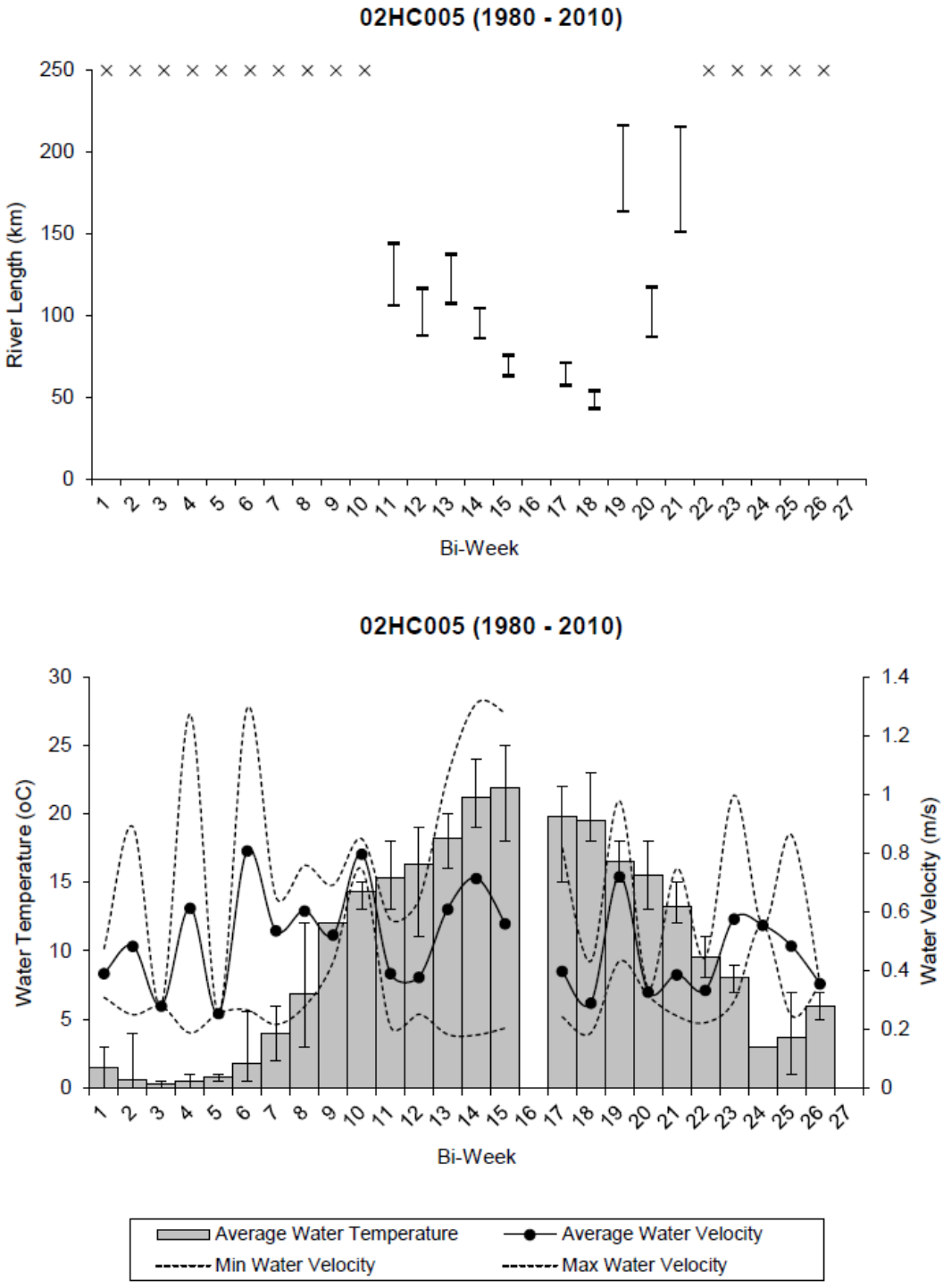


*Figure A1-172. Gauging station 02HC005 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

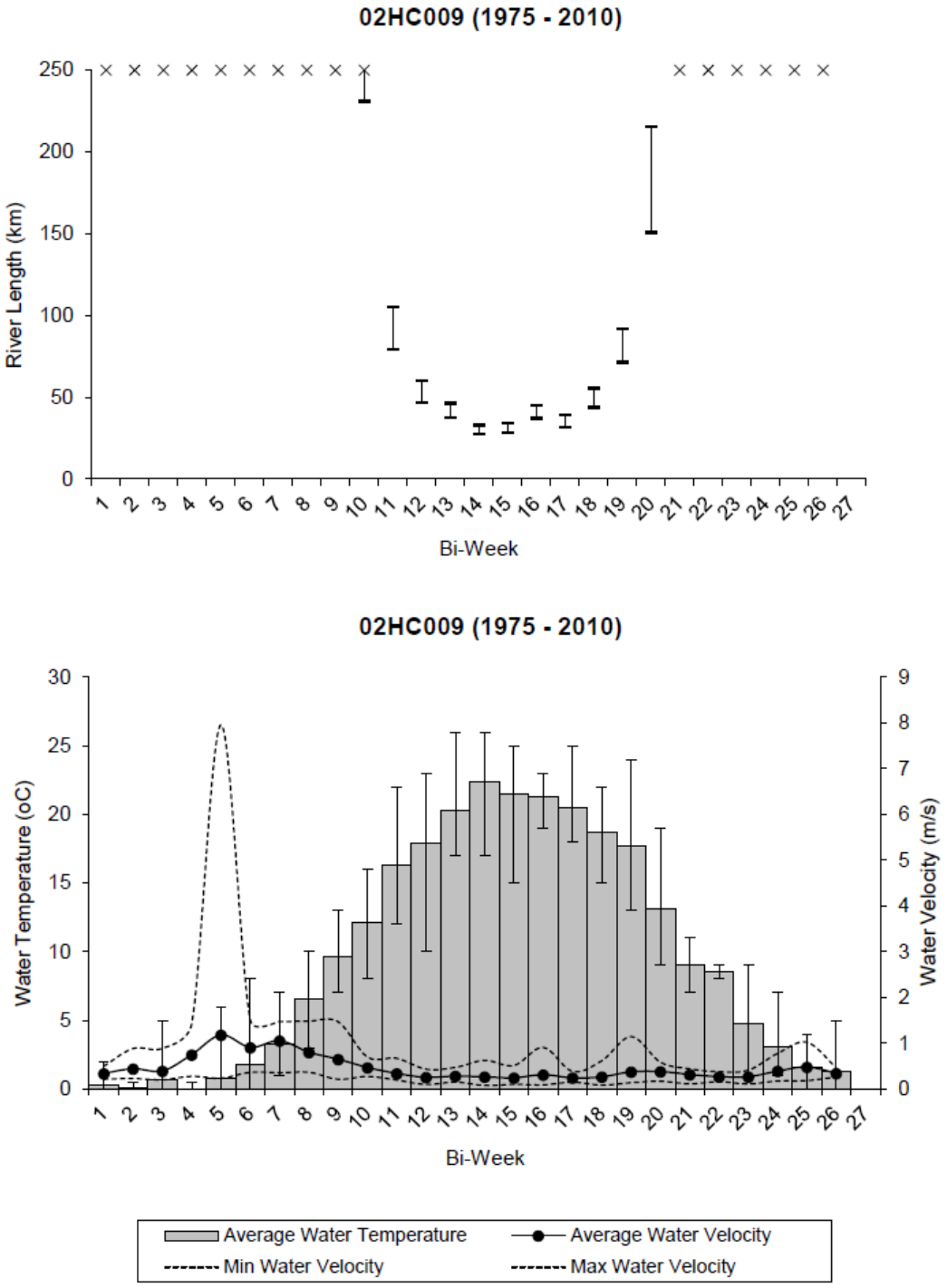


*Figure A1-173. Gauging station 02HC009 data from 1975–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

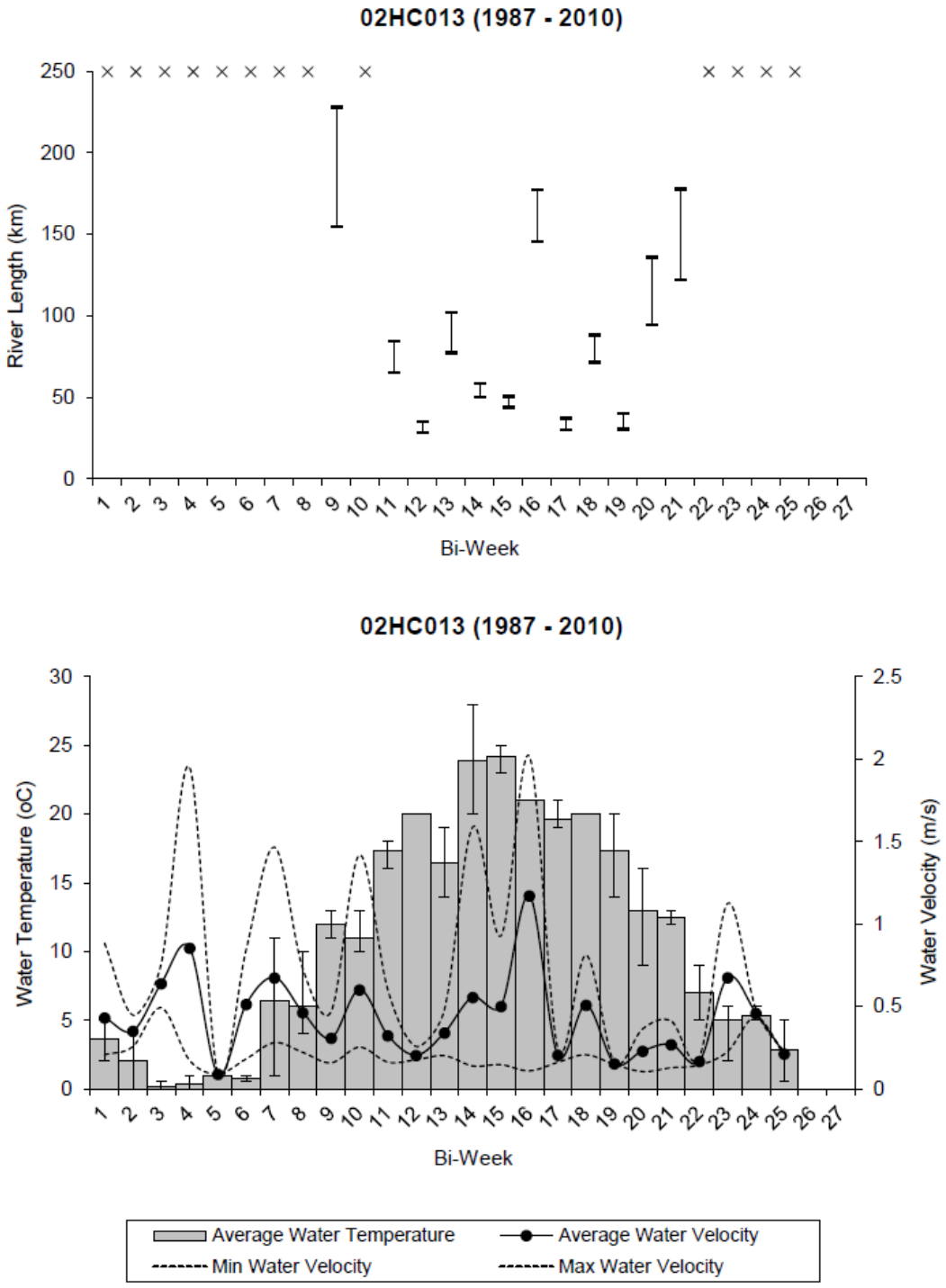


*Figure A1-174. Gauging station 02HC013 data from 1987–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

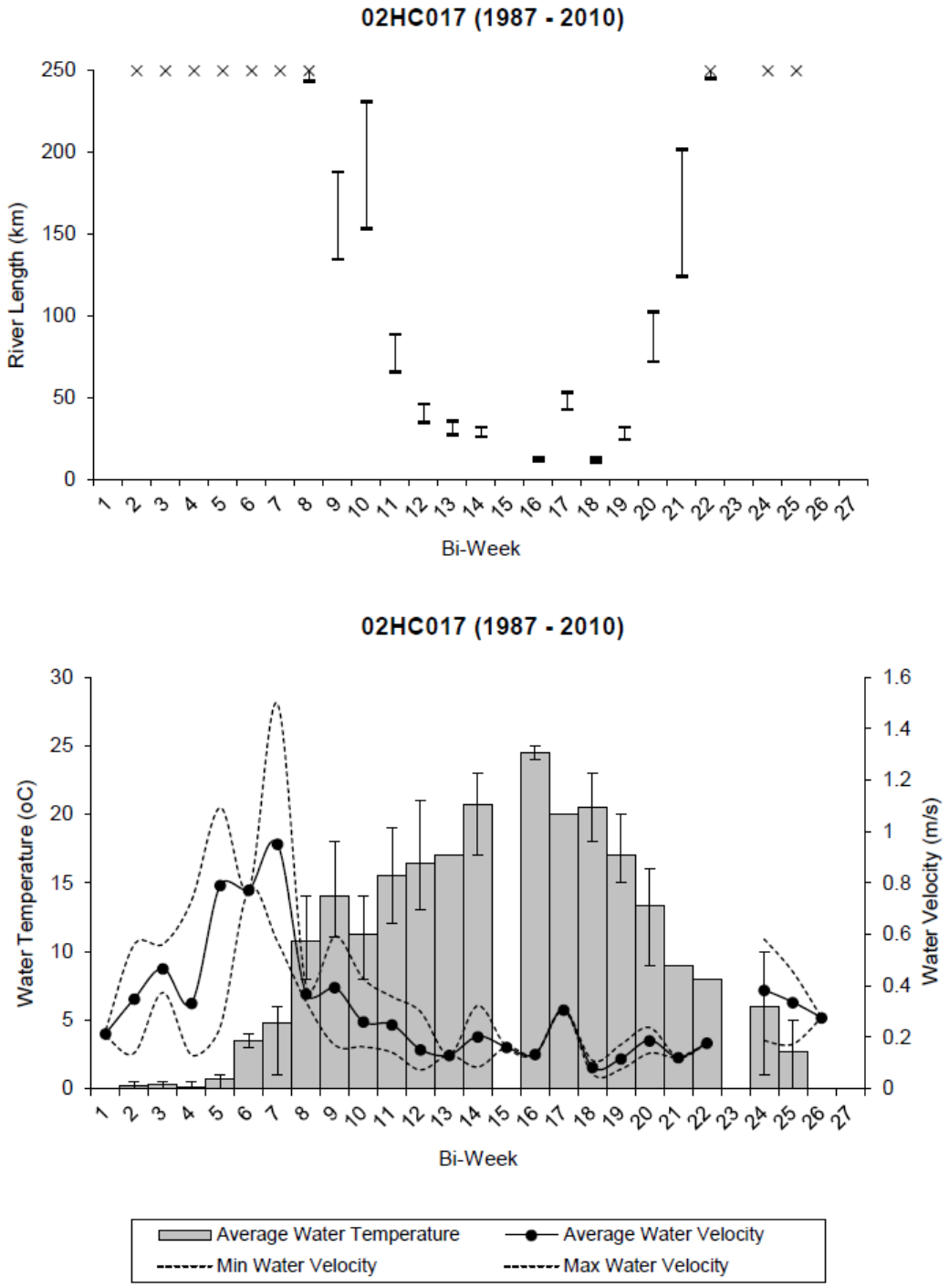


*Figure A1-175. Gauging station 02HC017 data from 1987–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

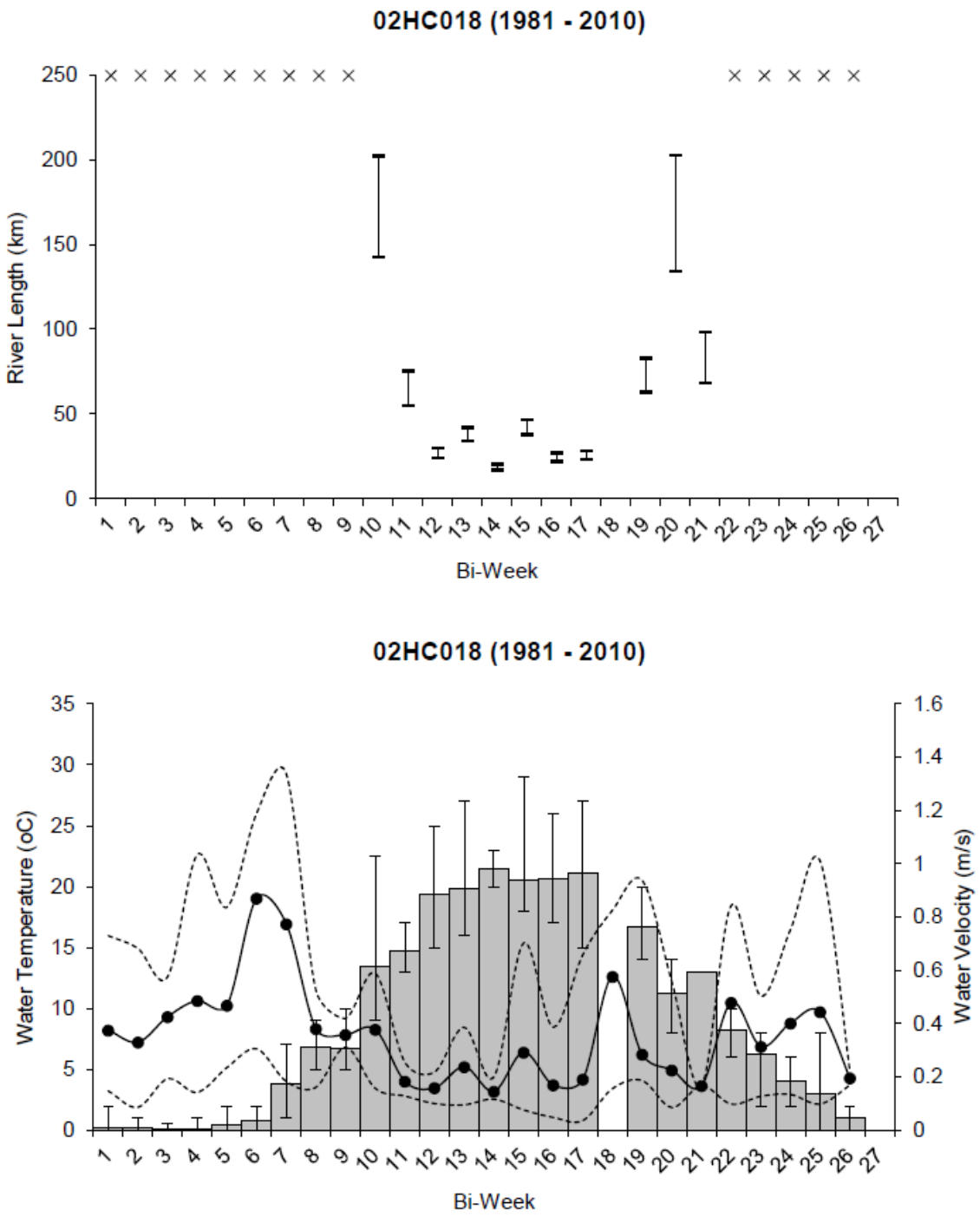


*Figure A1-176. Gauging station 02HC018 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

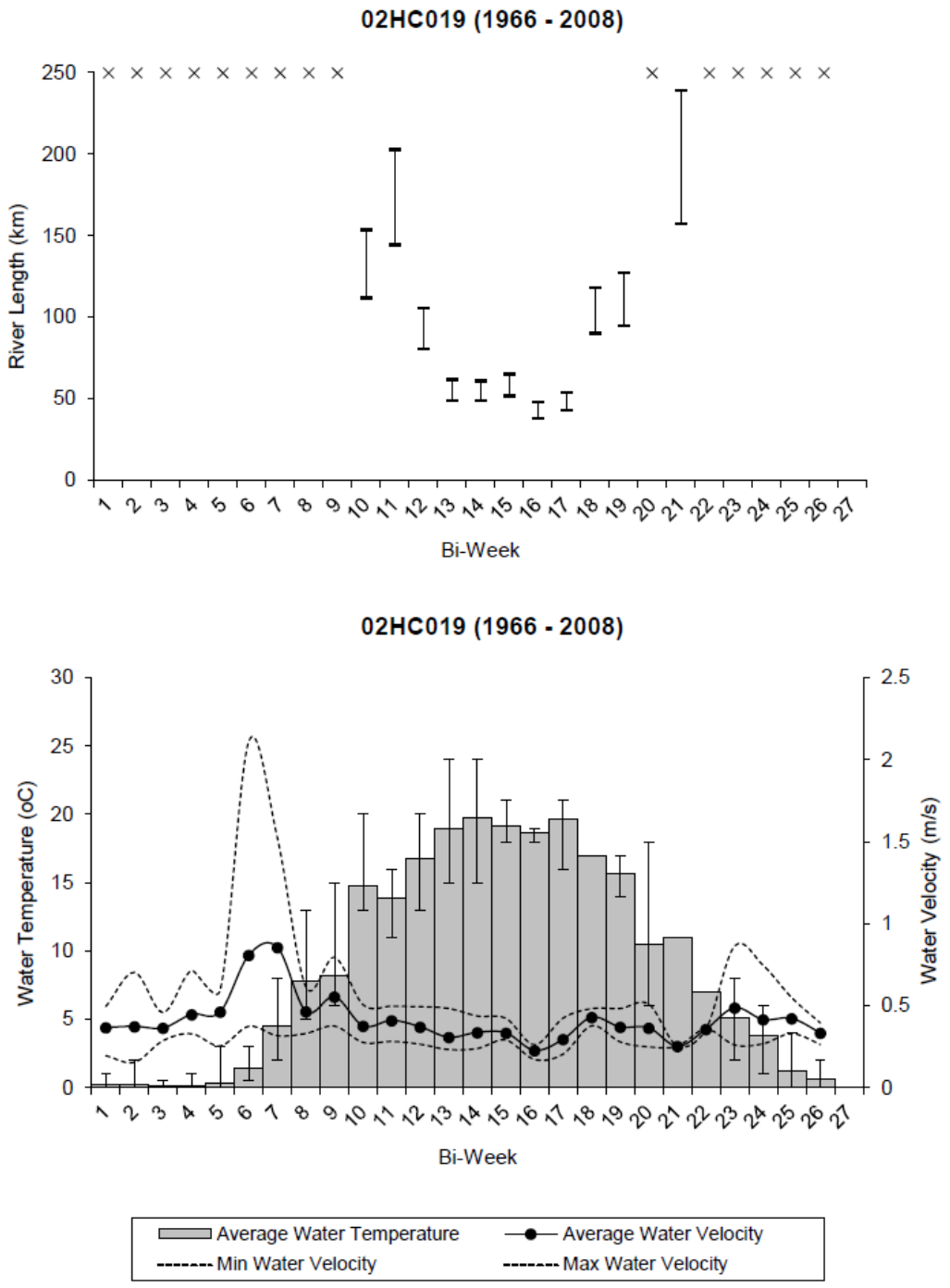


*Figure A1-177. Gauging station 02HC019 data from 1966–2008. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

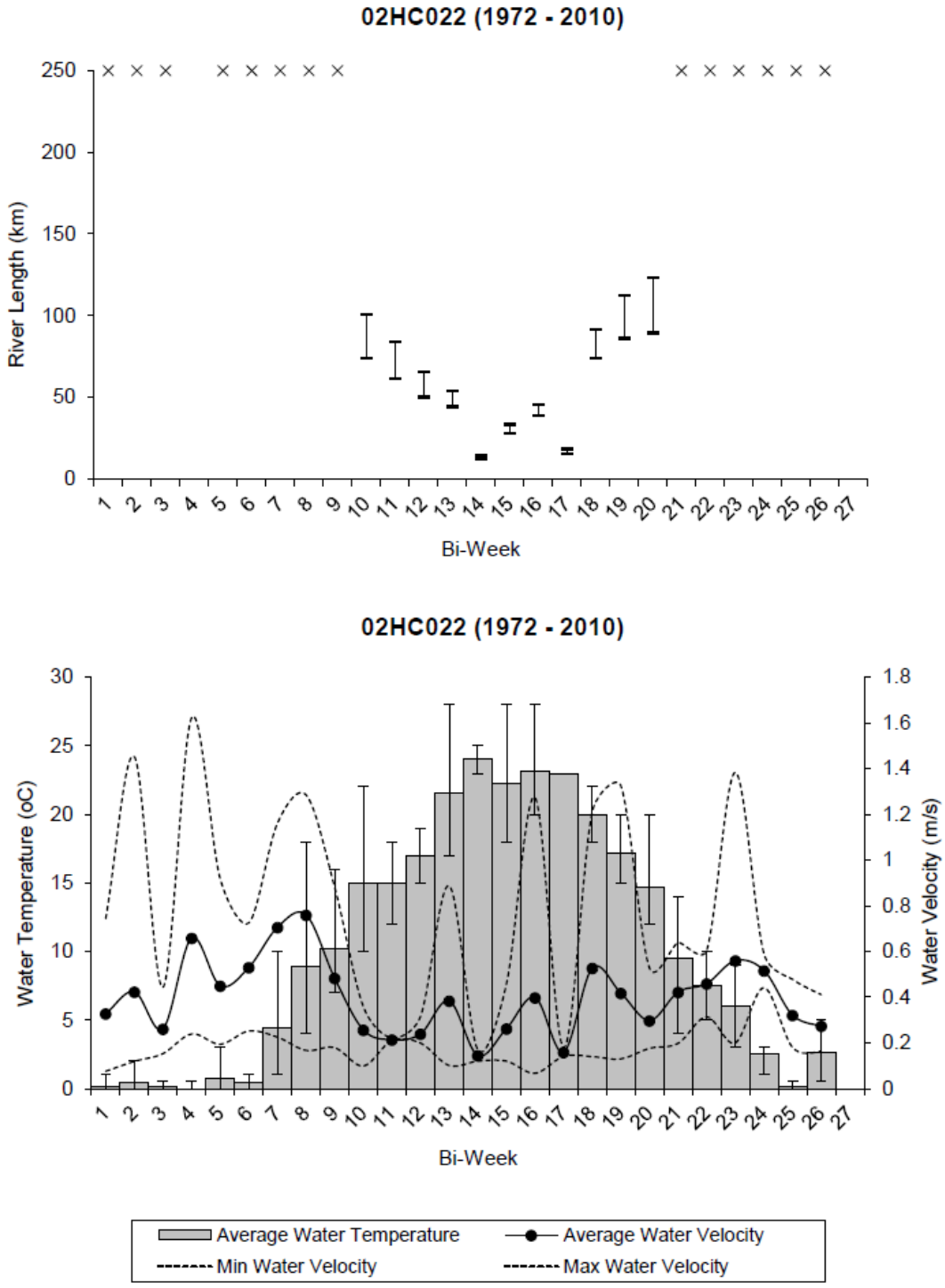


*Figure A1-178. Gauging station 02HC022 data from 1972–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

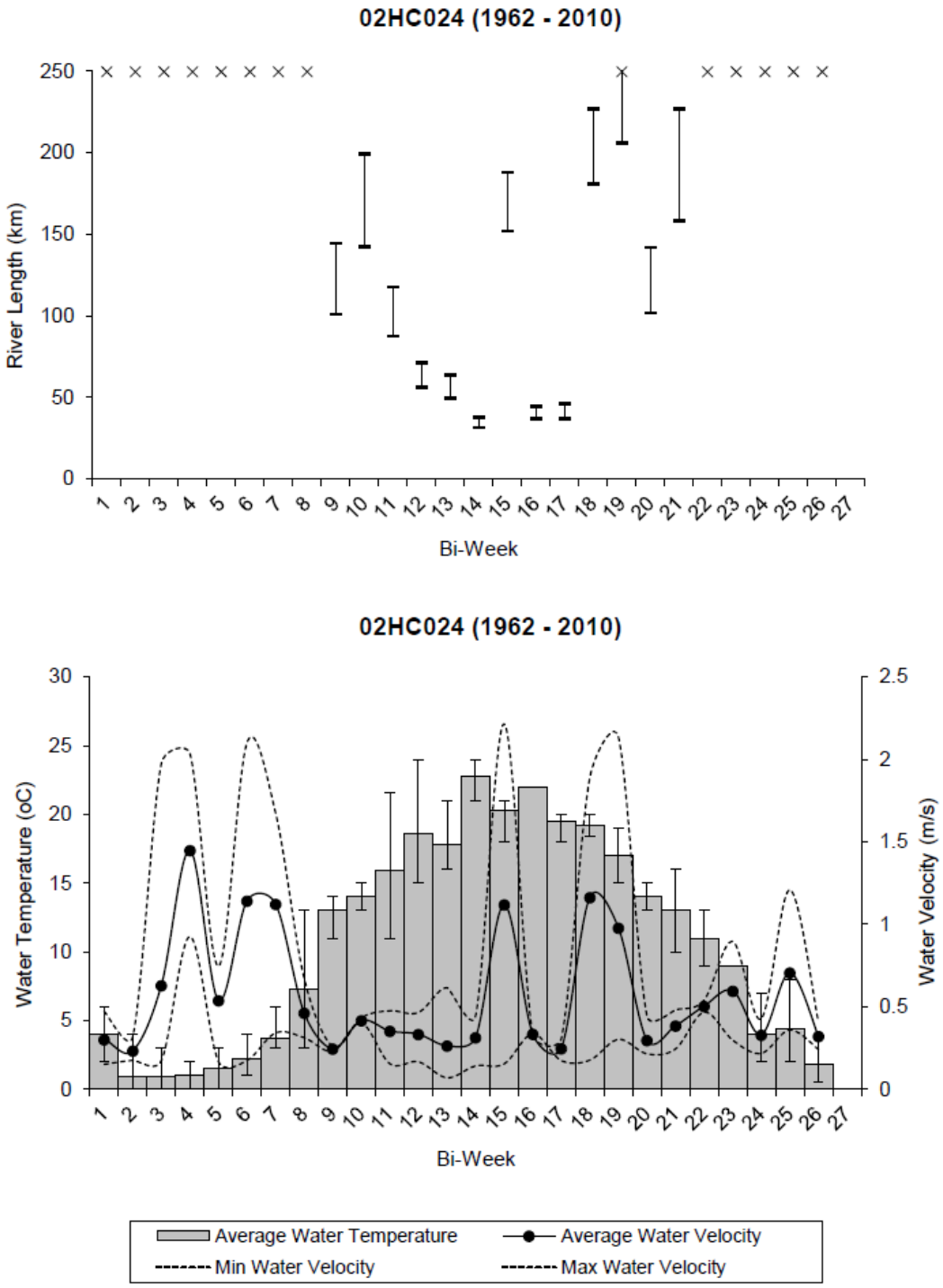


*Figure A1-179. Gauging station 02HC024 data from 1962–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

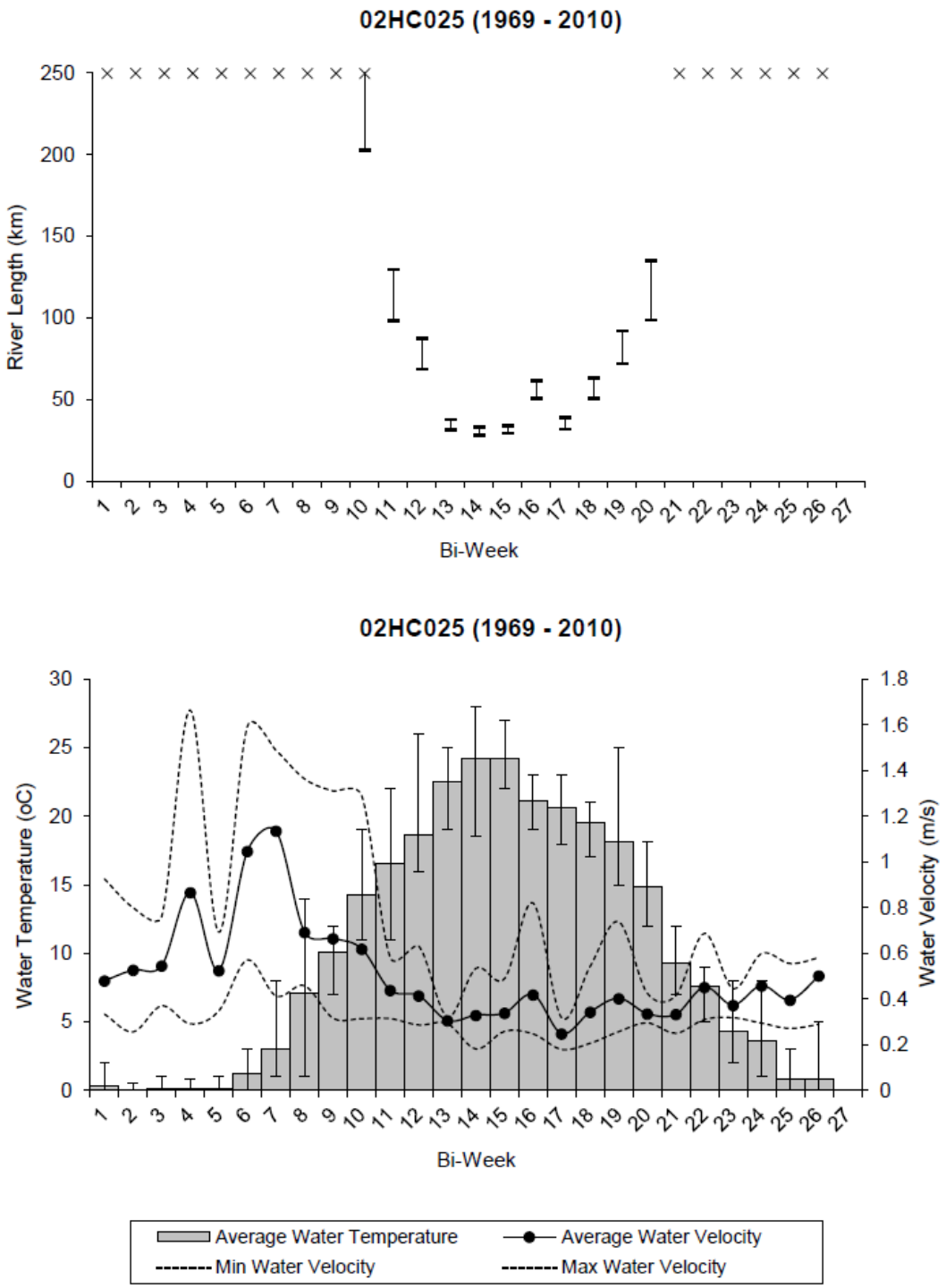


*Figure A1-180. Gauging station 02HC025 data from 1969–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

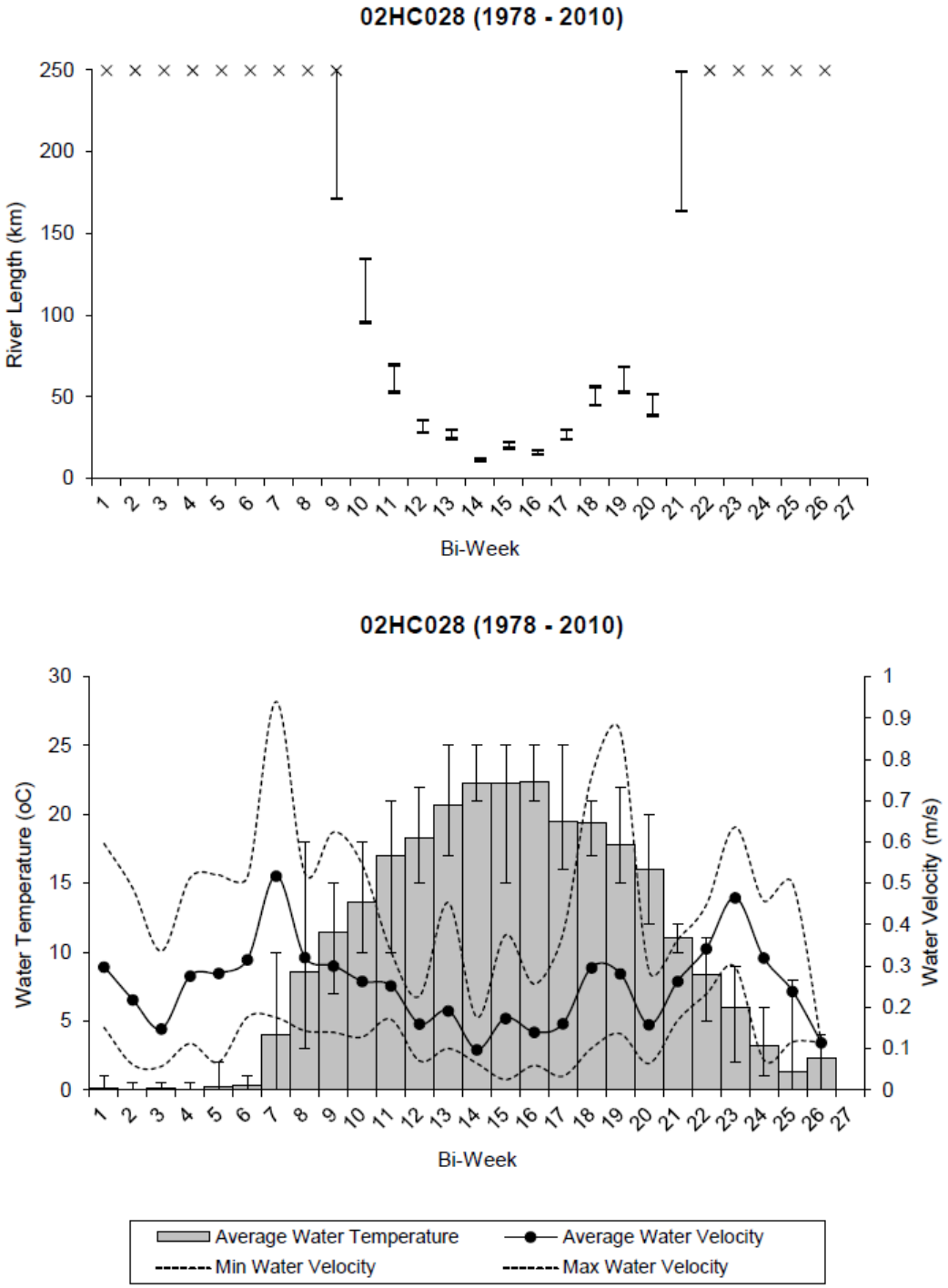


*Figure A1-181. Gauging station 02HC028 data from 1978–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

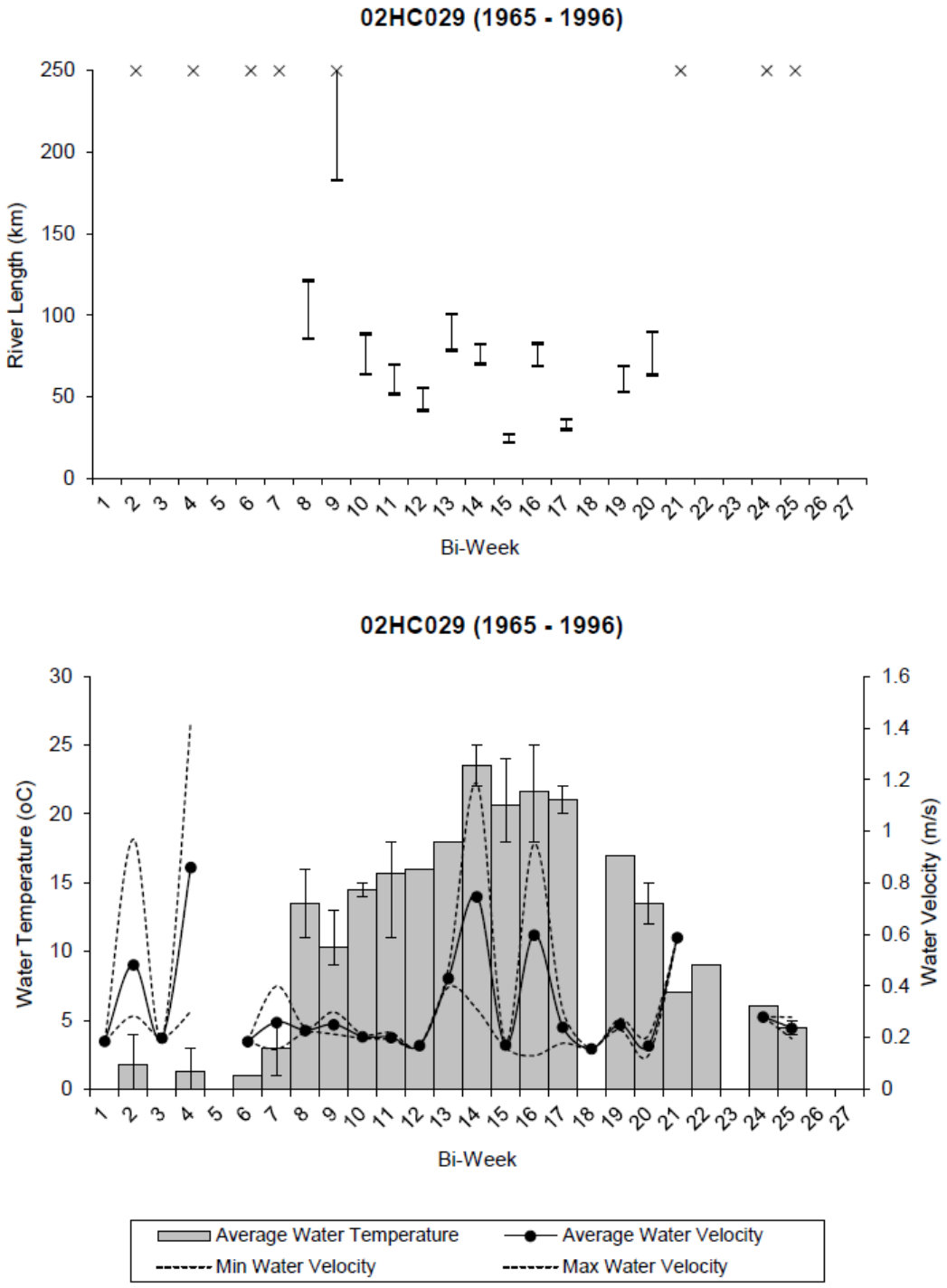


*Figure A1-182. Gauging station 02HC029 data from 1965–1996. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

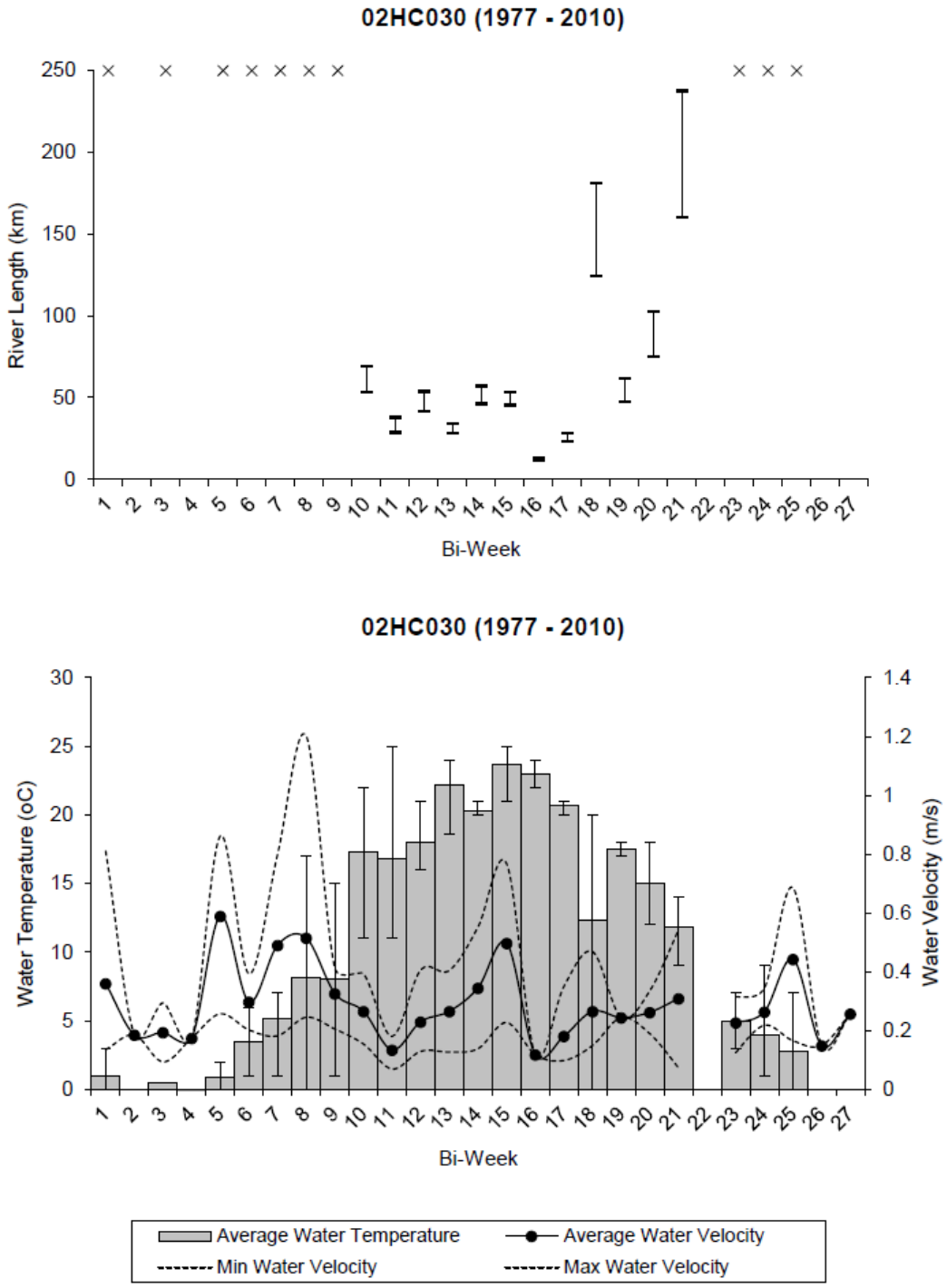


*Figure A1-183. Gauging station 02HC030 data from 1977–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

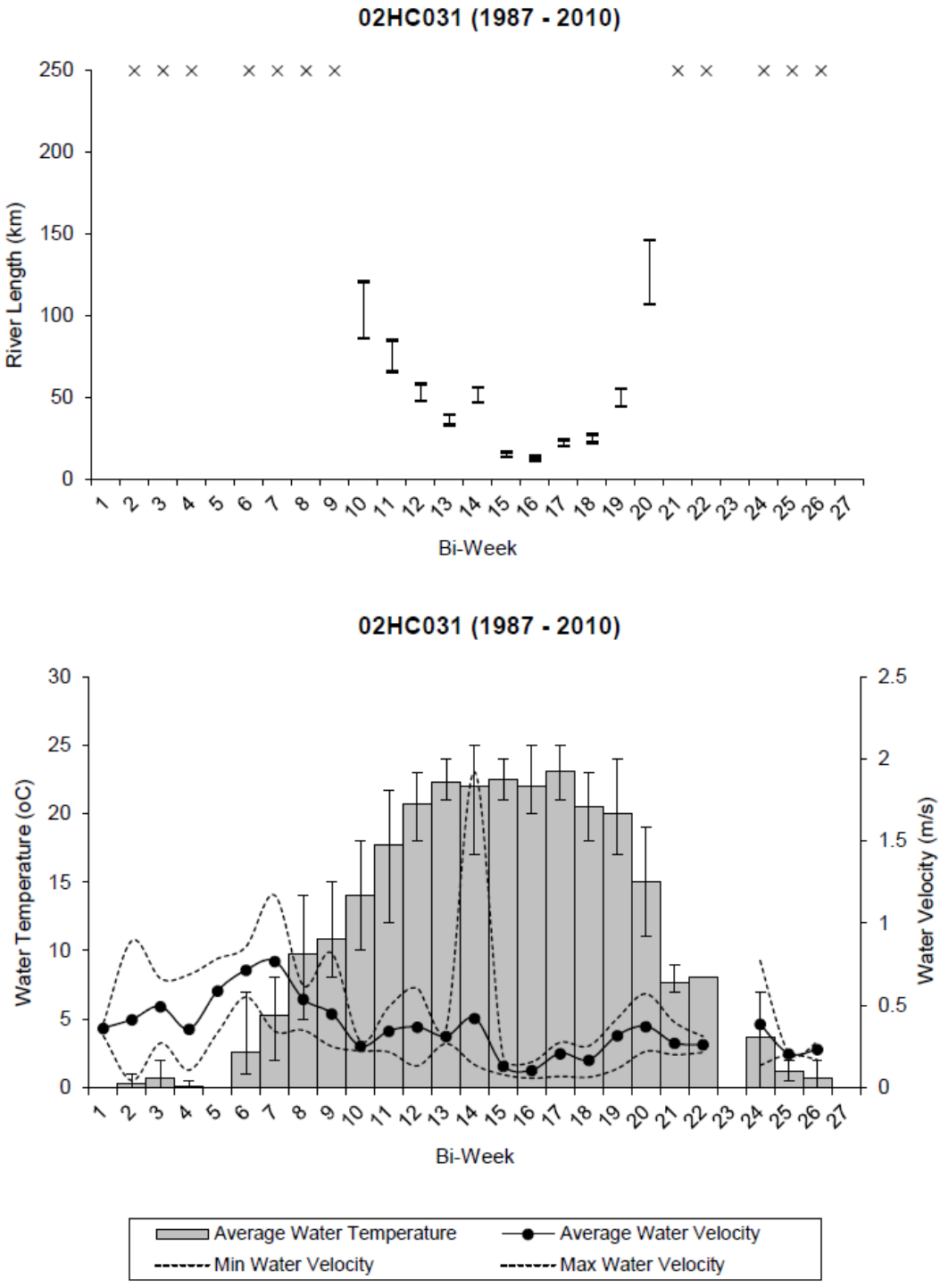


*Figure A1-184. Gauging station 02HC031 data from 1987–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

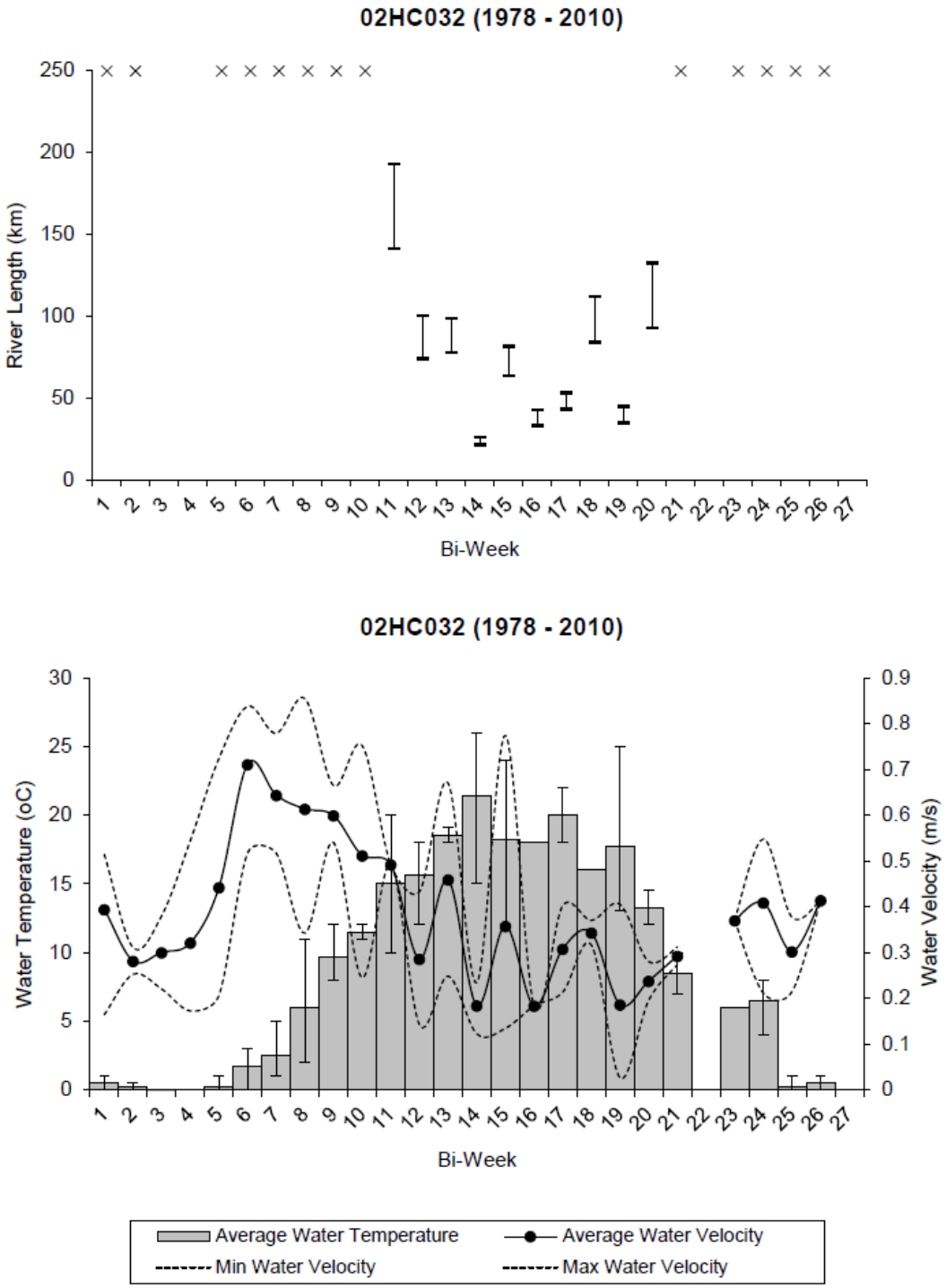


*Figure A1-185. Gauging station 02HC032 data from 1978–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

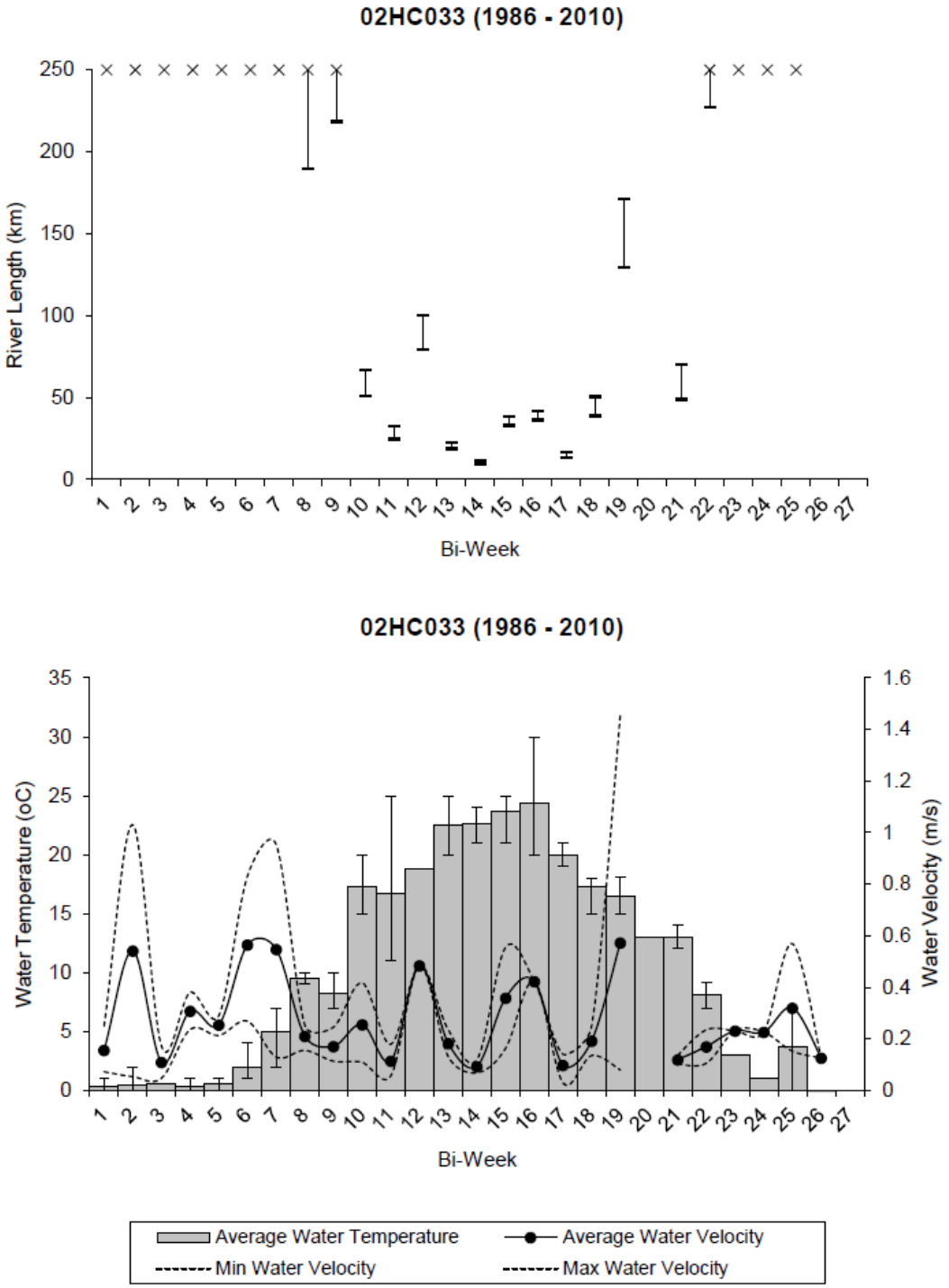


*Figure A1-186. Gauging station 02HC033 data from 1986–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

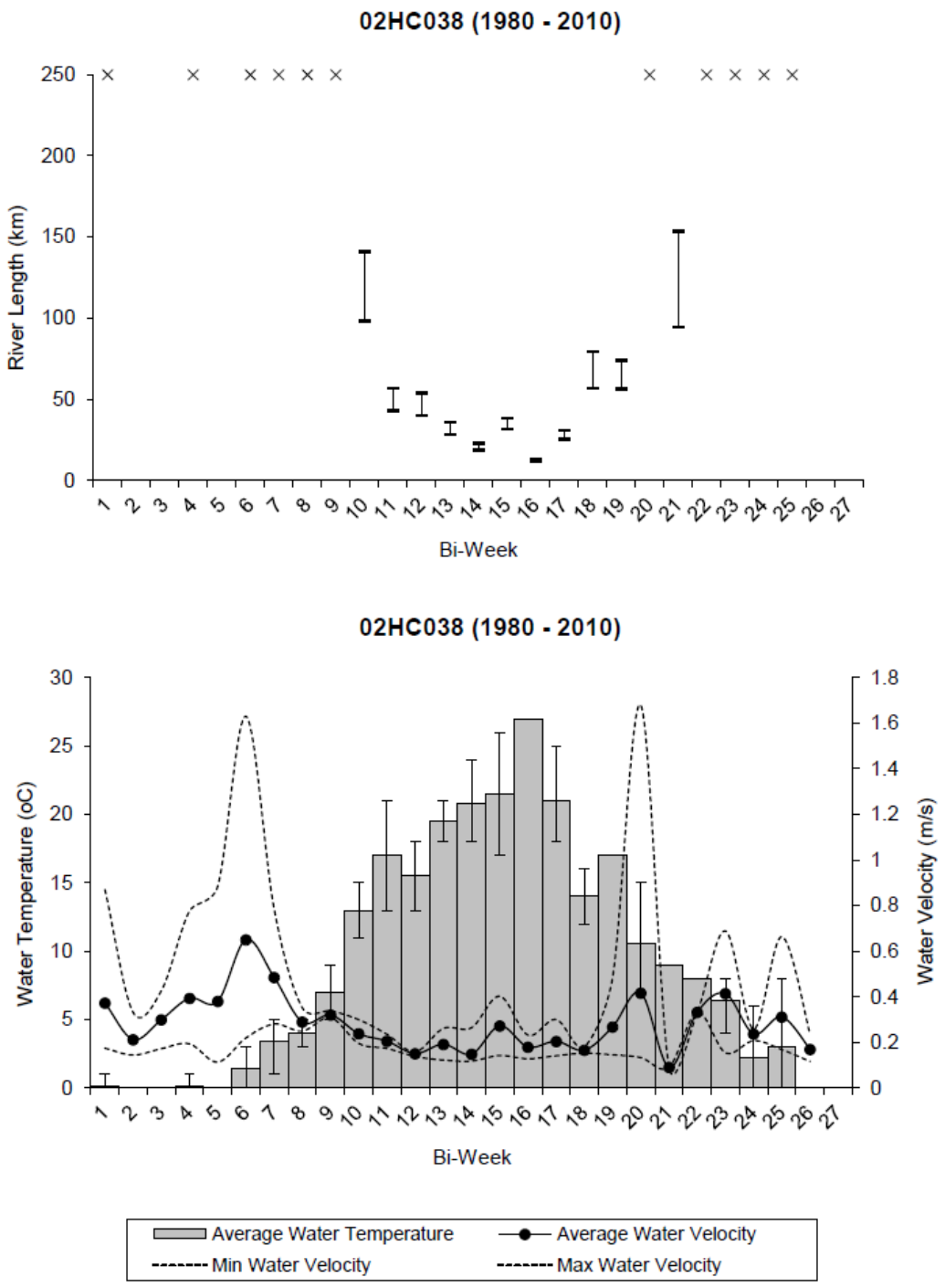


*Figure A1-187. Gauging station 02HC038 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

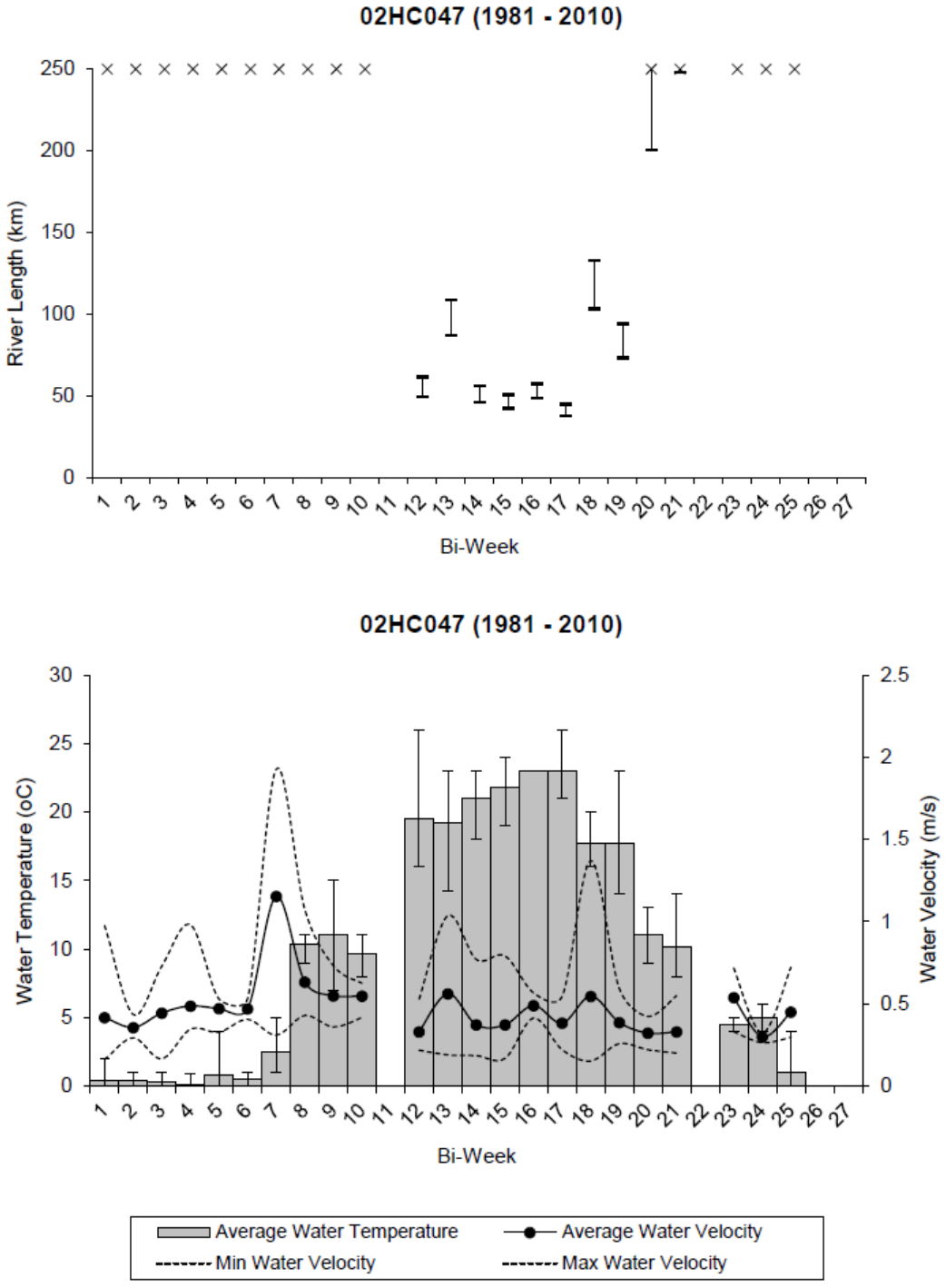


*Figure A1-188. Gauging station 02HC047 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

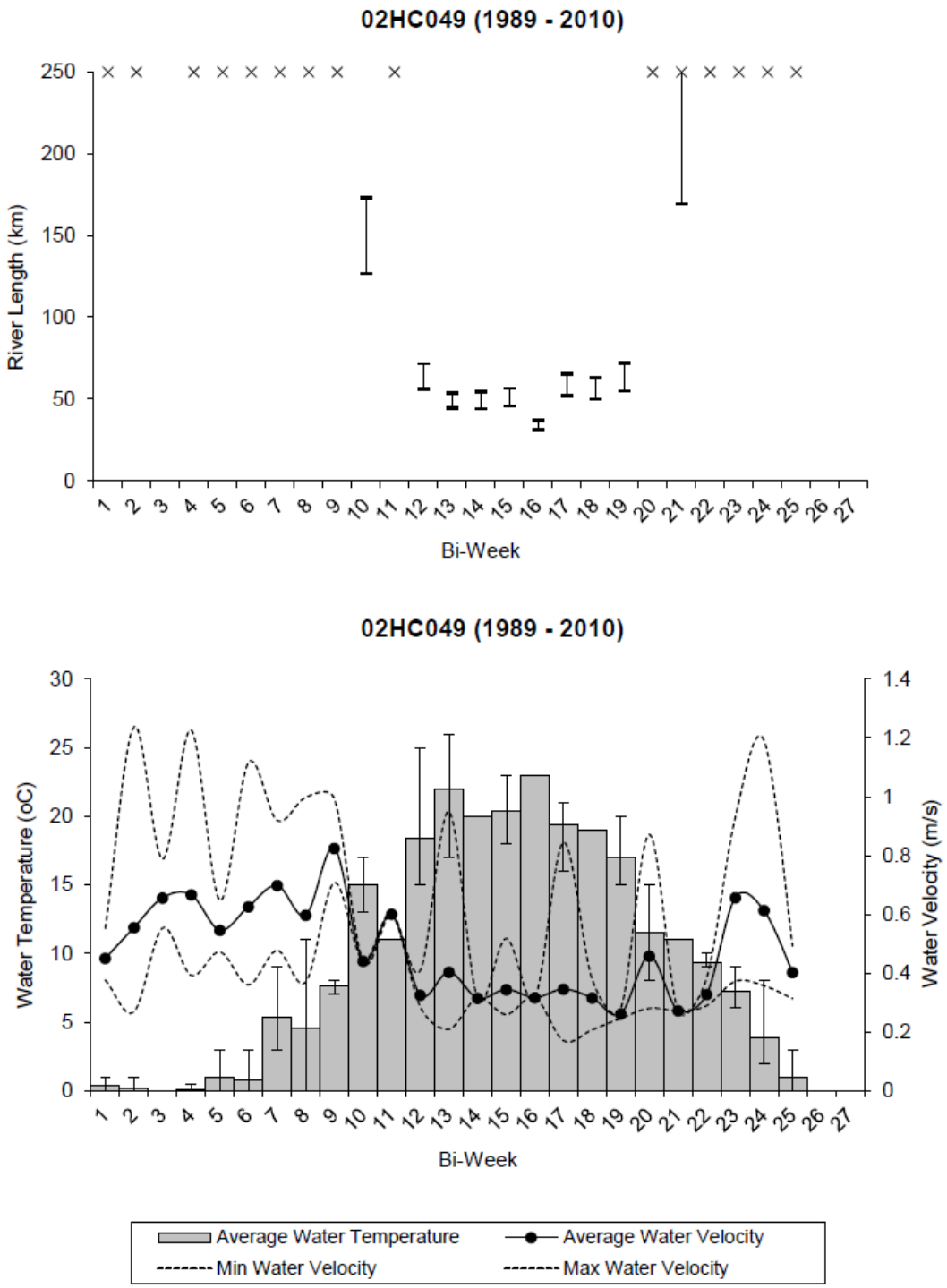


*Figure A1-189. Gauging station 02HC049 data from 1989–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

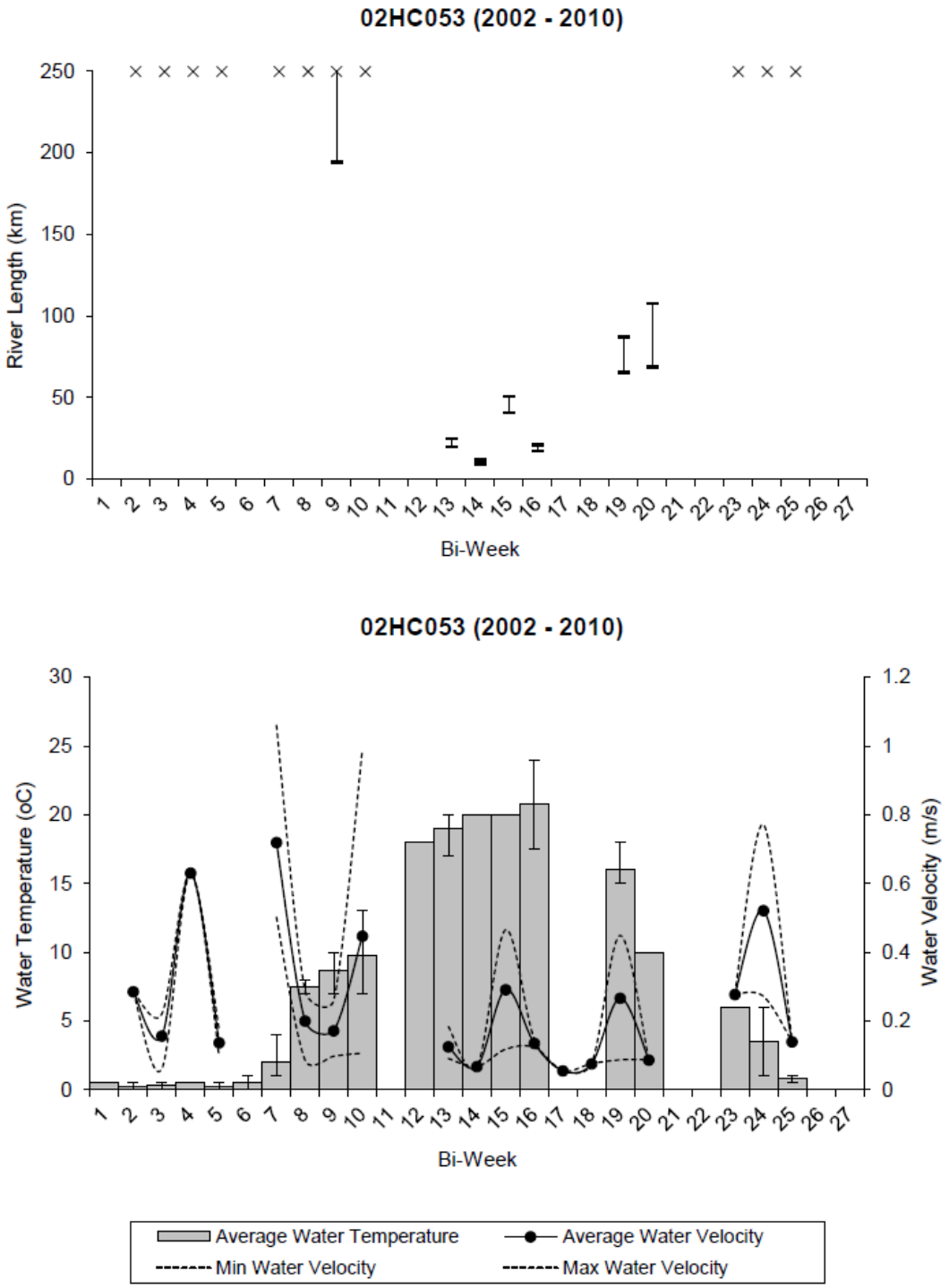


*Figure A1-190. Gauging station 02HC053 data from 2002–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

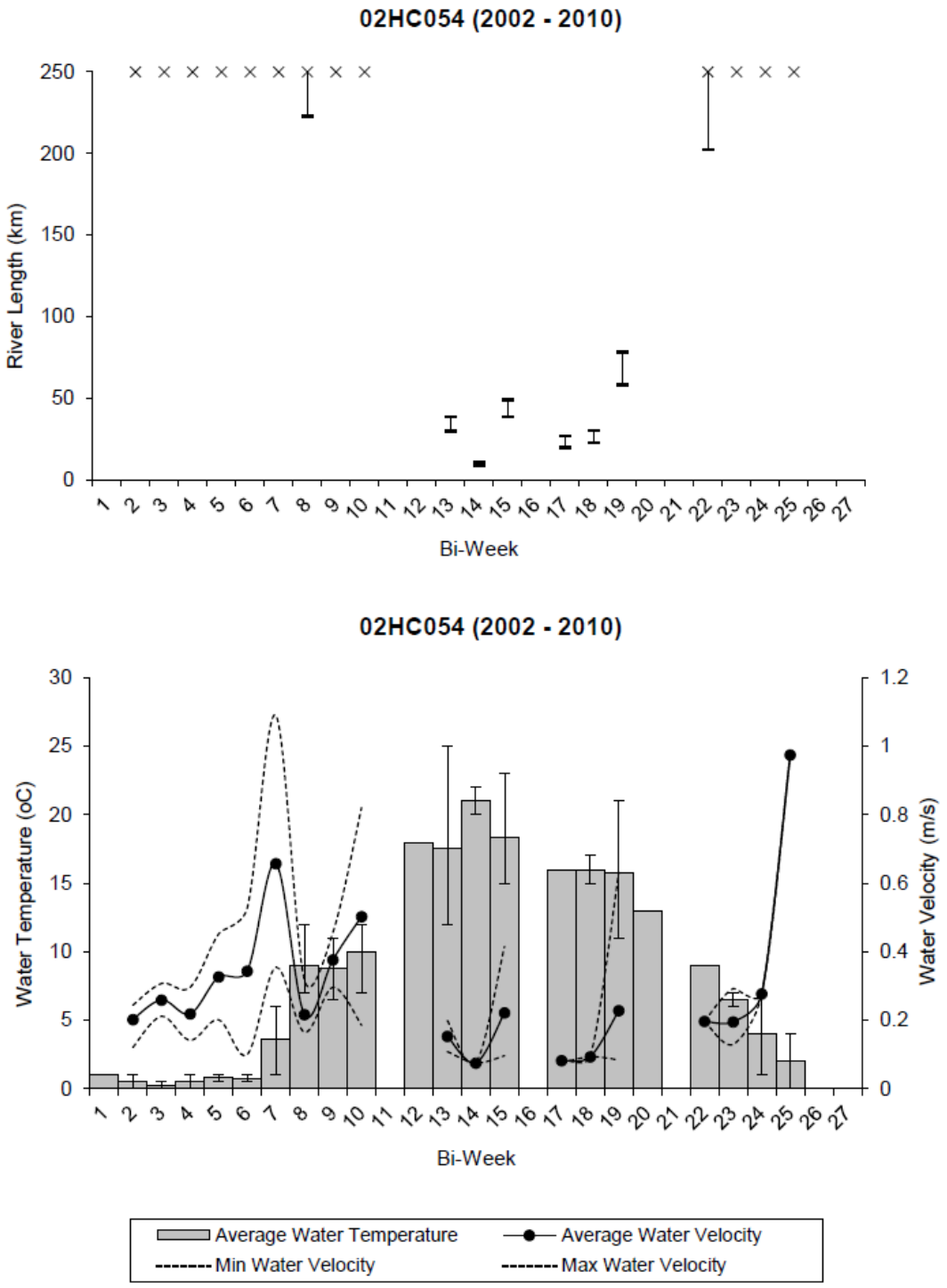


*Figure A1-191. Gauging station 02HC054 data from 2002–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

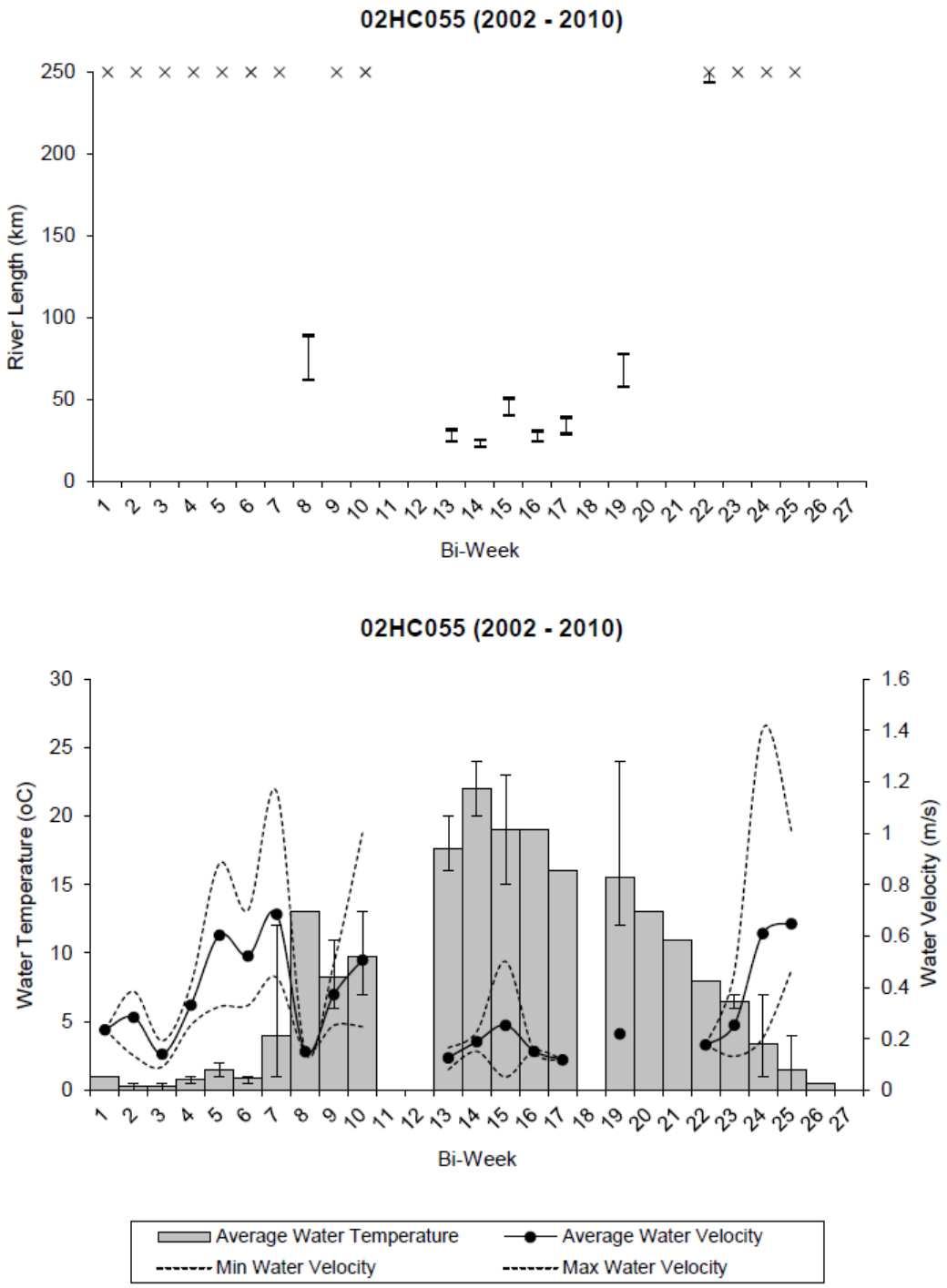


*Figure A1-192. Gauging station 02HC055 data from 2002–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

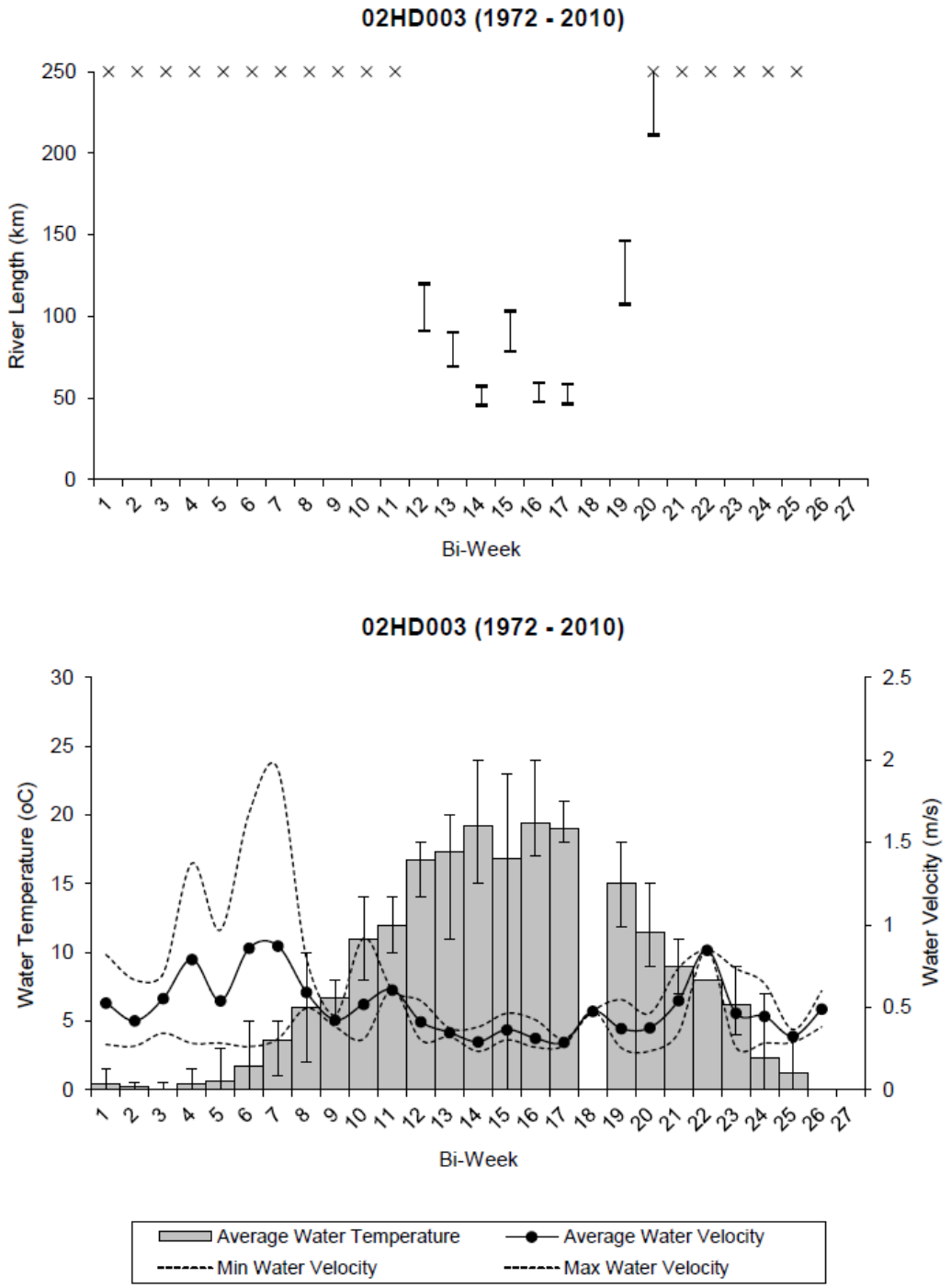


*Figure A1-193. Gauging station 02HD003 data from 1972–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

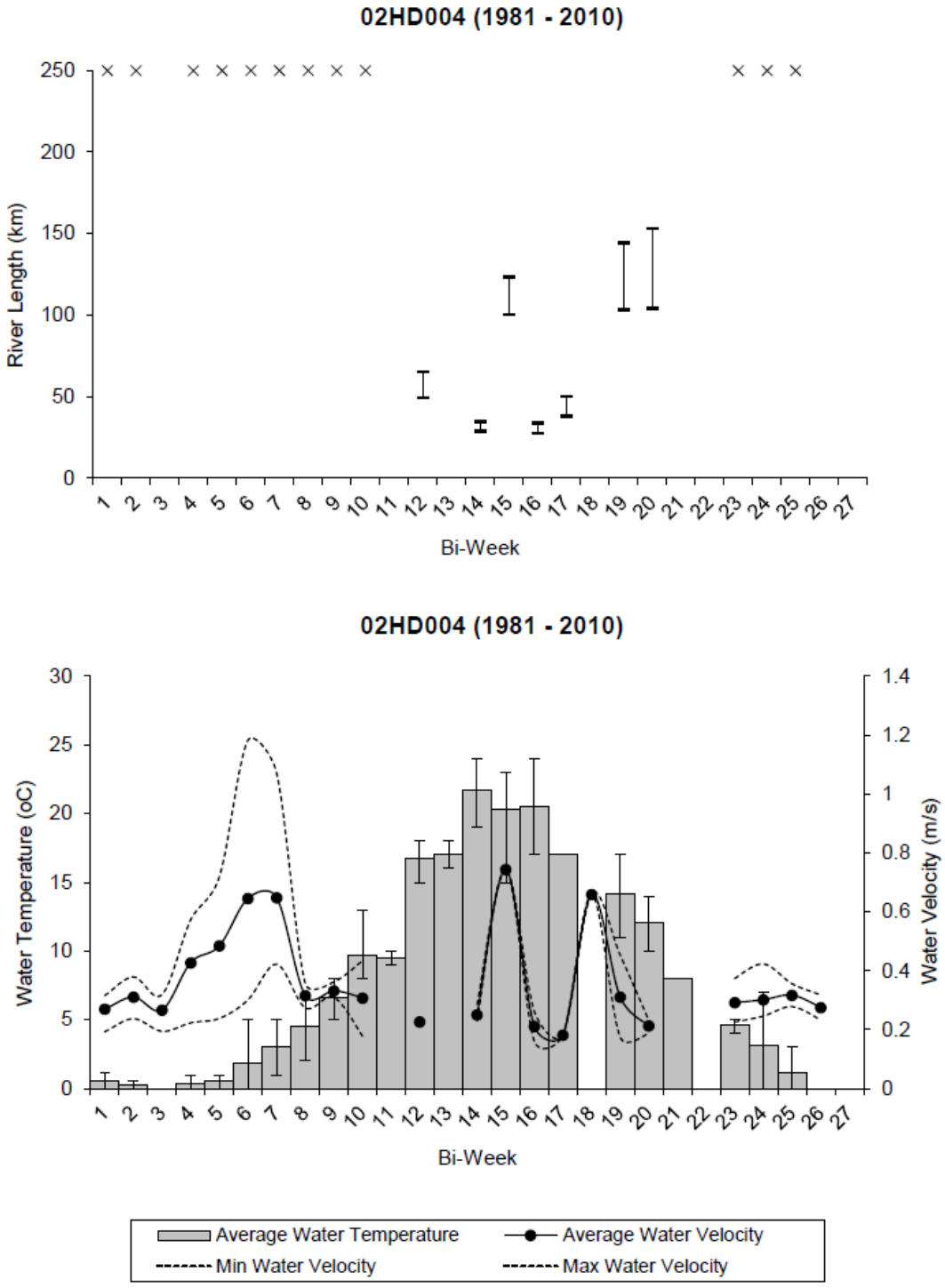


*Figure A1-194. Gauging station 02HD004 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

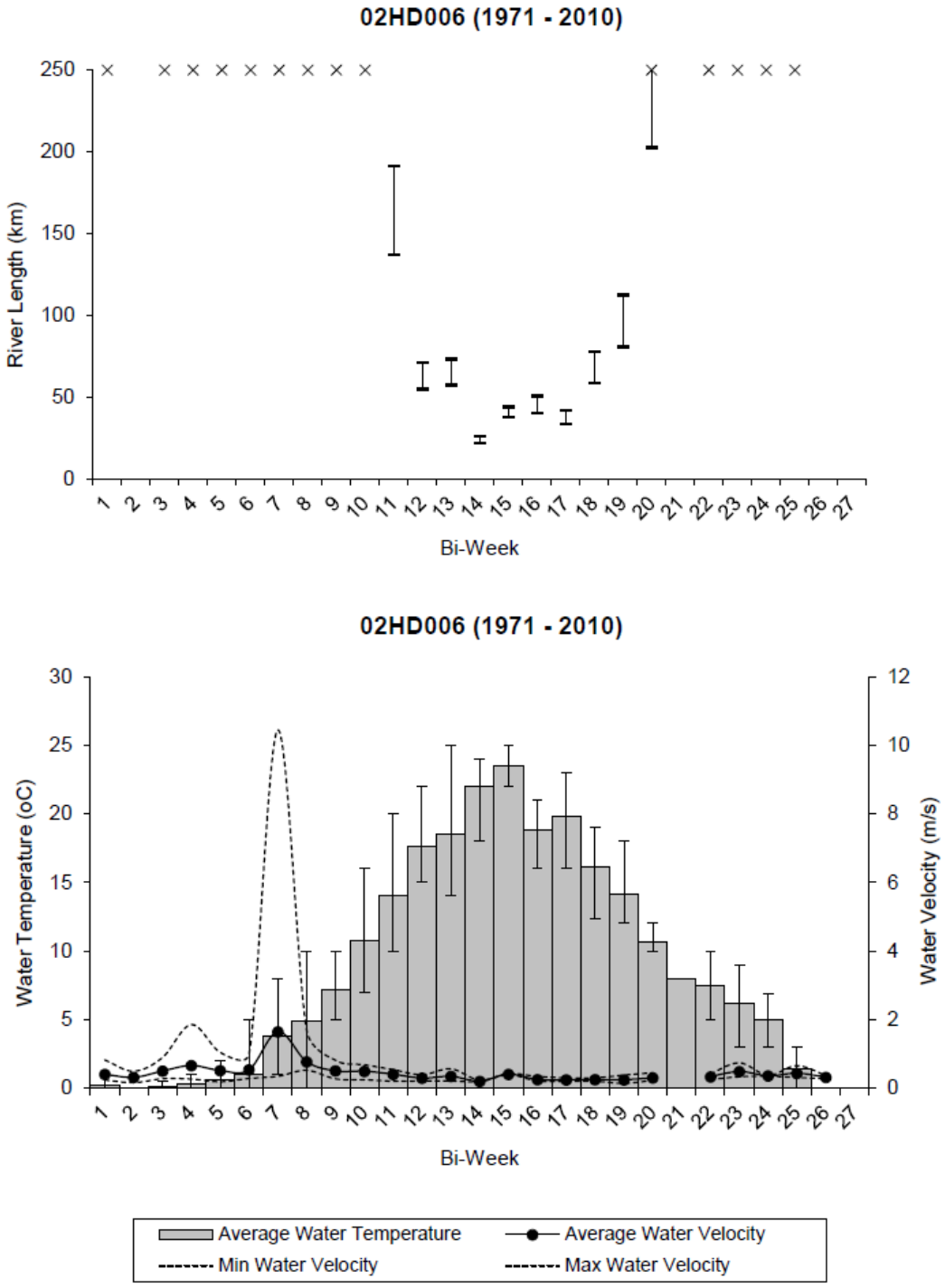


*Figure A1-195. Gauging station 02HD006 data from 1971–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

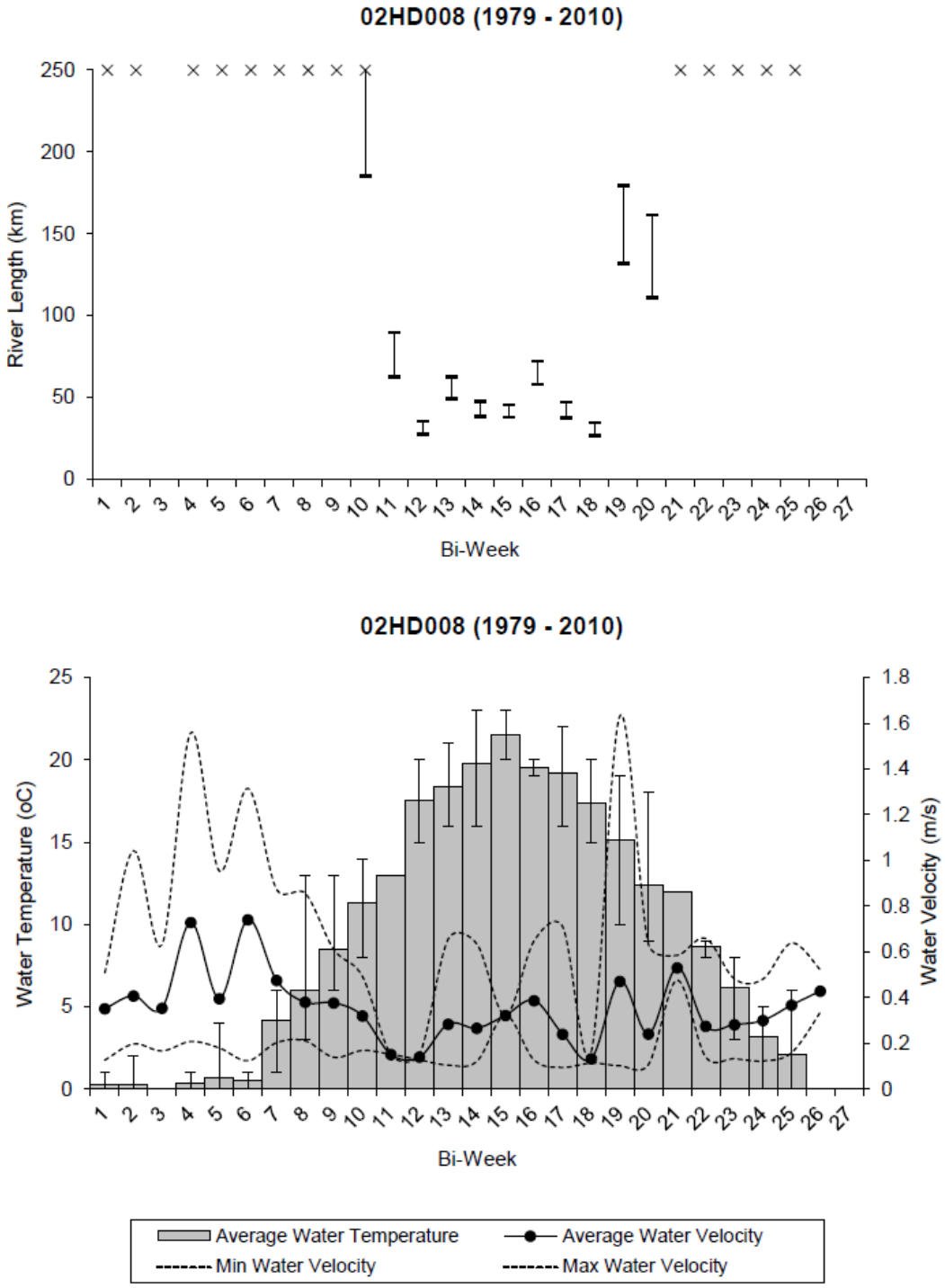


*Figure A1-196. Gauging station 02HD008 data from 1979–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

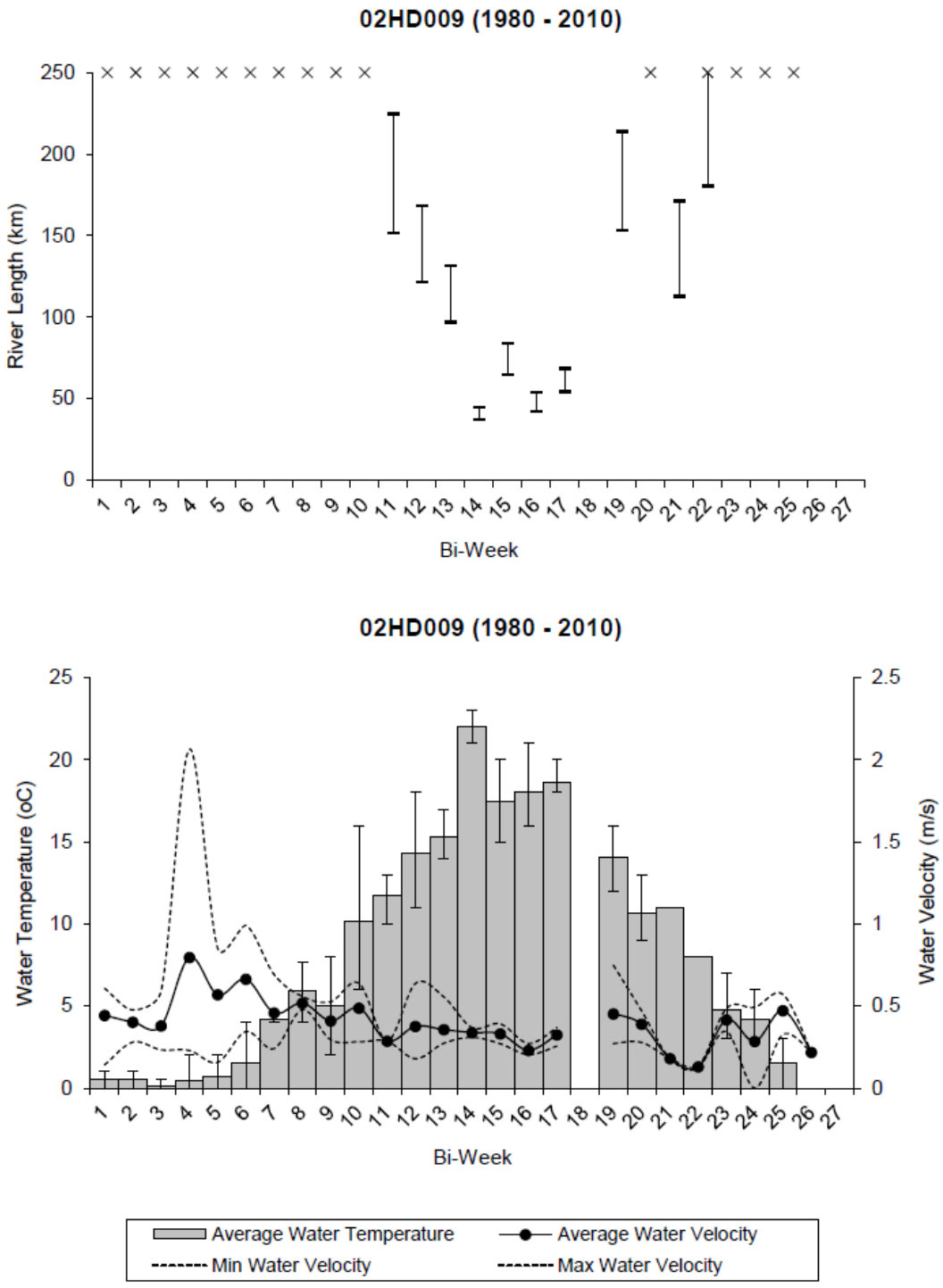


*Figure A1-197. Gauging station 02HD009 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

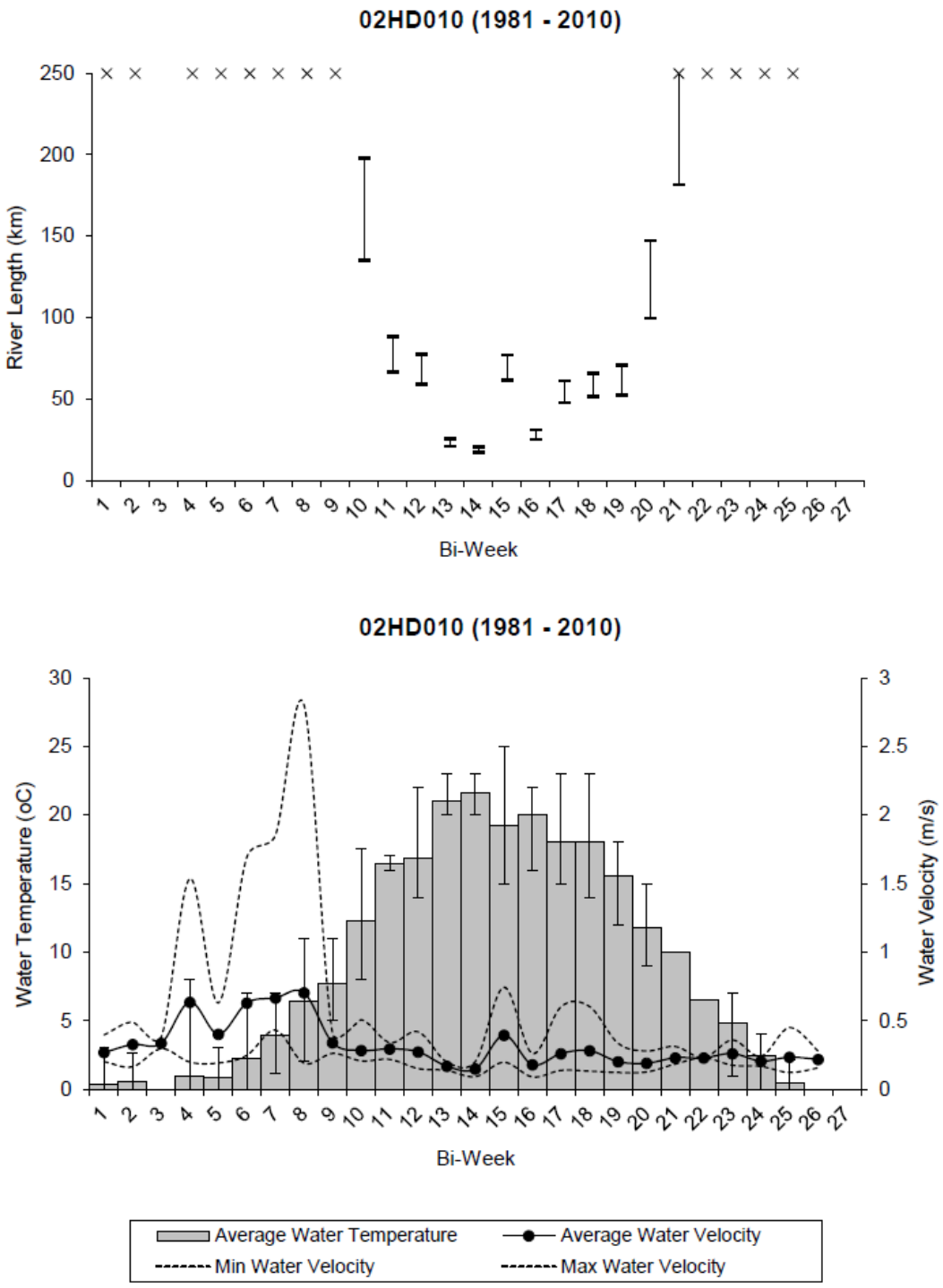


*Figure A1-198. Gauging station 02HD010 data from 1981–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

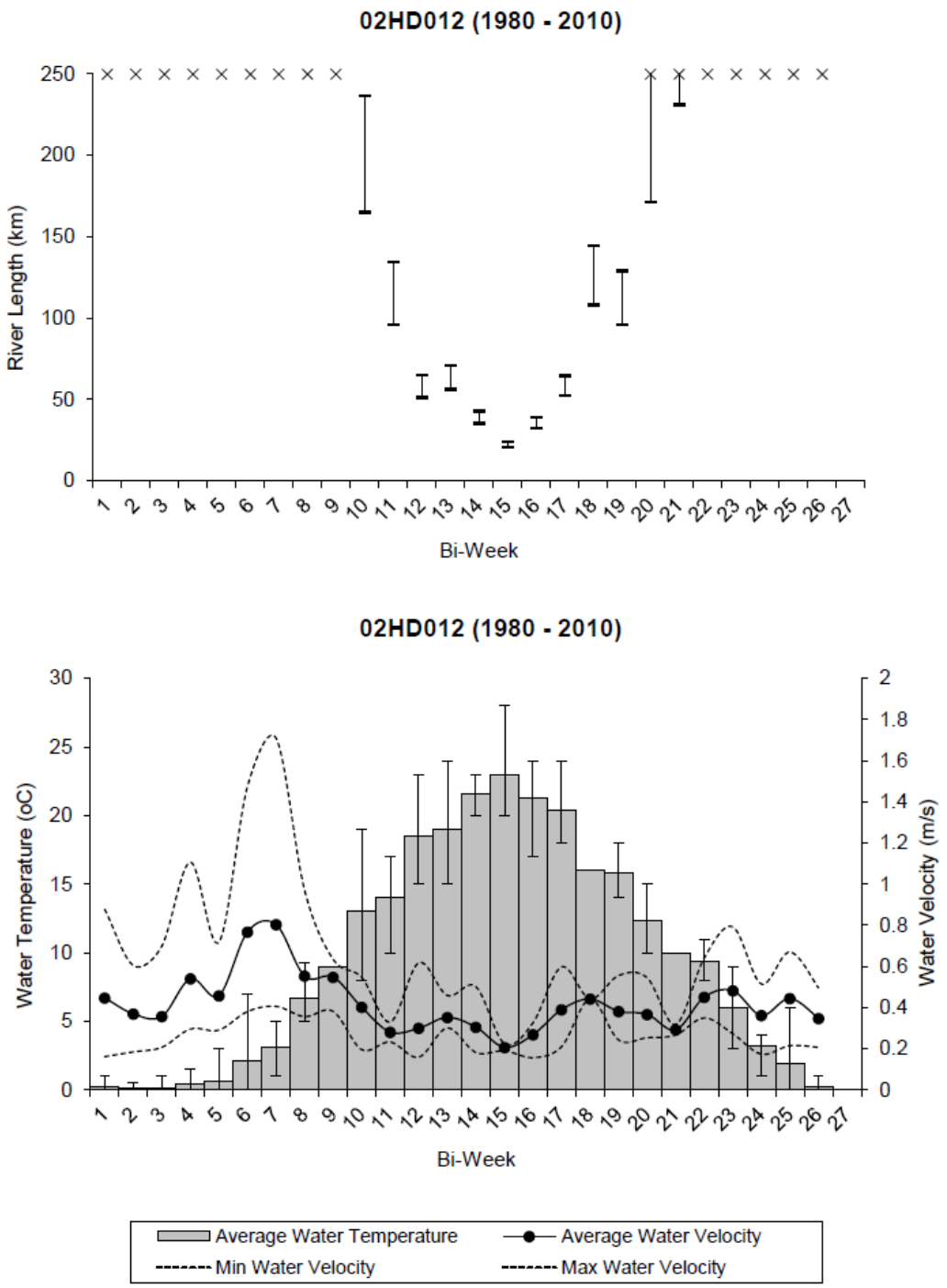


*Figure A1-199. Gauging station 02HD012 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

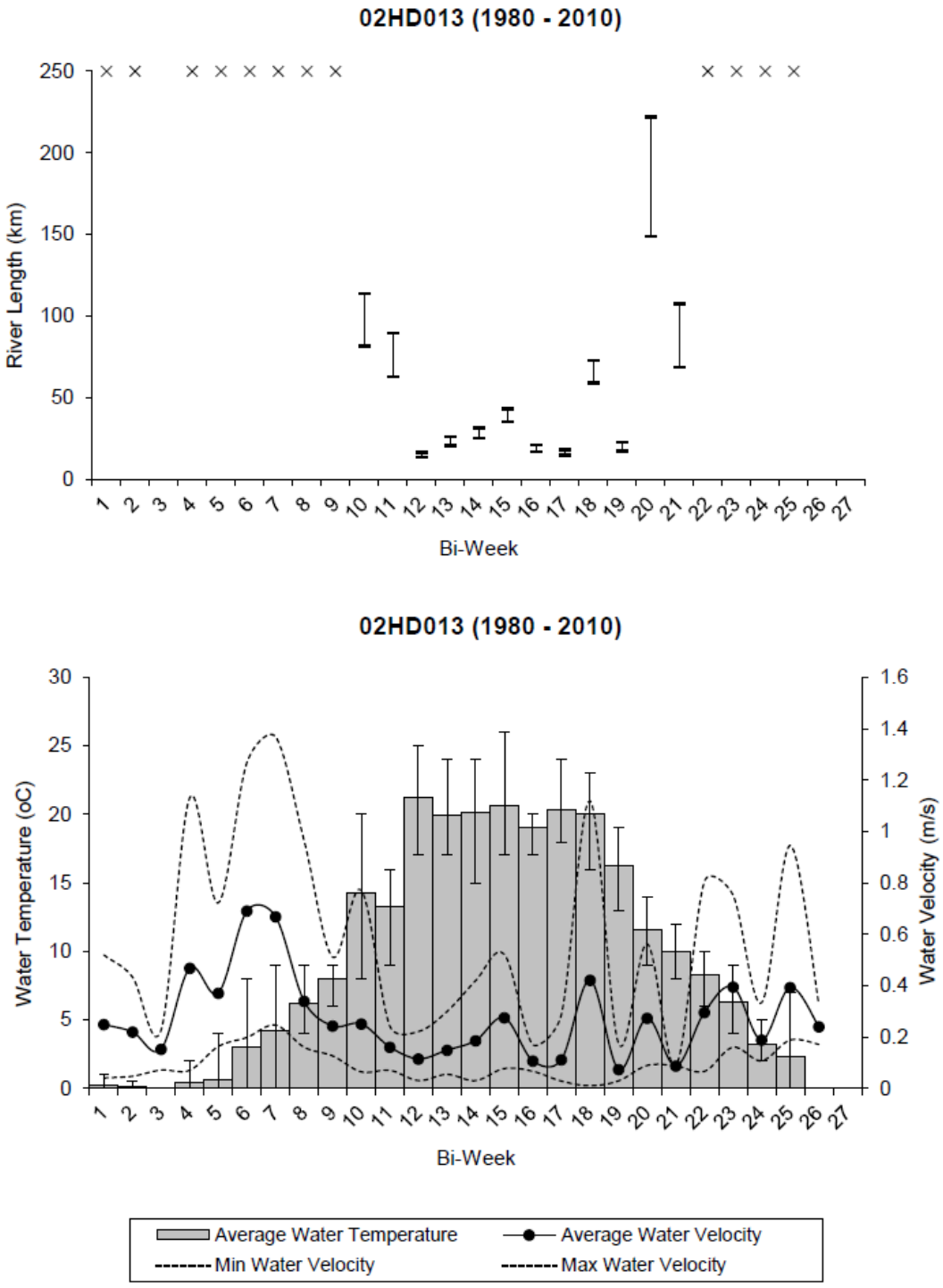


*Figure A1-200. Gauging station 02HD013 data from 1980–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

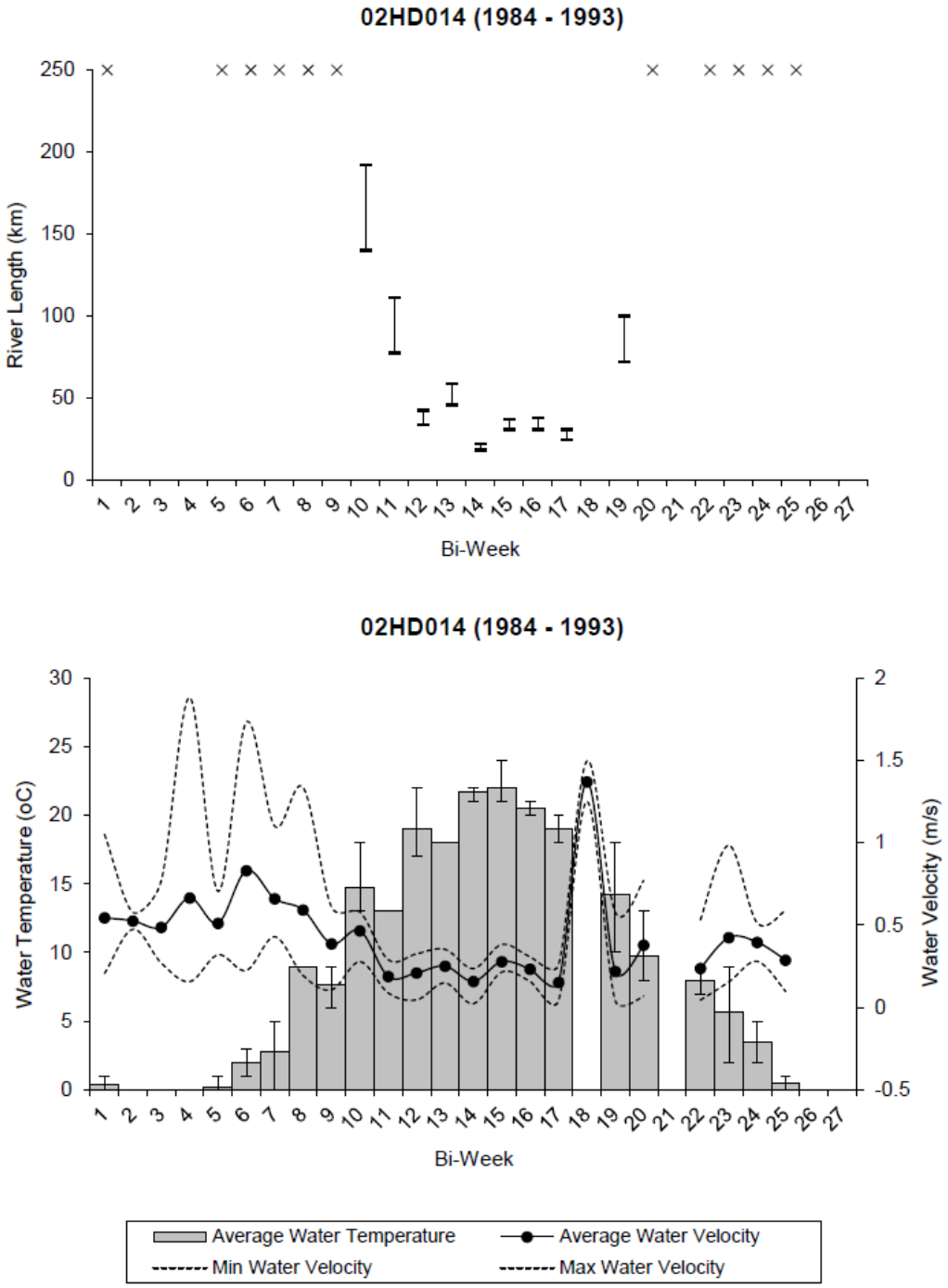


*Figure A1-201. Gauging station 02HD014 data from 1984–1993 Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

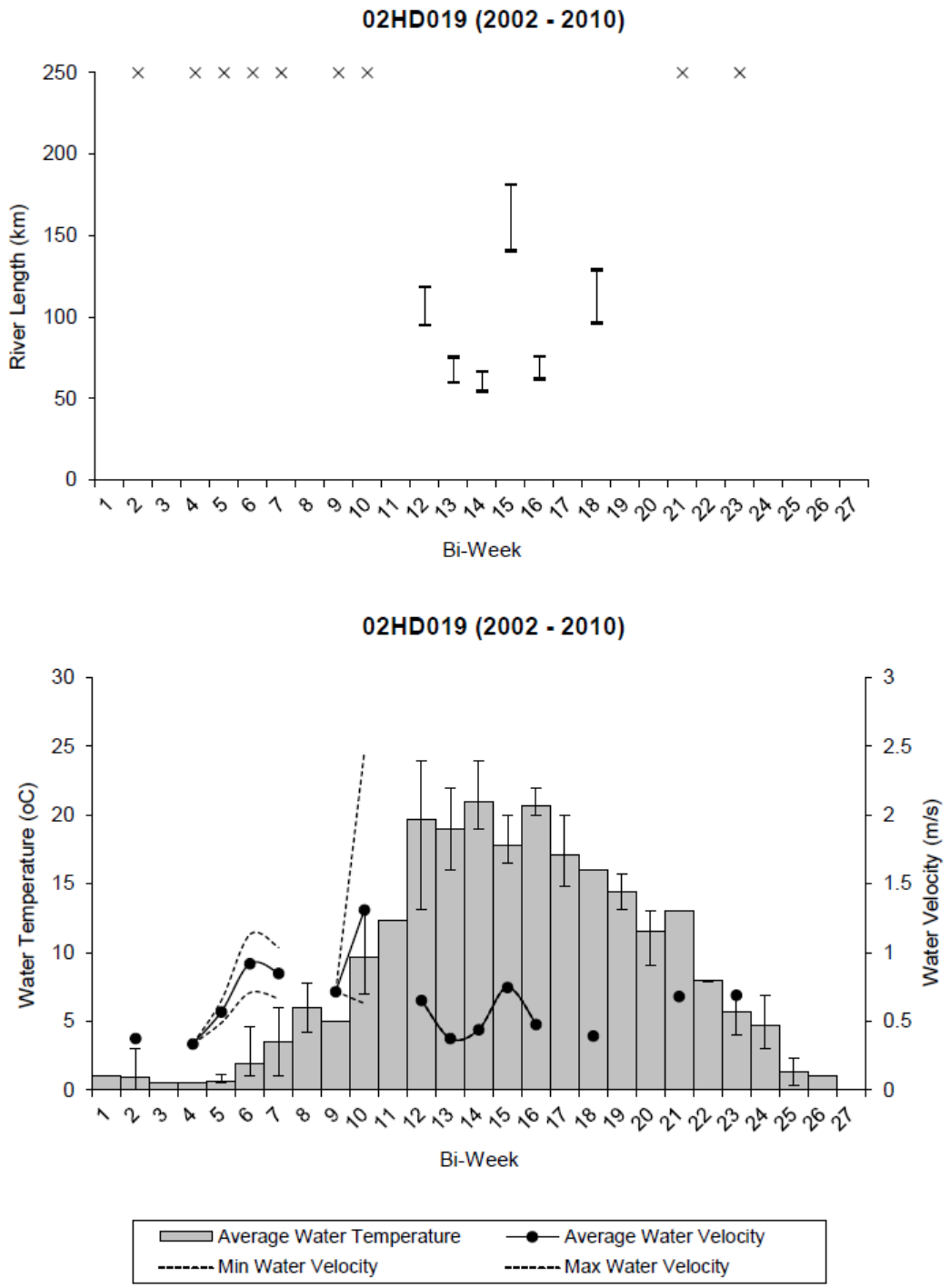


*Figure A1-202. Gauging station 02HD019 data from 2002–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

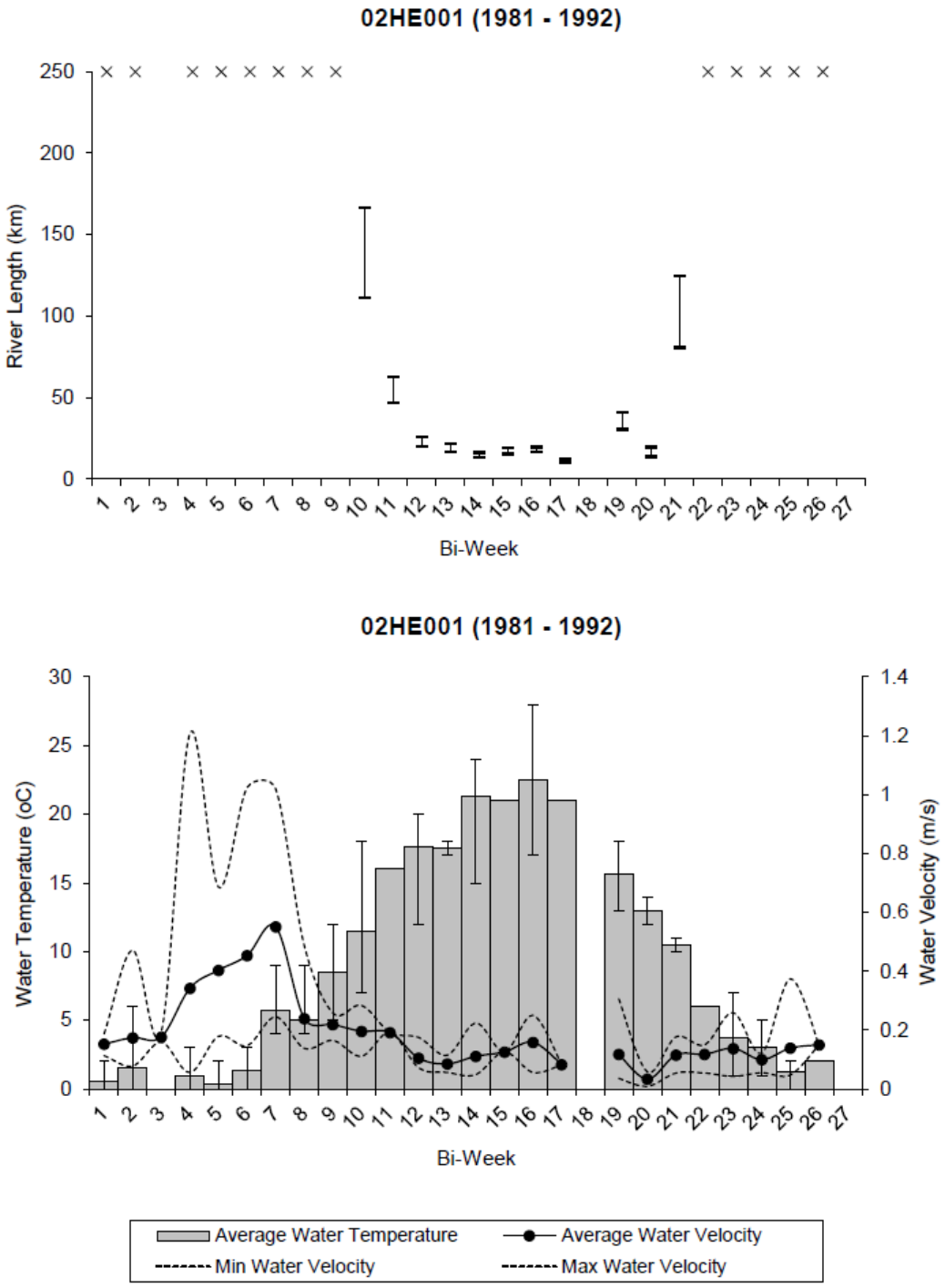


*Figure A1-203. Gauging station 02HE001 data from 1981–1992. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

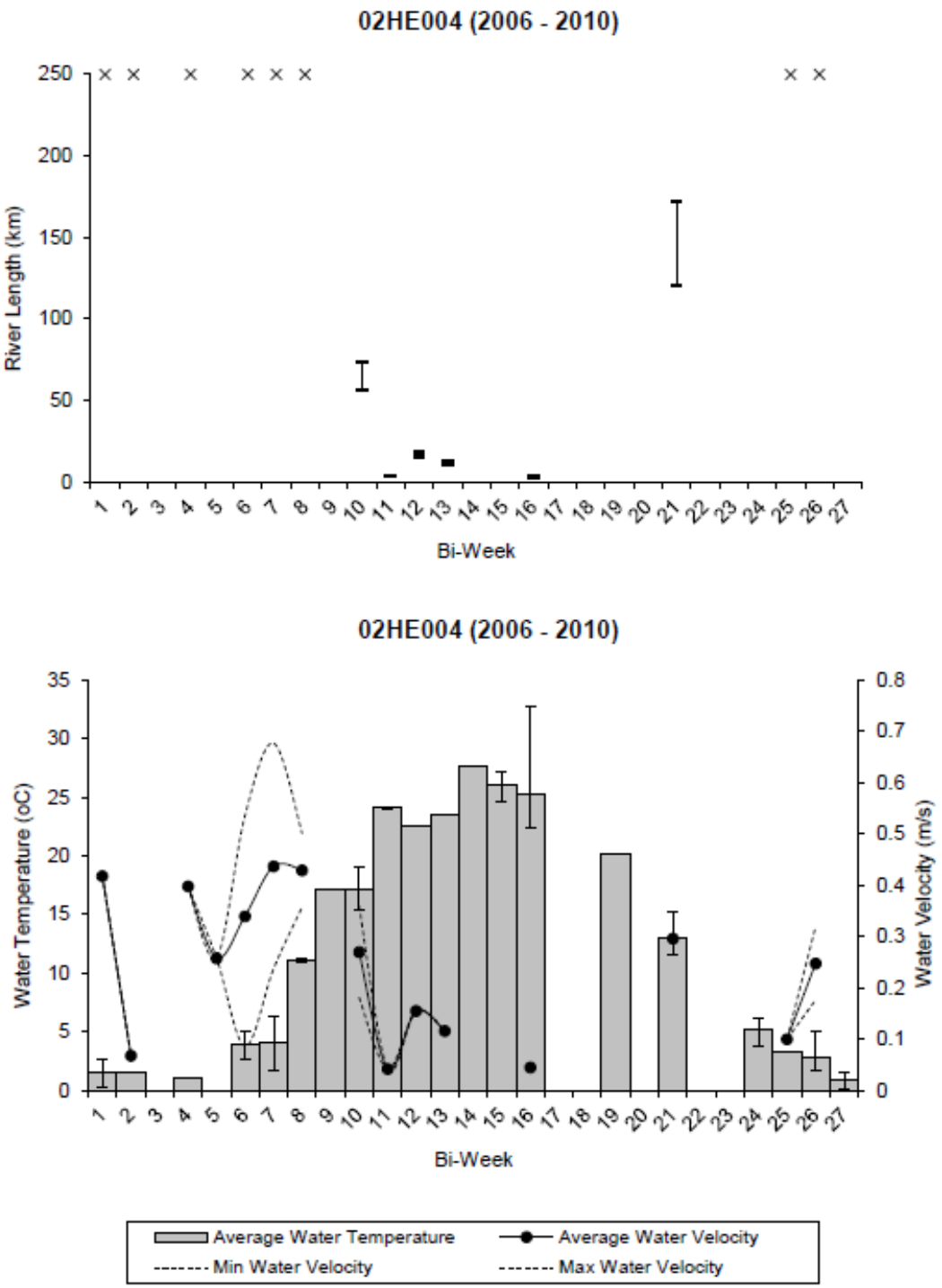


*Figure A1-204. Gauging station 02HE004 data from 2006–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

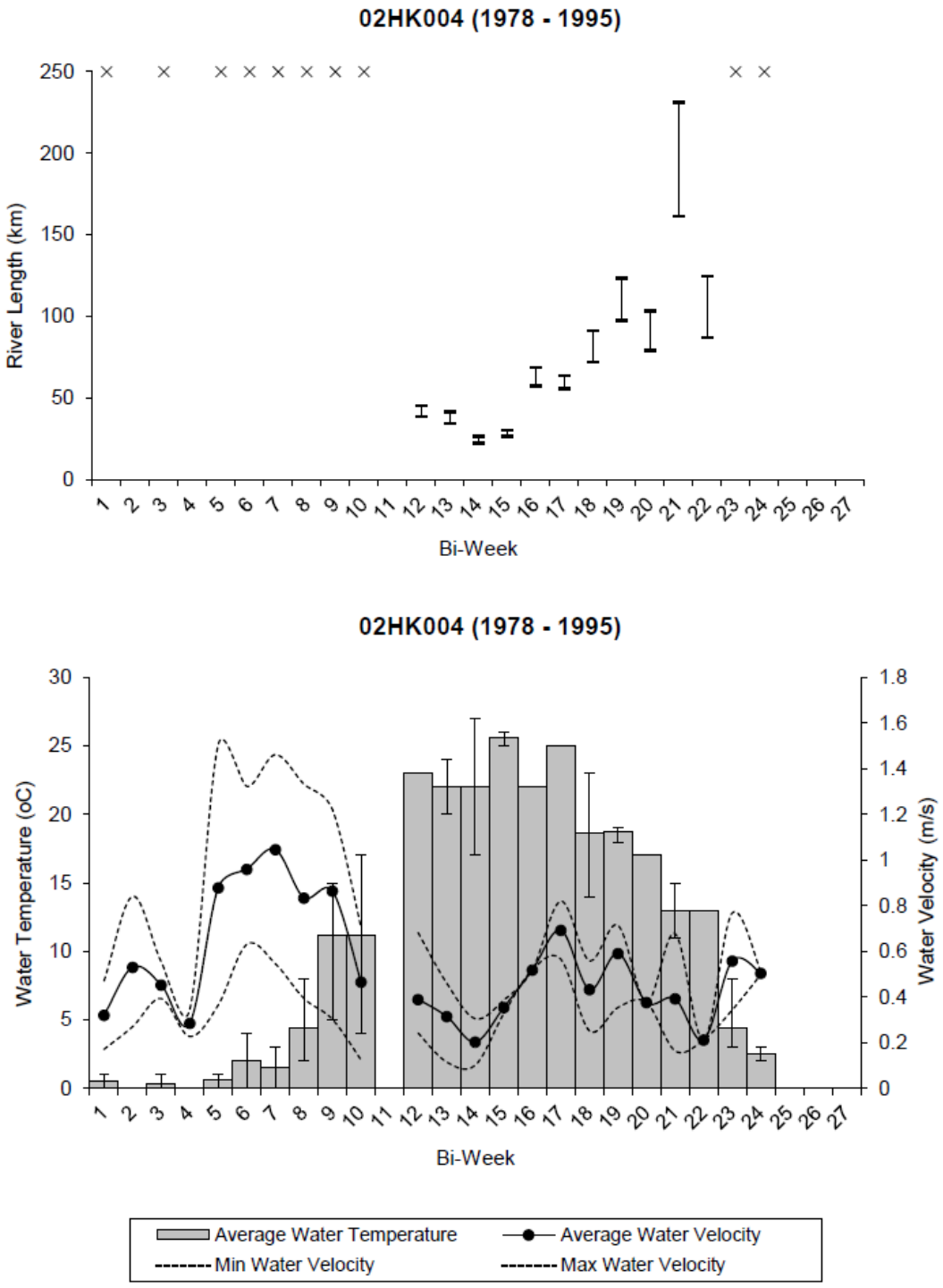


*Figure A1-205. Gauging station 02HK004 data from 1978–1995. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

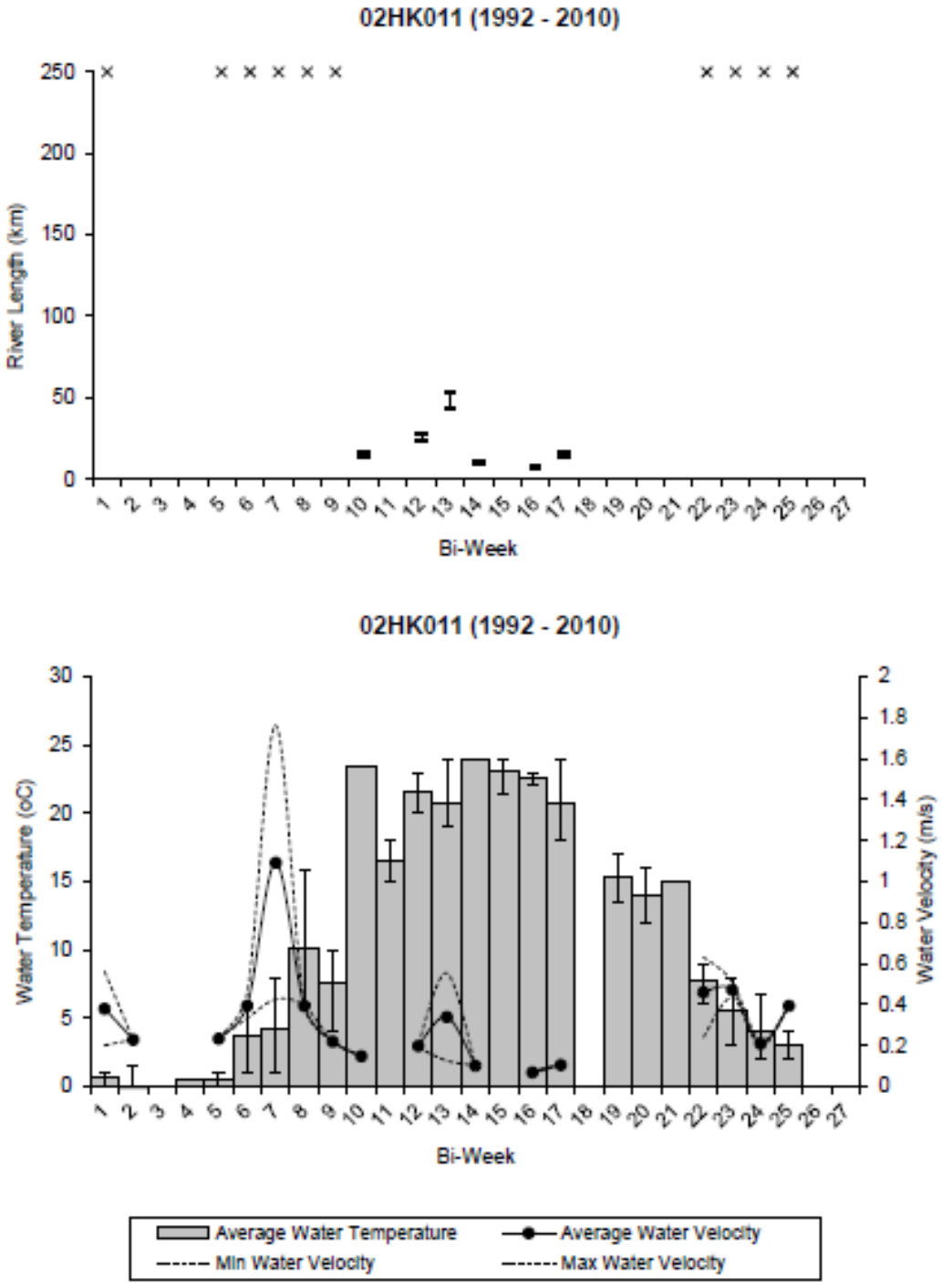


*Figure A1-206. Gauging station 02HK011 data from 1992–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

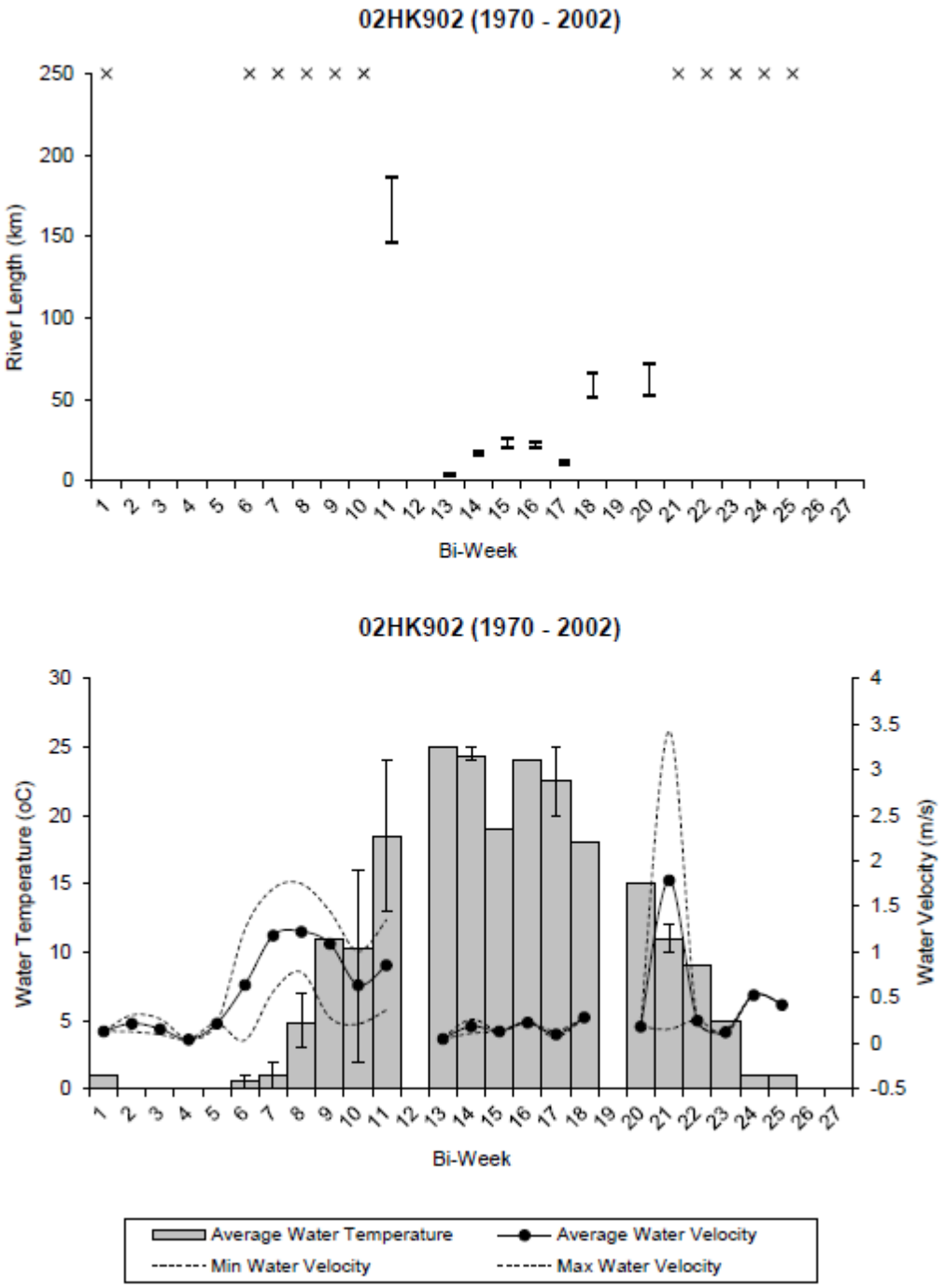


*Figure A1-207. Gauging station 02HK902 data from 1970–2002. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

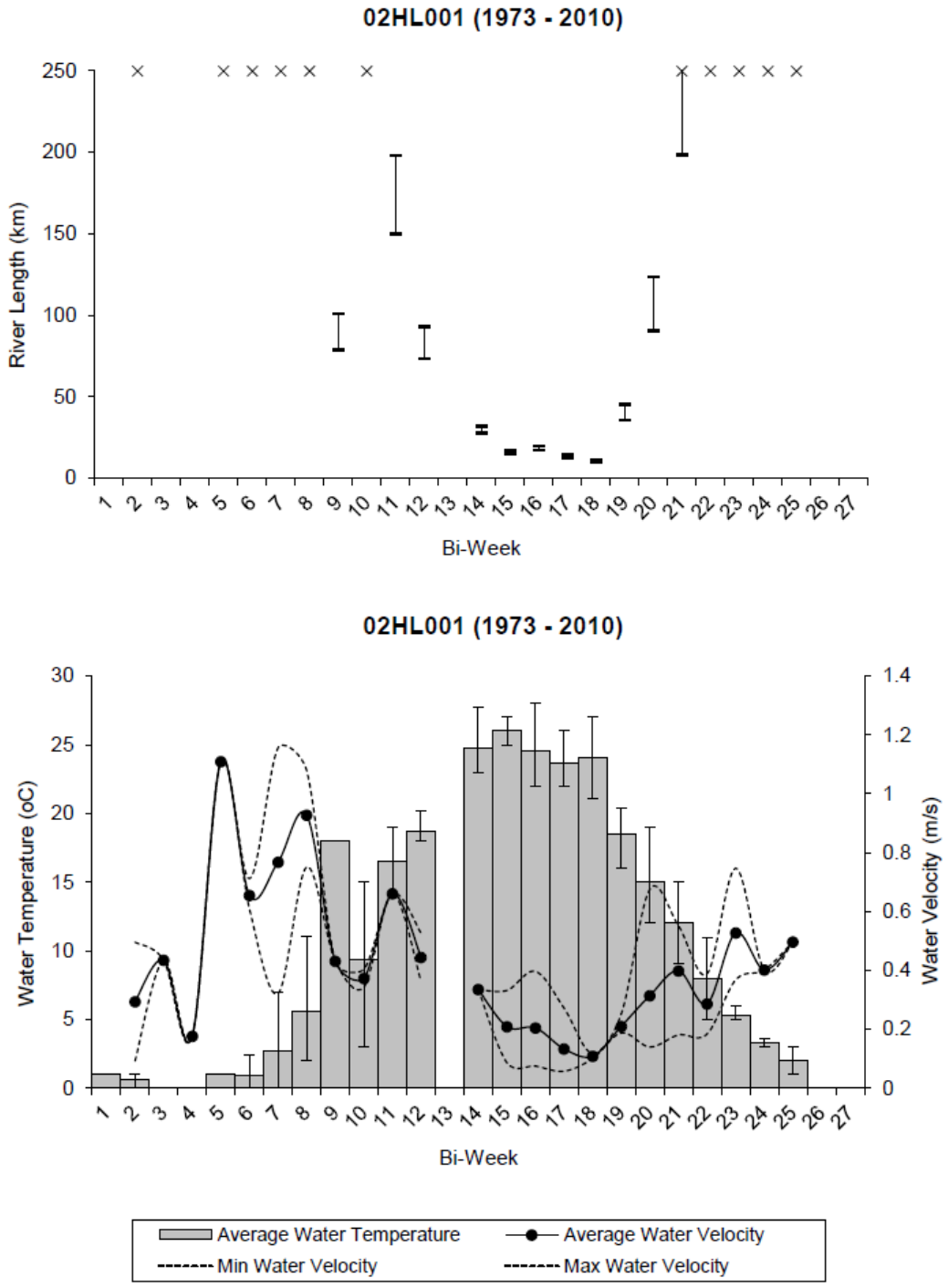


*Figure A1-208. Gauging station 02HL001 data from 1973–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

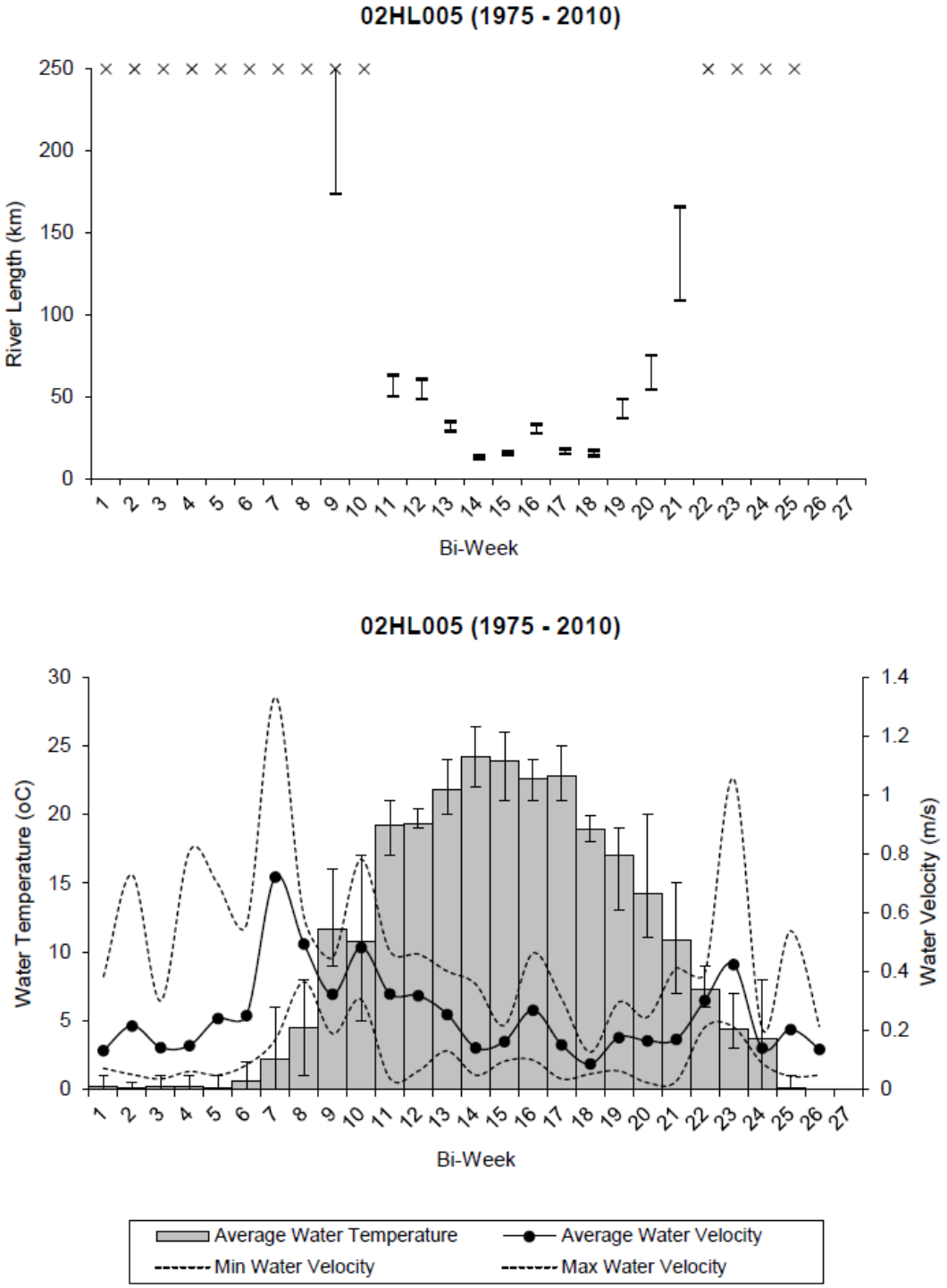


*Figure A1-209. Gauging station 02HL005 data from 1975–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

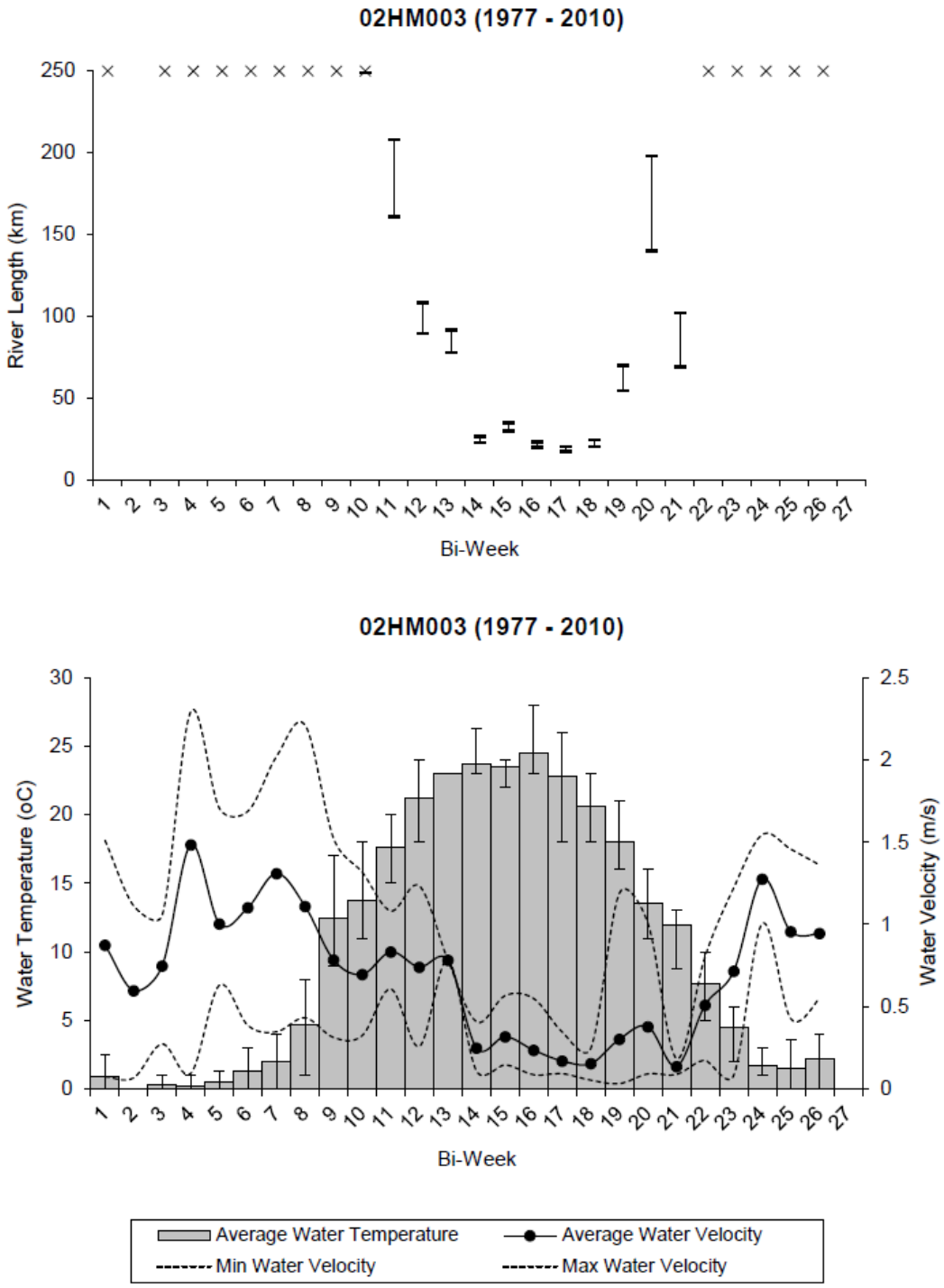


*Figure A1-210. Gauging station 02HM003 data from 1977–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

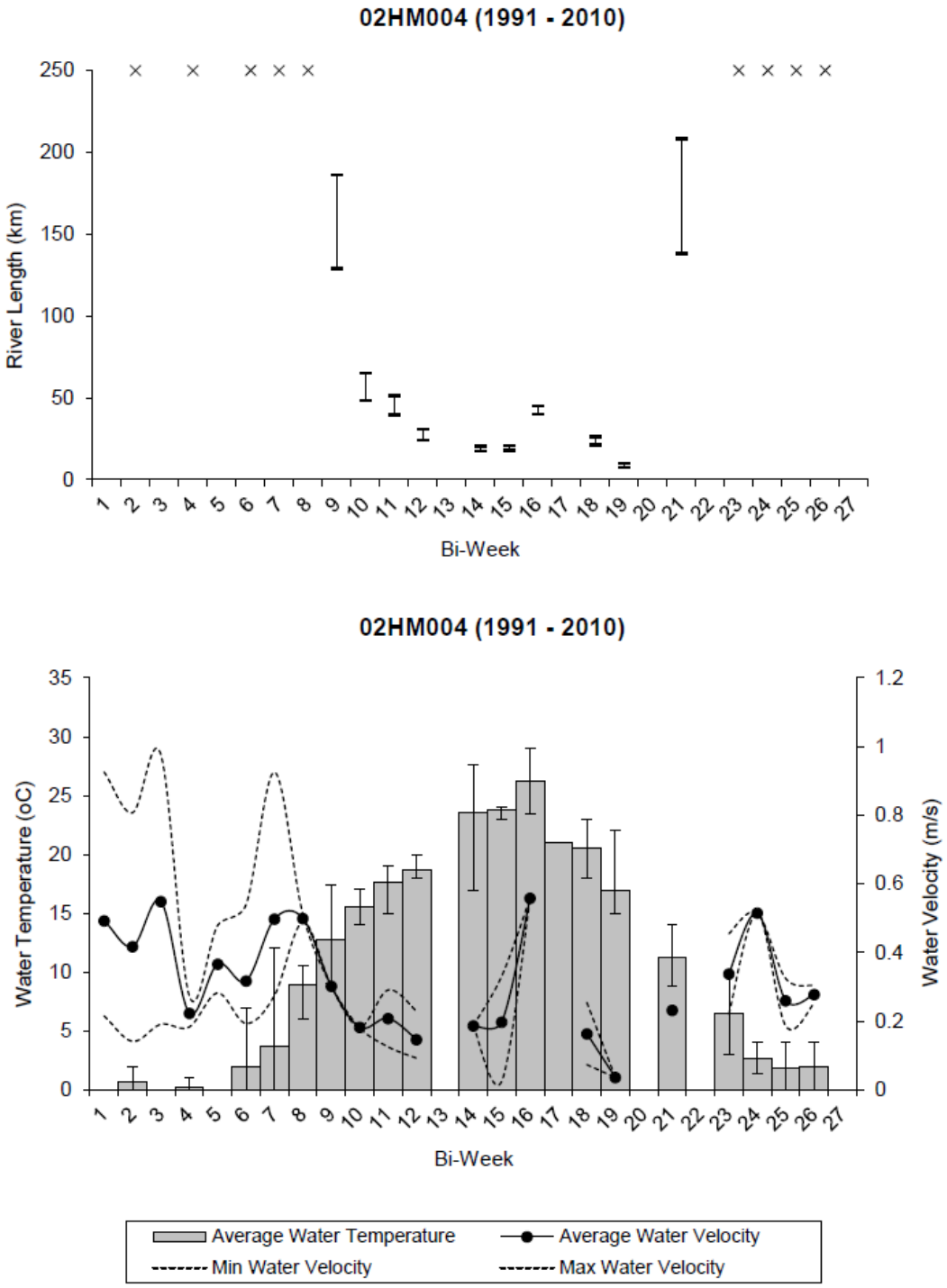


*Figure A1-211. Gauging station 02HM004 data from 1991–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

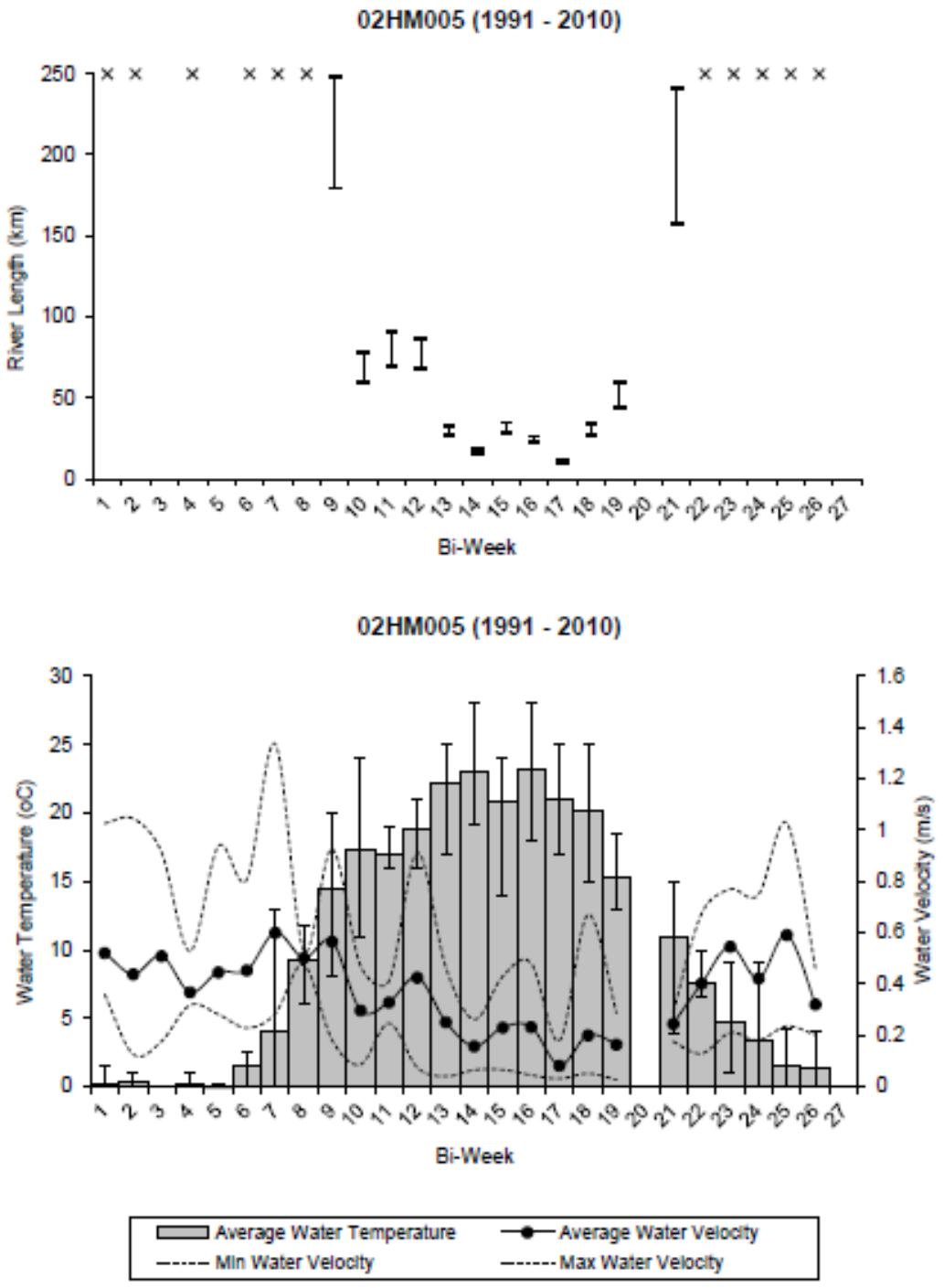


*Figure A1-212. Gauging station 02HM005 data from 1991–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

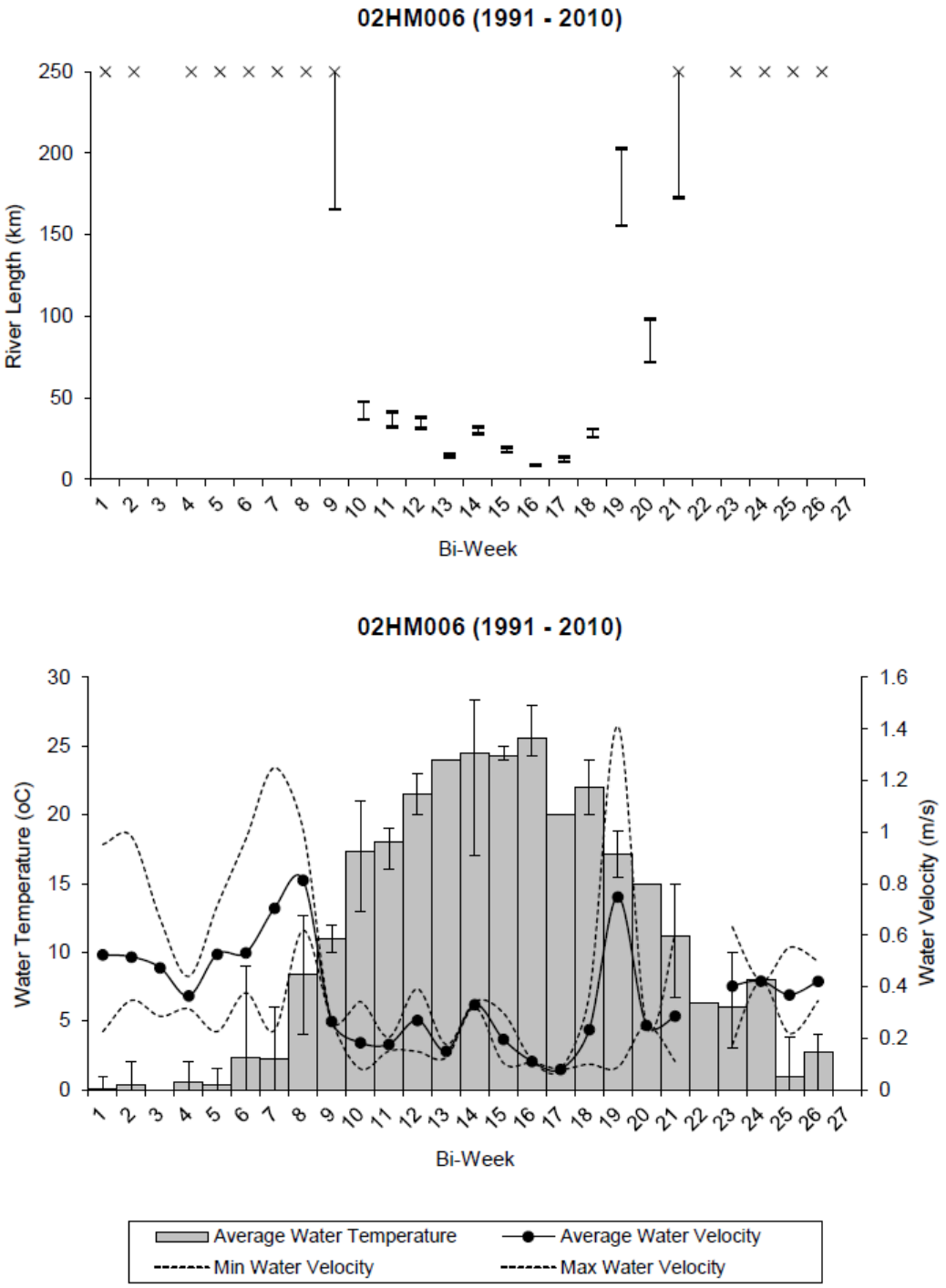


*Figure A1-213. Gauging station 02HM006 data from 1991–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

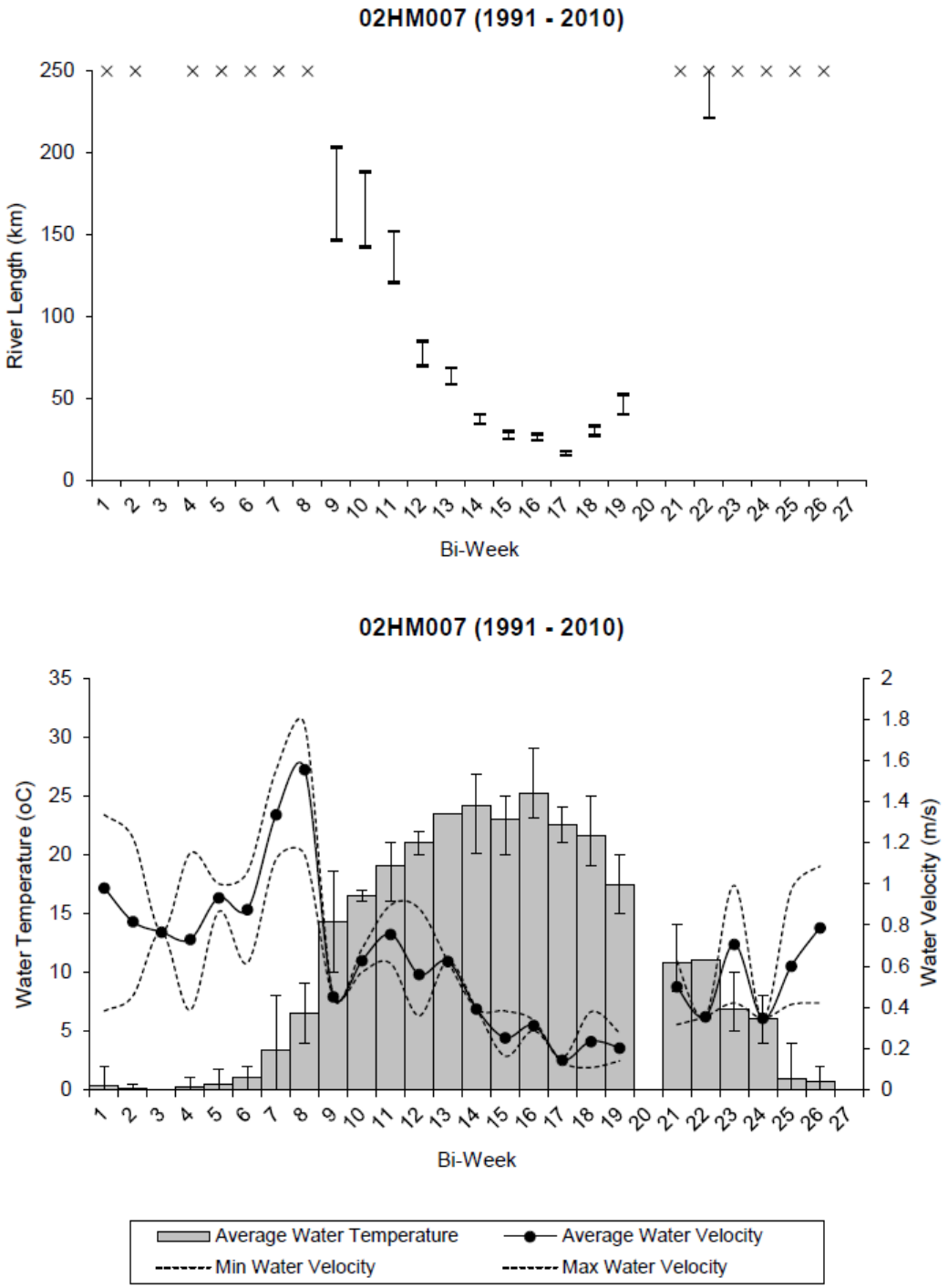


*Figure A1-214. Gauging station 02HM007 data from 1991–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

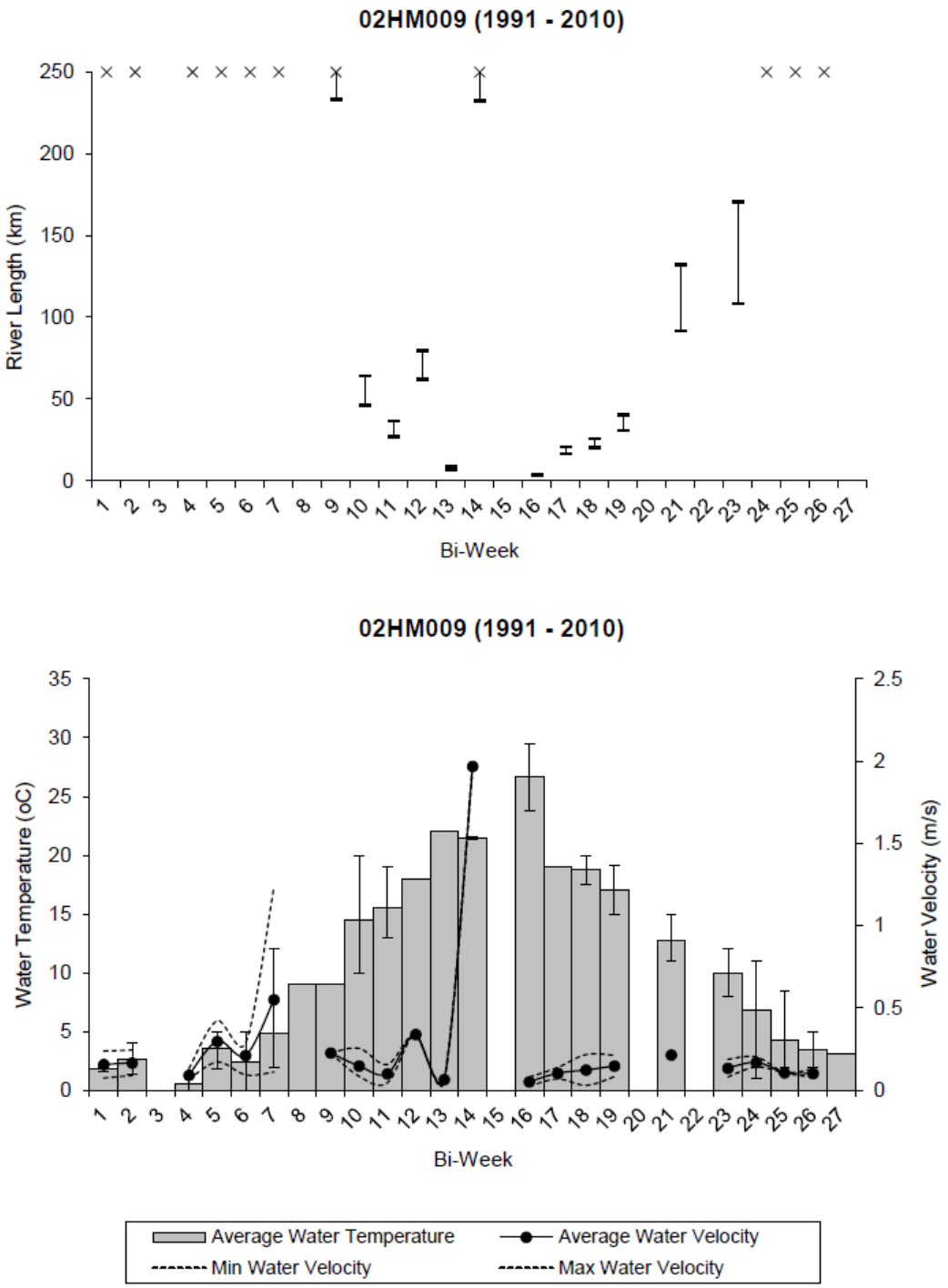


*Figure A1-215. Gauging station 02HM009 data from 1991–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

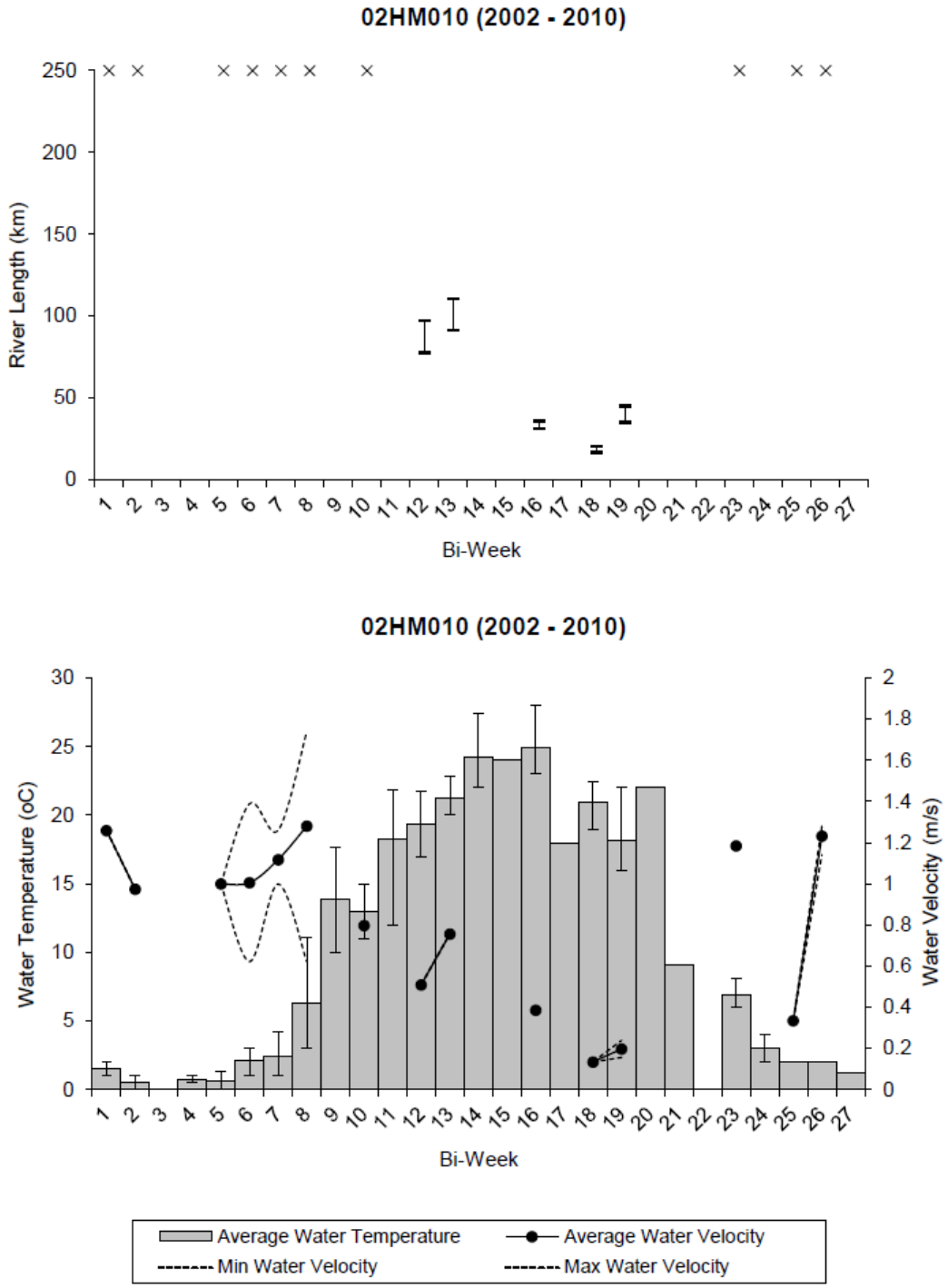


*Figure A1-216. Gauging station 02HM010 data from 2002–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

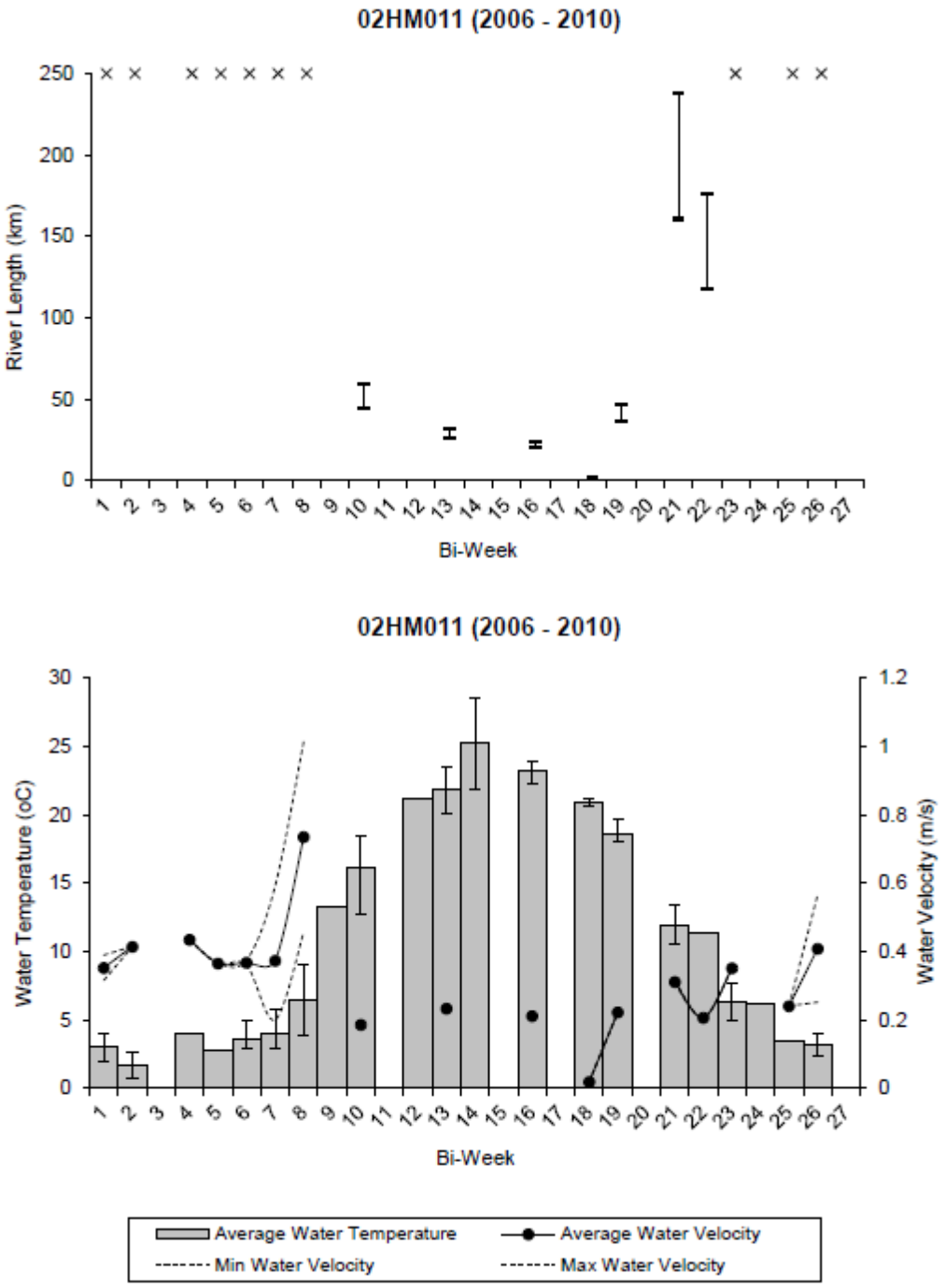


*Figure A1-217. Gauging station 02HM011 data from 2006–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum) lines.*

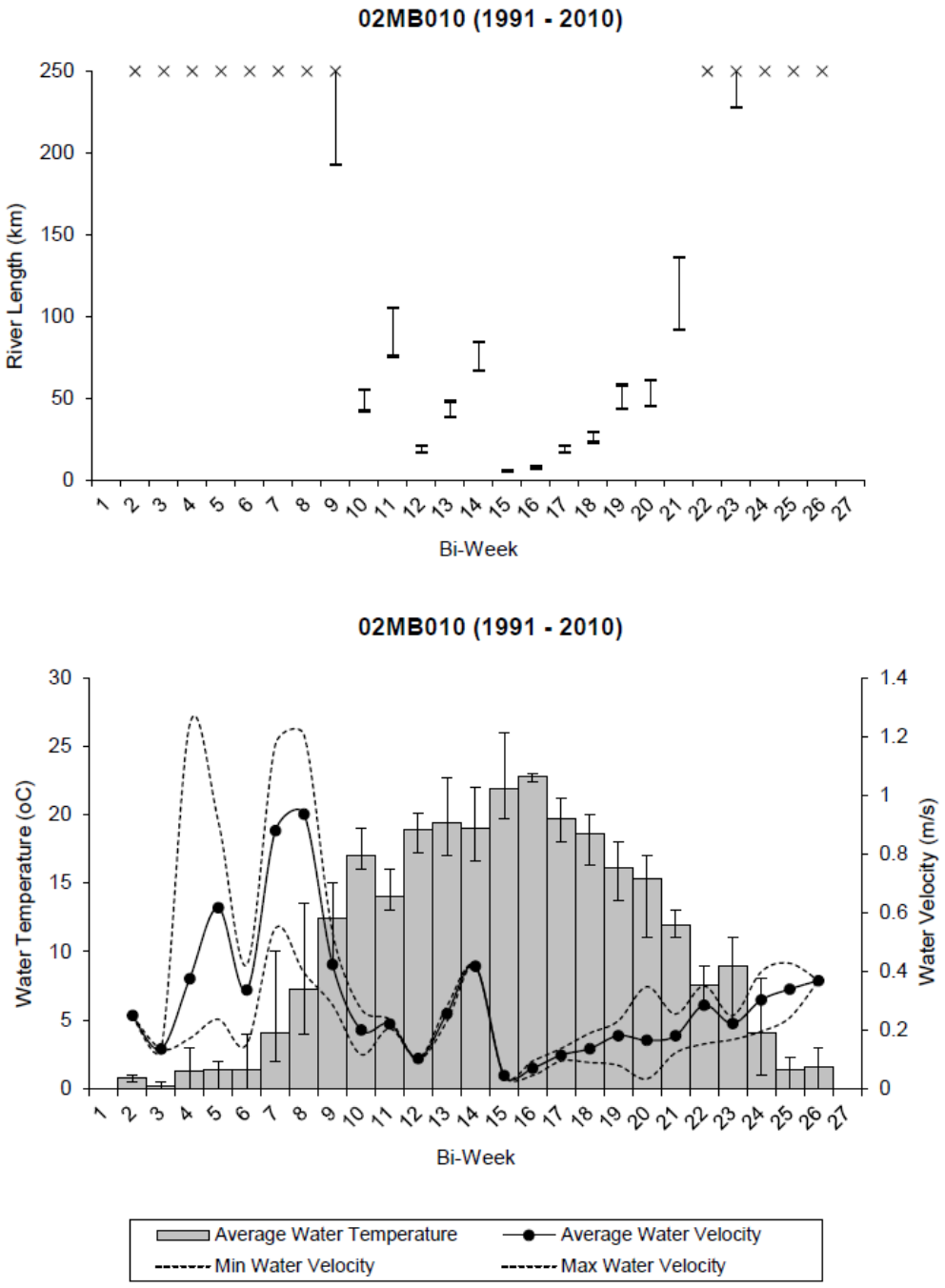


*Figure A1-218. Gauging station 02MB010 data from 1991–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum).*

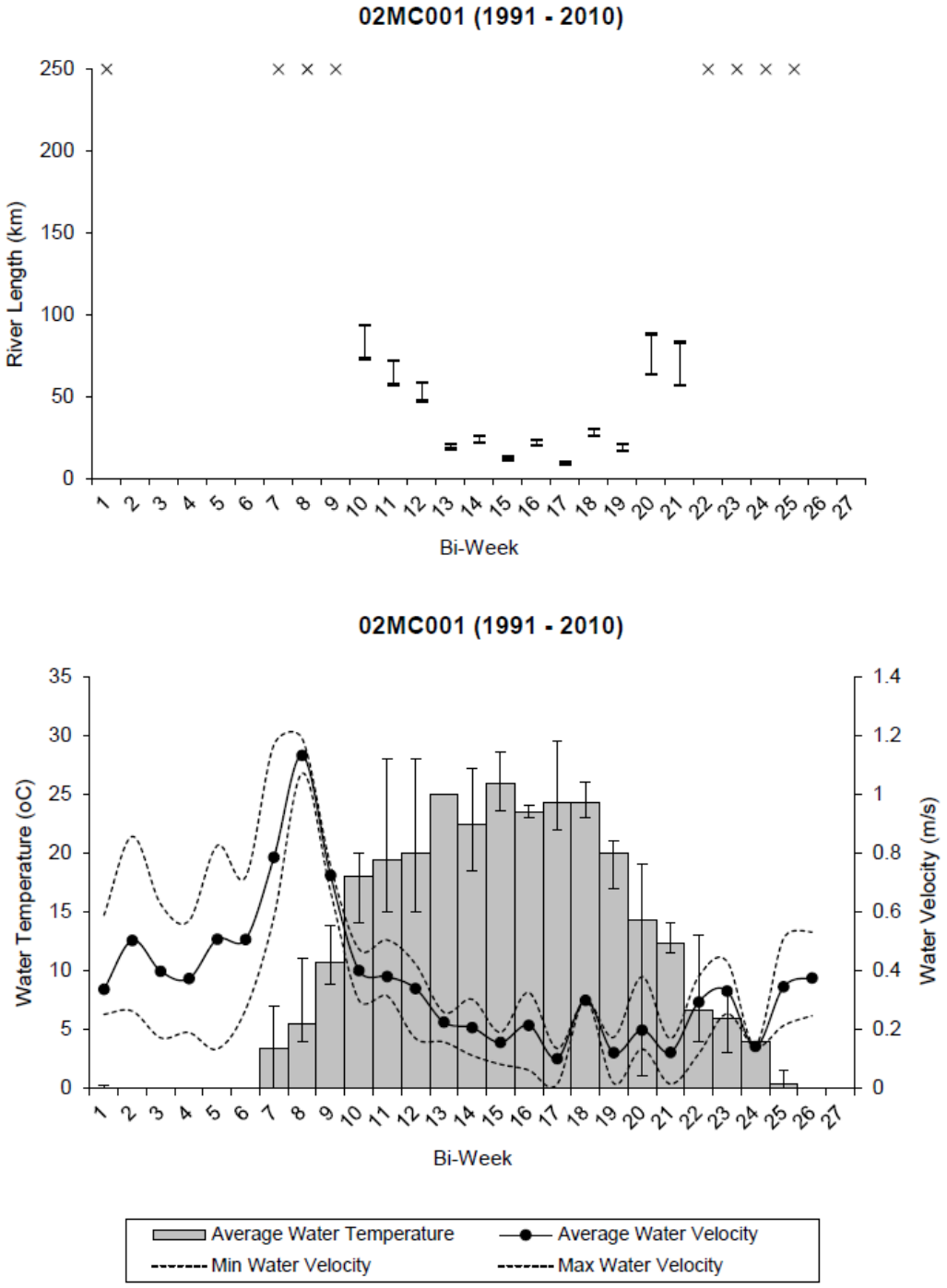


*Figure A1-219. Gauging station 02MC001 data from 1991–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum).*

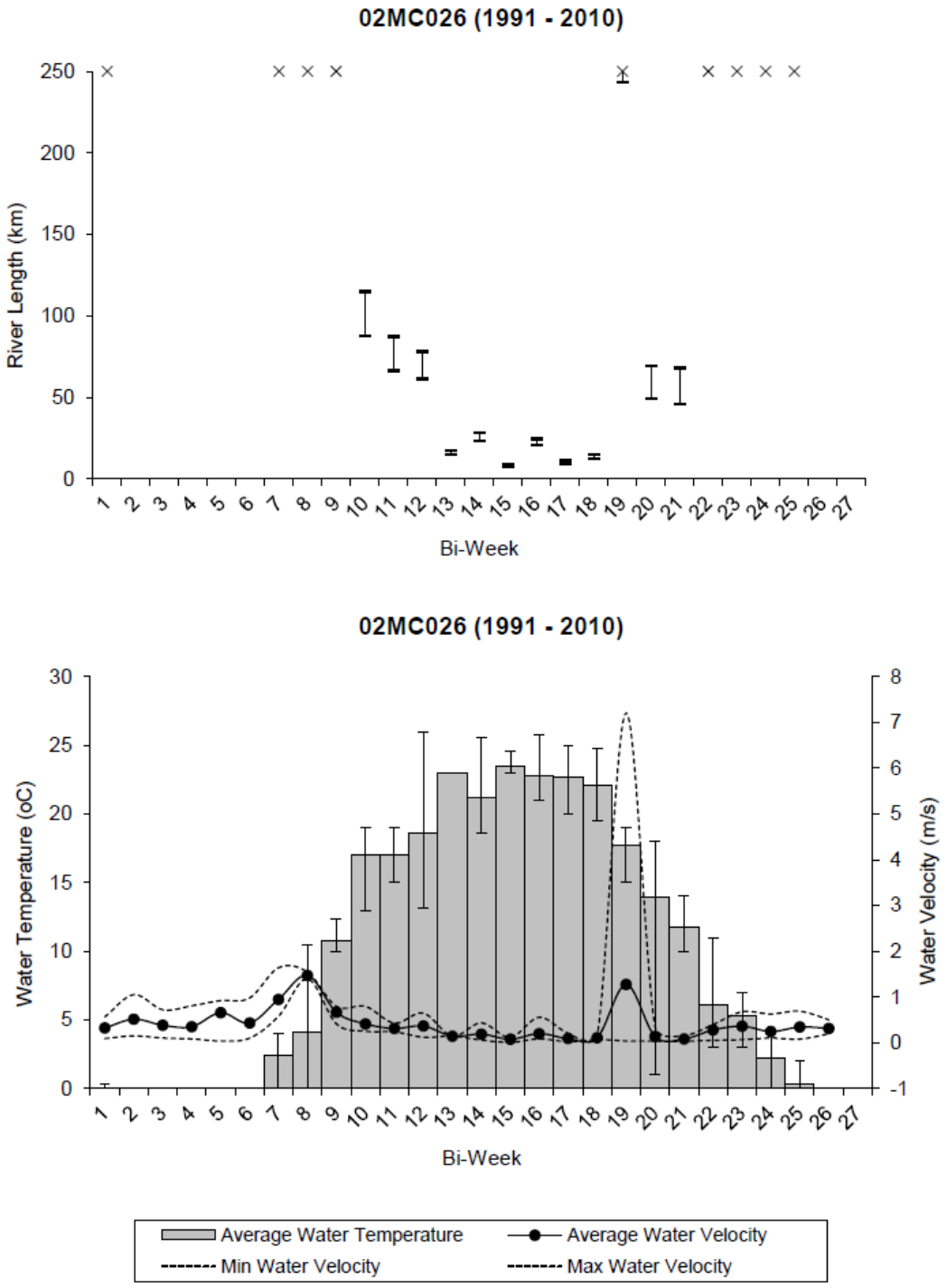


*Figure A1-220. Gauging station 02MC026 data from 1991–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum).*

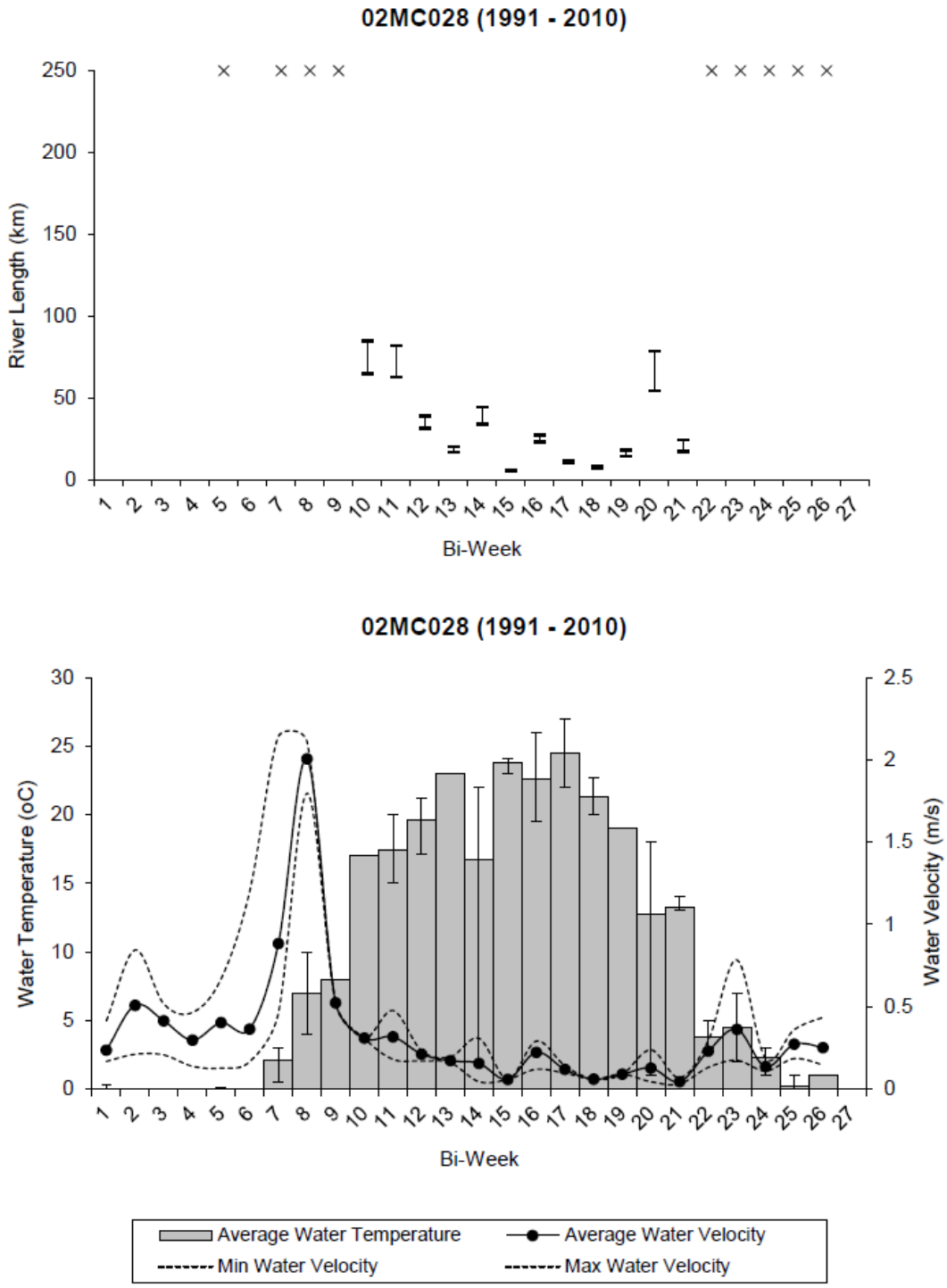


*Figure A1-221. Gauging station 02MC028 data from 1991–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum).*

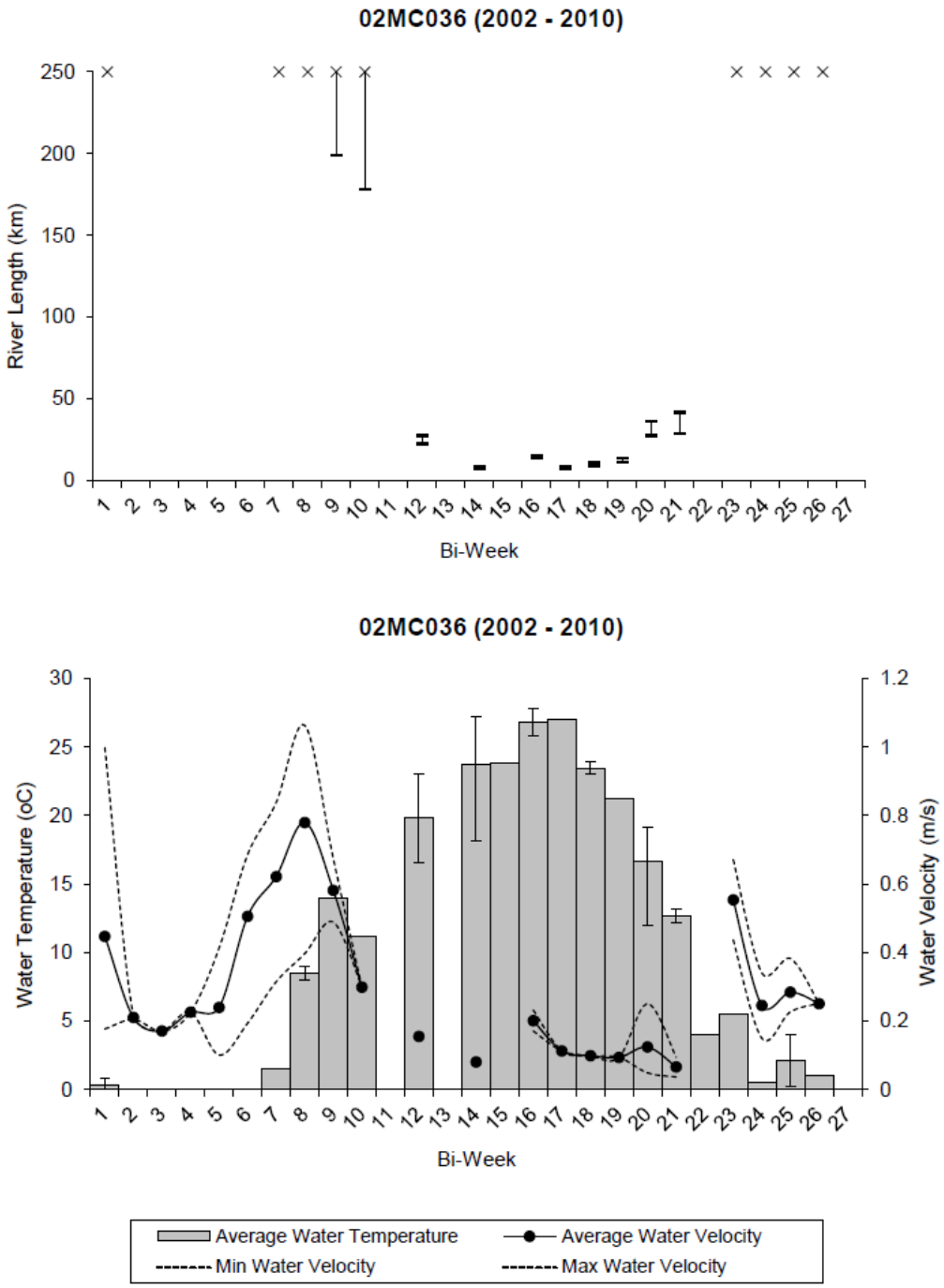


*Figure A1-222. Gauging station 02MC036 data from 2002–2010. Top graph: The bars represent the range of river length required for egg drift and hatch based on water velocity and water temperature requirements. Horizontal lines on each bar represent, from top to bottom: averages using Anonymous (1970); averages using Chang (1966); maximum values using Anonymous (1970); and, maximum values using Chang (1966). Bottom graph: The grey bars represent the average water temperature. Water velocity is represented by solid (average) and dashed (minimum and maximum).*

# APPENDIX 2. TRIBUTARY SUITABILITY RESULTS

*Table A2-1. Evaluation of tributary suitability for Asian carp spawning by stream gauging station using decision tree (see Figure 3). Suitability: 0 – not suitable; 1 – suitable; 2 – highly suitable.*

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Superior | 02AB008 | Neebing River near Thunder Bay | McIntyre River | 52.51 | 16...19 | 75, 12.5, 20, 70 | 12.5 | 16 | - | 17, 18, 19 | - | 1 | - |
| Superior | 02AB014 | North Current River near Thunder Bay | Current River | < 1 | 17, 18 | 40, 25 | 25 | 20, 21 | 20, 21 | - | - | 0 | too short |
| Superior | 02AB017 | Whitefish River at Nolalu | Mission River | 151.77 | 16...18 | 25, 25, 50 | 25 | 20 | - | - | - | 0 | no spike |
| Superior | 02AB019 | McVicar Creek at Thunder Bay | Dog River | 22.63 | 17, 18 | 10, 10 | 10 | 20 | - | - | - | 0 | no spike |
| Superior | 02AB020 | McIntyre River above Thunder Bay | McIntyre River | 52.51 | 17, 18 | 25, 30 | 25 | 19, 24 | - | - | - | 0 | no spike |
| Superior | 02AB021 | Current River at Stepstone | Current River | < 1 | 14, 17, 18 | 100, 40, 60 | 40 | 18, 20 | - | - | - | 0 | too short |
| Superior | 02AB022 | Corbett Creek near Murillo | Mission River | 151.77 | 14...19 | 10, 10, 20, 10, 30 | 10 | 21 | 21 | - | - | 0 | no spike |
| Superior | 02AB024 | Neebing River near Intola | McIntyre River | 52.51 | 15 | 10, 30 | 10 | 21 | 21 | - | - | 0 | spike too late |
| Superior | 02AE001 | Gravel River near Cavers | Gravel River | 95.34 | 17, 18 | 55 | 55 | 19 | - | 17 | - | 1 | - |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Superior | 02BA003 | Little Pic river near Coldwell | Little Pic River | 168.77 | 16, 19 | 100 | 100 | 17 | 17 | 17 | 17 | 2 | - |
| Superior | 02BA006 | Steel River below Santoy Lake | Steel River | ~ 15 | 18, 19 | 10, 60 | 10 | 19 | - | 19 | - | 1 | - |
| Superior | 02BB003 | Pic River near Marathon | Pic River | 229.26 | 16...18 | 20 | 20 | 18 | - | 18 | - | 1 | - |
| Superior | 02BB004 | Cedar Creek near Hemlo | Pic River | 229.26 | 15... 19 | 10, 25, 15, 20, 70 | 10 | 16, 21 | - | - | - | 0 | no spike |
| Superior | 02BC005 | Pukaskwa River at Pukaskwa NP | Pukaskwa River | 89.11 | 16...18 | 40, 50, 60 | 40 | 16, 17, 18 | - | 17, 18 | - | 1 | - |
| Superior | 02BF001 | Batchawana River near Batchawana | Batchawana River | 133.05 | 14...19 | 50,50,50, 50,50,50 | 50 | - | - | - | - | 0 | no spike |
| Superior | 02BF002 | Goulais River near Searchmont | Goulais River | 183.79 | - | - | - | - | - | - | - | 0 | no spike |
| Superior | 02BF004 | Big Carp River near Sault Ste. Marie | Big Carp River | 19.43 | 13...19 | 50,25,x,50, 25,40,25 | 25 | 13,16, 18 | - | - | - | 0 | too short |
| Superior | 02BF005 | Norberg Creek (Site A) above Batchawana River | Batchawana River | 133.05 | 14...19 | 40,25,30, 35,40 | 25 | 16, 24 | - | - | - | 0 | no spike |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Superior | 02BF006 | Norberg Creek (Site B) at outlet of Turkey Lake | Batchawana River | 133.05 | 14...20 | 20,25,35, 30,40,45 | 20 | 16, 20 | - | - | - | 0 | no spike |
| Superior | 02BF007 | Norberg Creek (Site C) at outlet of Little Turkey Lake | Batchawana River | 133.05 | 13...20 | 20,20,15, 25,25,40 | 20 | 16, 21 | - | - | - | 0 | no spike |
| Superior | 02BF008 | Norberg Creek (Site D) below Wishart Lake | Batchawana River | 133.05 | 14...19 | 40,40,40, 45,50 | 40 | 16, 20 | - | - | - | 0 | no spike |
| Superior | 02BF012 | Norberg Creek (Site F) at outlet of Batchawana | Batchawana River | 133.05 | 14...20 | 20,15,25, 10,25, 30,50 | 10 | - | - | - | - | 0 | no spike |
| Huron | 02CA002 | Root River at Sault Ste. Marie | Garden River | 41.3 | 14...20 | 15,x,20,25, 20,x | 15 | 16, 20 | - | 16,20 | - | 1 | - |
| Huron | 02CC008 | Mississagi River at Mississagi Chute | Mississagi River | 56.75 | 14...16 | x,40,60 | 40 | - | - | - | - | 0 | too short |
| Huron | 02CD001 | Serpent River at Highway No. 17 | Serpent River | 125.91 | 13...19 | 50,40,50, 55,45,60, 10,0 | 40 | 16,18, 19 | - | 16,18, 19 | - | 1 | - |
| Huron | 02CD002 | Serpent River at outlet of Dunlop Lake | Serpent River | 125.91 | 14...20 | 50,40,35, 20,45,45, 125 | 20 | 18,20 | - | 18,20 | - | 1 | - |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Huron | 02CD003 | Serpent River below Quirke Lake | Serpent River | 125.91 | 15...20 | 50,60,50, 60,55 | 50 | 16,18, 20 | 20 | 16,18 | 20 | 2 | - |
| Huron | 02CD004 | Serpent River below Pecors Lake | Serpent River | 125.91 | 14...18 | 35,35,40, 45,45 | 35 | 17 | - | 17 | - | 1 | - |
| Huron | 02CD006 | Serpent River above Quirke Lake | Serpent River | 125.91 | 14...20 | 45,45,40, 35,70,40 | 35 | 18,20 | - | 18,20 | - | 1 | - |
| Huron | 02CE002 | Aux Sables River at Massey | Spanish River | 152.34 | 15...18 | 60,65,75, 80 | 60 | 15,17, 19 | 17 | 17 | - | 1 | - |
| Huron | 02DB005 | Wanapitei River near Wanup | Wanapitei River | ~ 70 | 14...19 | 30,x,25,35, 45,55 | 25 | 17,21 | 21 | 17 | - | 1 | - |
| Huron | 02DB007 | Coniston Creek above Wanapitei River | Wanapitei River | ~ 70 | 13...18, 20 | 50,25,30, 35,30,50, 175,100 | 25 | 14,16, 19 | 19 | 14,16 | - | 1 | - |
| Huron | 02DD010 | French River at Dry Pine Bay | French River | 107.8 | 14,x,16.. .19 | 45,x,45,50, 45,50 | 45 | 14,20 | 20 | 14 | - | 1 | - |
| Huron | 02DD015 | Commanda Creek near Commanda | French River | 107.8 | 14...19 | 40,45,50, 25,110,100 | 40 | 16 | - | 16 | - | 1 | - |
| Huron | 02DD016 | French River at Portage Dam | French River | 107.8 | 16...19 | x,25,x,150 | 25 | 19 | 19 | - | - | 2 | - |
| Huron | 02DD017 | French River at Chaudiere Dam | French River | 107.8 | 14...19 | 20,80,x,50, x,110 | 20 | 15,16 | 15,16 | - | 15, 16 | 2 | - |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Huron | 02DD020 | Little French River at Okikendawt Island | French River | 107.8 | 15...18 | 100,100, 60,65 | 60 | 15,16, 19 | 15,16, 19 | - | 15,16, 19 | 2 | - |
| Huron | 02EA005 | North Magnetawan River near Burk's Falls | Magnetawan River | 32.78 | 11...19 | 25,40,40, 35,30,125, 100 | 25 | 14,18 | - | 14 | - | 1 | - |
| Huron | 02EA006 | Magnetawan Riveer near Burk's Falls | Magnetawan River | 32.78 | 13...19 | 25,55,55, 55,55, 75,80 | 25 | 15,18 | 18 | - | - | 0 | too short |
| Huron | 02EA010 | North Magnetawan River above Pickerel Lake | Magnetawan River | FALSE | 14...18 | 15,90,30, 50,70 | 15 | - | - | - | - | 0 | no spike |
| Huron | 02EA011 | Magnetawan River near Britt | Magnetawan River | 32.78 | 14...19 | 50,60,55, 50,140 | 50 | 15,18 | 15,18 | - | - | 0 | too short |
| Huron | 02EB011 | Moon River at Highway No. 69 | Moon River | 34.67 | 15...20 | 20,x,45,40, x,75 | 20 | 17,20 | - | - | - | 0 | too short |
| Huron | 02EC005 | Severn River at Washago | Severn River | ~ 1 | 13...19 | 45,35,25,x, 45,55,30 | 25 | 18 | 18 | - | - | 0 | too short |
| Huron | 02EC006 | Severn River at Big Falls | Severn River | ~ 1 | 13...18 | 100,90,x, 40,55,50 | 40 | 13,17 | 17 | - | - | 0 | too short |
| Huron | 02EC007 | Severn River at Little Falls | Severn River | ~ 1 | 14...20 | 125,60,x, 50,25,x, 250 | 25 | 14,20 | 14,20 | - | - | 0 | too short |
| Huron | 02EC008 | Black River at Baldwin | Severn River | ~ 1 | 12...20 | 30,40,25, 25,30,20, 25,50,60 | 20 | 16,19, 20 | - | - | - | 0 | too short |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Huron | 02EC013 | Middle Severn River at Washago | Severn River | ~ 1 | 14...18 | x,25,x,20, 20 | 20 | 18 | - | - | - | 0 | too short |
| Huron | 02EC014 | Severn River above Wasdell Falls | Severn River | ~ 1 | 14...20 | x,20,x,30, 45,40,30 | 20 | 18,20 | - | - | - | 0 | too short |
| Huron | 02ED003 | Nottawasaga River near Baxter | Nottawasaga River | 115.23 | 13...20 | 25,25,20, 30,40,30, 70,80 | 25 | 14,16 | - | 14,16 | - | 1 | - |
| Huron | 02ED007 | Coldwater River at Coldwater | North River | 44.74 | 14...19 | 60,60,40, 10,60,75 | 40 | 14,16, 18,20 | 20,20 | 14 | - | 1 | - |
| Huron | 02ED010 | Willow Creek at Midhurst | Nottawasaga River | 115.23 | 13...18 | 20,30,25, 30,35,40 | 20 | 14,17, 19 | - | 14,17, 19 | - | 1 | - |
| Huron | 02ED013 | Wye River near Wyevale | Wye River | 1.5 | 13...19 | 30,30,40, 20,20,30, 50 | 20 | 13,14, 15,18 | - | - | - | 0 | too short |
| Huron | 02ED017 | Hog Creek near Victoria Harbour | Hog Creek | 27.42 | 13...18 | 20,20,25, 20,x,40 | 20 | 13,15 | - | 15 | - | 1 | - |
| Huron | 02ED018 | Sturgeon River at Sturgeon Bay | Sturgeon River | 33.59 | 13...16 | 25,20,30, 15 | 15 | 13,15 | - | 15 | - | 1 | - |
| Huron | 02ED019 | Copeland Creek near Penetaguishene | Copeland Creek | 10.45 | 14...18 | 25,10,160, x,110 | 10 | 14,16, 18 | - | 15 | - | 1 | - |
| Huron | 02ED024 | North Fiver at the falls | North River | 44.74 | 12...19 | 80,70,75, 60,55,45, 50,45 | 45 | 12,15, 16 | - | - | - | 0 | too short |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Huron | 02ED026 | Nottawasaga River at Hockley | Nottawasaga River | FALSE | 15...18 | 60,50,75, 80 | 50 | 15,17 | - | 15,17 | - | 1 | - |
| Huron | 02ED031 | Pretty River at Collingwood | Pretty River | 25.69 | 16...19 | 50,25,40, 45 | 25 | 16,19 | - | 16,19 | - | 1 | - |
| Huron | 02ED032 | Willow Creek near Minesing | Nottawasaga River | 115.23 | 13...18 | 70,120,85, 90,70,75 | 70 | 15 | - | 15 | - | 1 | - |
| Huron | 02ED101 | Nottawasaga River near Alliston | Nottawasaga River | 115.23 | 13...19 | 60,60,45, 60,60, x,100 | 45 | 14,16, 19 | - | 14,16, 19 | - | 1 | - |
| Huron | 02FA001 | Sauble River at Sauble Falls | Sauble River | 55.28 | 13...19 | 150,40,80, 40,70,80, 70 | 40 | 13,15, 17 | 13,15, 17 | 14 | 16 | 2 | - |
| Huron | 02FA002 | Stokes River near Ferndale | Stokes River | 19.84 | 13...19 | 25,20,20, 15,25, 20,50 | 15 | 17 | - | 17 | - | 1 | - |
| Huron | 02FA004 | Sauble River at Allenford | Sauble River | 55.28 | 13...19 | 75,30,30, 25,25, 25,30 | 25 | 13,14 | - | 14 | - | 1 | - |
| Huron | 02FB007 | Sydenham River near Owen Sound | Sydenham River | 8.36 | 14...18 | 60,45,45, 55,45 | 45 | 16 | - | - | - | 0 | too short |
| Huron | 02FB009 | Beaver River near Clarksburg | Beaver River | ~ 20 | 14...19 | 50,50,65, 60,x,80 | 50 | 14,16 | - | 14,16 | - | 0 | too short |
| Huron | 02FB010 | Bighead River near Meaford | Bighead River | No barrier | 14...19 | 60,40,30, 30,30,50 | 30 | 14 | 14 | 14 | - | 1 | - |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Huron | 02FC001 | Saugeen River near Port Elgin | Saugeen River | 8 (fishway) | 15...19 | 50,45,x,50, 110 | 45 | 15,19 | - | - | - | 0 | too short |
| Huron | 02FC002 | Saugeen River near Walkerton | Saugeen River | 8 (fishway) | 14...19 | 50,25,30, 25,25,60 | 25 | 14,16 | - | - | - | 0 | too short |
| Huron | 02FC012 | South Saugeen River near Hanover | Saugeen River | 8 (fishway) | 14...19 | 40,20,25, 20,40,40 | 20 | 14,18 | - | - | - | 0 | too short |
| Huron | 02FC015 | Teeswater River near Paisley | Saugeen River | 8 (fishway) | 13...19 | 75,40,25, 20,40, 20,25 | 20 | 13,17 | 13 | - | - | 0 | too short |
| Huron | 02FC016 | Saugeen River above Durham | Saugeen River | 8 (fishway) | 14...20 | 40,50,45, 25,45,150, 75 | 25 | 19 | 19 | - | - | 0 | too short |
| Huron | 02FC017 | Beatty Saugeen River near Holstein | Saugeen River | 8 (fishway) | 15...19 | 40,15,35, 30,55 | 15 | 15,17, 19 | - | - | - | 0 | too short |
| Huron | 02FC018 | North Saugeen River above Chesley | Saugeen River | 8 (fishway) | 14...H13 017 | 80,40,20, 60 | 20 | 14,17 | - | - | - | 0 | too short |
| Huron | 02FC020 | Teeswater River at Teeswater | Saugeen River | 8 (fishway) | 15...20 | 45,x,25,10, x,55 | 10 | - | - | - | - | 0 | no spike |
| Huron | 02FD001 | Pine River at Lurgan | Pine River | 40.08 | 13...20 | 35,25,30, 25,25,10, 135 | 10 | 17 | 19 | 17 | 19 | 2 | - |
| Huron | 02FD002 | Lucknow River at Lucknow (9 mile) | Lucknow River | ~ 4 (fishway) | 14...19 | 20,25,20, 15,15,140 | 15 | - | 19 | - | - | 0 | too short |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Huron | 02FD003 | North Penetangore River at Kincardine | Penetangore River | 40.44 | 13...20 | 25,30,10, 10,15,25, x,15 | 15 | 14,18 | - | 14,18 | - | 1 | - |
| Huron | 02FE002 | Maitland River below Wingham | Maitland River | 117.3 | 14...19 | 25,25,20, 25,30,30 | 20 | 14,18 | - | 14,18 | - | 1 | - |
| Huron | 02FE003 | Middle Maitland River near Listowel | Maitland River | 117.3 | 13…20 | 40,20,20, 25,20,25, 50,40 | 20 | 13,16 | 20 | 16 | 20 | 2 | - |
| Huron | 02FE005 | Maitland River above Wingham | Maitland River | 117.3 | 13…20 | 30,30,25, 40,35,20, 100,110 | 25 | 14,16 | 19 | 14,16 | 19 | 2 | - |
| Huron | 02FE007 | Little Maitland River at Bluevale | Maitland River | 117.3 | 13…20 | 60,30,25, 20,30, 25,50 | 20 | 13,17, 19 | - | 17,19 | - | 1 | - |
| Huron | 02FE008 | Middle Maitland River near Belgrave | Maitland River | 117.3 | 12…21 | 40,55,20, 25,20,20, 20,100,140 | 20 | - | 13,19 | - | 19 | 2 | - |
| Huron | 02FE009 | South Maitland River at Summerhill | Maitland River | 117.3 | 14…20 | 50,25,25, 25,25, 75,75 | 25 | 16 | 19 | 16 | 19 | 2 | - |
| Huron | 02FE011 | Maitland River near Harriston | Maitland River | 117.3 | 12…19 | 50,40,25, 15,20,20, 25,20 | 15 | 12,16, 18,20 | - | 16,18, 20 | - | 1 | - |
| Huron | 02FE013 | Middle Maitland River above Ethel | Maitland River | 117.3 | 14…20 | 25,50,45, 25,30,100, 210 | 25 | - | 15,16, 19,20 | - | 15,16, 19 | 2 | - |
| Huron | 02FE014 | Blyth Brook below Blyth | Maitland River | 117.3 | 13…19 | 25,25,25, 20,25, 25,60 | 20 | 13,15, 19 | - | 15,19 | - | 1 | - |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Huron | 02FE015 | Maitland River at Benmiller | Maitland River | 117.3 | 15…20 | 30,90,25, 50,55 | 25 | 16,18 | - | 16,18 | - | 1 | - |
| Huron | 02FE016 | South Maitland River at Roxboro | Maitland River | 117.3 | 13…20 | 20,x,x,15, x,x,40,x | 15 | - | - | - | - | 0 | no spike |
| Huron | 02FF002 | Ausable River near Springbank | Ausable River | 148.83 | 13…19 | 40,55,35, 30,25, 55,25 | 25 | - | 14,18 | - | 14,18 | 2 | - |
| Huron | 02FF004 | South Parkhill Creek near Parkhill | Ausable River | 76.48 | 13…19 | 20,15, 25,5,25, 30,45 | 5 | 15,17, 19 | - | 15,17, 19 | - | 1 | - |
| Huron | 02FF007 | Bayfield River near Varna | Bayfield River | 83.26 | 13…20 | 20,20,35, 20,20, 30,40 | 20 | - | 16 | - | 16 | 2 | - |
| Huron | 02FF008 | Parkhill Creek above Parkhill Reservoir | Ausable River | 76.48 | 13…19 | 50,25,15, 10,20, 60,80 | 15 | 14,18, 19 | - | 14,18, 19 | - | 1 | - |
| Huron | 02FF009 | Ausable River near Exeter | Ausable River | 148.83 | 13…20 | 40,75,20, 15,20,30, 50,60 | 15 | 20 | 14 | 20 | 14 | 2 | - |
| Huron | 02FF011 | Silver Creek at Seaforth (Bayfield Trib) | Bayfield River | 83.26 | 13…20 | 15,30,30, 20,10,10, 15,x | 15 | 13,14, 15 | - | 14,15 | - | 1 | - |
| Huron | 02FF012 | Perch Creek at Sarnia | Cow Creek | 23.96 | 13…20 | 20,15,x,5, 10,25,x,25 | 5 | 18 | - | 18 | - | 1 | - |
| Huron | 02FF015 | Tricks Creek near Clinton | Bayfield River | 83.26 | 15...17 | 20,20,x | 20 | - | - | - | - | 0 | no spike |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Erie | 02GA003 | Grand River at Galt | Grand River | 150 | 14…20 | 50,50,75, 60,x, 80,125 | 50 | - | - | - | - | 0 | no spike |
| Erie | 02GA010 | Nith River near Canning | Grand River | 150 | 13…19 | 55,40,50, 55,x,100 | 40 | - | 15,18, 19 | - | 15,18, 19 | 2 | - |
| Erie | 02GA014 | Grand River near Marsville | Grand River | 150 | 13…20 | 50,15,30, 30,25,40, 30,30 | 15 | 13,15, 16,18 | - | 15,16, 18 | - | 1 | - |
| Erie | 02GA016 | Grand River below Shand Dam | Grand River | 150 | 15…20 | 45,40,50, 45,100,125 | 40 | 15 | 19 | 15 | 19 | 2 | - |
| Erie | 02GA018 | Nith River at new Hamburg | Grand River | 150 | 13…19 | 25,20,25, 25,25,30 | 20 | - | 19 | - | 19 | 2 | - |
| Erie | 02GA034 | Grand River at west Montrose | Grand River | 150 | 13…20 | 90,50,75, 50,55,80, 175 | 50 | - | 15,18 | - | 15,18 | 2 | - |
| Erie | 02GA041 | Grand River near Dundalk | Grand River | 150 | 14…19 | 25,25,25, 40,15,45 | 15 | 17,20 | - | 17,20 | - | 1 | - |
| Erie | 02GB001 | Grand River at Brantford | Grand River | 150 | 13…19 | 85,55,50, 55,60, 55,65 | 50 | - | 14,19 | - | 14,19 | 2 | - |
| Erie | 02GB007 | Fairchild Creek near Brantford | Grand River | 150 | 13…21 | 50,45,55, 60,50,65, 75,95,250 | 45 | 13,18 | 16,21 | 18 | 16,21 | 2 | - |
| Erie | 02GB008 | Whitemans Creek near Mount Vernon | Grand River | 150 | 13…20 | 70,40,40, 50,45, 35,55 | 35 | - | 13,16, 20 | - | 16,20 | 2 | - |
| Erie | 02GC002 | Kettle Creek at St. Thomas | Kettle Creek | ~ 30 | 13…19 | 40,20,25, 15,20, 25,30 | 15 | 13,15, 18 | - | 15,18 | - | 1 | - |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Erie | 02GC006 | Big Creek near Delhi | Big Creek | 62.23 | 14…20 | 40,30,45, 60,55, 60,95 | 30 | 16,17, 19 | - | 16,17, 19 | - | 1 | - |
| Erie | 02GC007 | Big Creek near Walsingham | Big Creek | 62.23 | 13…20 | 55,60,45, 40,45,60, 65,100 | 40 | 14,16, 20 | - | 14,16 | - | 1 | - |
| Erie | 02GC008 | Lynn River at Simcoe | Lynn River | ~ 10 | 13…19 | 70,55,30, 45,50,65, 60,180 | 30 | 13,17, 18 | 14 | - | - | 0 | too short |
| Erie | 02GC010 | Big Otter Creek at Tillsonburg | Big Otter Creek | ~ 80 | 13…19 | 70,40,30, 25,45, 35,60 | 25 | 17,19 | 13 | 17,19 | - | 1 | - |
| Erie | 02GC011 | Big Creek near Kelvin | Big Creek | 62.23 | 14…18 | x,15,x,30,x | 15 | 17 | - | 17 | - | 1 | - |
| Erie | 02GC012 | Patterson Creek near Simcoe | Big Otter Creek | ~ 10 | 13…17 | 50,15,30, 35,25 | 15 | 13 | - | - | - | 0 | too short |
| Erie | 02GC014 | Young Creek near Vittoria | Big Otter Creek | ~ 20 | 13…18 | 100,95, 140,x,80, 65 | 65 | 15,18 | 14 | - | - | 0 | too short |
| Erie | 02GC015 | Little Otter Creek near Straffordville | Big Otter Creek | ~ 80 | 13…19 | 65,30,40, 30,40, 40,75 | 30 | 15,17,1 9 | 13 | 15,17, 19 | - | 1 | - |
| Erie | 02GC017 | Big Otter Creek above Otterville | Big Otter Creek | ~ 80 | 13…20 | 50,30,60, 40,35, 70,55,80 | 30 | 13,16, 18,20 | - | 16,18 | - | 1 | - |
| Erie | 02GC018 | Catfish Creek near Sparta | Catfish Creek | 62.57 | 13…20 | 30,30,35, 30,15,35, 45,140 | 15 | 15,18 | 20 | 15,18 | - | 1 | - |
| Erie | 02GC021 | Venison Creek near Walsingham | Big Creek | 62.23 | 13…19 | 50,40,35, 40,35,45, 75,190 | 35 | 13,16, 18,19, 20 | - | 16,18, 19 | - | 1 | - |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Erie | 02GC022 | Nanticoke Creek at Nanticoke | Nanticoke Creek | 47.95 | 13…19 | 30,25,20, 20,20,35, 60 | 20 | 13,17 | 19 | 17 | 19 | 2 | - |
| Erie | 02GC026 | Big Otter Creek near Calton | Big Otter Creek | ~ 80 | 13…20 | 40,60,25, 35,45,45, 80,90 | 25 | 14,17,1 9 | - | 14,17,1 9 | - | 1 | - |
| Erie | 02GC029 | Kettle Creek above St. Thomas | Kettle Creek | ~ 30 | 13…20 | 20,15,20, 10,15,65, 35 | 10 | 15 | 18,20 | 15 | 18 | 2 | - |
| Erie | 02GC030 | Catfish Creek at Aylmer | Catfish Creek | 62.57 | 13…21 | 20,15,10, 15,15,15, 35,60,60 | 10 | 15,19 | - | 15,19 | - | 1 | - |
| Erie | 02GC031 | Dodd Creek below Paynes Mills (Kettle) | Kettle Creek | ~ 30 | 13…19 | 30,30,30, 20,10, 14,60 | 10 | 13,15,1 9 | - | 15,19 | - | 1 | - |
| Erie | 02GD001 | Thames River near Ealing | Thames River | 243.65 | 13…20 | 55,15,25, 30,25,35, 45,90 | 15 | 15,16, 18,19 | - | 15,16,1 8,19 | - | 1 | - |
| Erie | 02GD003 | North Thames River below Fanshawe Dam | Thames River | 243.65 | 13…19 | 40,x,25,20, 40,20,45 | 20 | 13,17,1 9 | - | 17,19 | - | 1 | - |
| Erie | 02GD004 | Middle Thames River at Thamesford | Thames River | 243.65 | 13…20 | 25,15,15, 20,20,20, 35,50 | 15 | 13,15,2 0 | - | 15,20 | - | 1 | - |
| Erie | 02GD005 | North Thames river at St. Marys | Thames River | 243.65 | 13…19 | 60,20,40, 60,40, 50,90 | 20 | 16,19 | 15 | 16,19 | 15 | 2 | - |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Erie | 02GD012 | Thames River at Woodstock | Thames River | 243.65 | 13…20 | 20,35,25, 25,25, 35,20 | 20 | 14,18, 20 | - | 14,18, 20 | - | 1 | - |
| Erie | 02GD014 | North Thames River near Mitchell | Thames River | 243.65 | 14…19 | 25,15,15, 10,30,30 | 10 | 15,18, 20 | - | 15,18, 20 | - | 1 | - |
| Erie | 02GD015 | North Thames River near Thorndale | Thames River | 243.65 | 13…20 | 70,75,25, 25,35,40, 90,135 | 25 | 18,20 | 15,19 | 18,20 | 15,19 | 2 | - |
| Erie | 02GD016 | Thames River at Ingersoll | Thames River | 243.65 | 13…19 | 45,130,30, 30,55,45, 60,170 | 30 | 17,20 | 14 | 17,20 | 14 | 2 | not directly connected to St. Clair |
| Erie | 02GD021 | Thames River at Innerkip | Thames River | 243.65 | 13…20 | 15,20,20, 35,45,40, 55,110 | 15 | - | 17,18, 20 | - | 17,18, 20 | 2 | - |
| Erie | 02GD023 | Thames River near Tavistock | Thames River | 243.65 | 13…20 | 20,5,20,20, 20,35,15, 45 | 5 | 15,18, 20 | - | 15,18, 20 | - | 1 | - |
| Erie | 02GE002 | Thames River at Byron | Thames River | 243.65 | 15…20 | 45,15,55, x,x,55 | 15 | 17 | - | 17 | - | 1 | - |
| Erie | 02GE003 | Thames River at Thamesville | Thames River | 243.65 | 13…20 | 85,35,70, 35,50, 60,75 | 35 | - | 14,16, 20 | - | 14,16, 20 | 2 | - |
| Erie | 02GE006 | Thames River near Dutton | Thames River | 243.65 | 15…20 | 25,x,45,60, 75,110 | 25 | - | - | - | - | 0 | no spike |
| Erie | 02GG002 | Sydenham River near Alvinston | Sydenham River | 156.66 | 13…20 | 40,15,15,x, 20,45, 15,30 | 15 | - | 13,18 | - | 18 | 2 | - |
| Erie | 02GG003 | Sydenham River at Florence | Sydenham River | 156.66 | 13…20 | 50,25,25, 25,30,55, 40,45 | 25 | - | - | - | - | 0 | no spike |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Erie | 02GG005 | Sydenham River at Strathroy | Sydenham River | 156.66 | 14…20 | 10,15,10, 25,20,35, 30 | 10 | 15,17, 19 | - | 15,17, 19 | - | 1 | - |
| Erie | 02GH001 | Sturgeon Creek near Leamington | Sturgeon Creek | 12.89 | 13…19 | 5,5,5,15, 20,15,30 | 5 | 14,16, 17,19 | - | 14,16 | - | 1 | - |
| Erie | 02GH002 | Ruscom River near Ruscom Station | Ruscom River | 34.43 | 13…20 | 35,5,10,10, 15,15,70, 35 | 5 | 15,17, 19 | 13 | 15,17 | - | 1 | - |
| Erie | 02GH003 | Canard River near Lukerville | Canard River | 53.56 | 13…20 | 20,10,30, 10,20,15, 30,35 | 10 | 17,19 | 15 | 17,19 | 15 | 2 | - |
| Erie | 02GH004 | Turkey Creek at Windsor | Turkey Creek | 14.43 | 12…21 | 70,55,40, 50,35,35, 50,80,75, 110 | 35 | - | 12,15, 20 | - | - | 0 | too short |
| Erie | 02GH011 | Little River at Windsor | Little River | 16.7 | 12…20 | 10,21,5,5, 5,10,10, 25,25 | 5 | 13,17, 20 | - | 17 | - | 1 | - |
| Ontario | 02HA006 | Twenty Mile Creek at Balls Falls | Twenty Mile Creek | ~ 10 | 12…20 | 55,40,10, 15,15,35, 10,35,35 | 10 | 12,19 | 17 | - | - | 0 | too short |
| Ontario | 02HA007 | Welland River below Caistor Corners | Welland River | ~ 100 | 13…20 | 15,25,15, 20,25,20, 35,60 | 15 | 14,17, 20 | - | 17,20 | - | 1 | - |
| Ontario | 02HA014 | Redhill Creek at Hamilton | Redhill Creek | 18.95 | 13…19 | 15,20,20, 120,15, 10,20 | 10 | 16 | - | - | - | 0 | too short |
| Ontario | 02HA022 | Stoney Creek at Stoney Creek | Stoney Creek | 16.74 | 14…19 | 20,100,20, 15,x,35 | 15 | 19 | 15 | - | - | 0 | too short |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Ontario | 02HA023 | Redhill Creek at Albion Falls | Redhill Creek | 18.95 | 13…19 | 45,30,50, 85,30,x,70 | 30 | 16,19 | - | - | - | 0 | too short |
| Ontario | 02HA024 | Oswego Creek at Canboro | Oswego Creek | ~ 100 | 12…18 | 35,15,10, 20,10,10 | 10 | 12,15 | - | - | - | 1 | - |
| Ontario | 02HA030 | Four Mile Creek near Virgil | Four Mile River | ~ 10 | 12…17 | x,5,20,x, x,25 | 5 | 14 | - | - | - | 0 | too short |
| Ontario | 02HB001 | Credit River near Cataract | Credit River | 30.15 | 13…18 | 35,70,45, 40,70,40 | 35 | 17,19 | - | 17,19 | - | 1 | - |
| Ontario | 02HB002 | Credit River at Erindale | Credit River | 30.15 | 14…19 | 80,50,55,x, 150,70 | 50 | - | 14,18 | - | - | 0 | too short |
| Ontario | 02HB004 | East Oakville Creek near Omagh | Sixteen Mile Creek | 63.39 | 14…19 | 15,15,10, 15,120,30 | 10 | - | 18 | - | - | 2 | - |
| Ontario | 02HB005 | Oakville Creek at Milton | Sixteen Mile Creek | 63.39 | 14…19 | 40,40,15, 30,60,70 | 15 | 15 | 18 | 15 | 18 | 2 | - |
| Ontario | 02HB007 | Spencer Creek at Dundas | Spencer Creek | 17.9 | 14…20 | 45,55,35, 35,45,50, 100 | 35 | 20 | 15,18 | - | - | 0 | too short |
| Ontario | 02HB008 | Credit River West Branch at Norval | Credit River | 30.15 | 14…20 | 50,50,25, 30,55, 95,105 | 25 | - | 15,18, 19 | - | 15,18 | 2 | - |
| Ontario | 02HB011 | Bronte Creek near Zimmerman | Bronte Creek | 38.21 | 14…18 | 40,30,30, 85,45 | 30 | 15 | 17 | 15 | - | 1 | - |
| Ontario | 02HB012 | Grindstone Creek near Aldershot | Grindstone Creek | 18.82 | 13…19 | 30,20,30, 30,25, 35,35 | 20 | 15,17 | - | - | - | 0 | too short |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Ontario | 02HB013 | Credit River near Orangeville | Credit River | 30.15 | 13…18 | 15,30,20, 15,25 | 10 | 14,18 | - | 18 | - | 1 | - |
| Ontario | 02HB015 | Spencer Creek near Westover | Credit River | 17.9 | 13…20 | 15,10,10, 10,25,15, 15,25 | 10 | 15 | 17 | 15 | - | 1 | - |
| Ontario | 02HB018 | Credit River at Boston Mills | Credit River | 30.15 | 14…19 | 90,80,75, 70,95,120 | 70 | - | 16,20 | - | - | 0 | too short |
| Ontario | 02HB019 | Credit River Alton Branch above Alton | Credit River | 30.15 | 14…18 | 15,20,10, 25,40 | 10 | 14,18 | - | 18 | - | 1 | - |
| Ontario | 02HB020 | Credit River Erin Branch Above Erin | Credit River | 30.15 | 13…19 | 40,45,35, 25,50, 50,75 | 25 | 13,15, 17,19 | - | 15,17, 19 | - | 1 | - |
| Ontario | 02HB021 | Ancaster Creek at Ancaster | Ancaster Creek | 17.9 | 13…19 | 60,30,15,x, 20,15,60 | 15 | 19 | - | - | - | 0 | too short |
| Ontario | 02HB022 | Bronte Creek at Carlisle | Bronte Creek | 38.21 | 13…19 | 35,25,85, 15,15, 50,25 | 15 | 18 | 15 | - | - | 0 | too short |
| Ontario | 02HB023 | Spencer Creek at Highway No. 5 | Spencer Creek | 17.9 | 14…20 | 10,10,10, 20,30,20, 70 | 10 | 17,20 | - | - | - | 0 | too short |
| Ontario | 02HB025 | Credit River at Norval | Credit River | ~ 70 | 14…20 | 50,70,65, 50,85, 90,150 | 50 | - | 15,16, 18,20 | - | 15,16 | 2 | - |
| Ontario | 02HB027 | Fourteen Mile Creek at Oakville | Fourteen Mile Creek | 14.75 | 13…20 | x,10,20, 20,15, 15,x,130 | 10 | 15,16 | 20 | - | - | 0 | too short |
| Ontario | 02HB028 | Grindstone Creek near Millgrove | Grindstone Creek | 17.9 | 14…17 | 20,5,20,60 | 5 | 14 | 17 | - | - | 0 | too short |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Ontario | 02HC003 | Humber River at Weston | Humber River | ~ 4 | 12…19 | 60,50,20, 35,45,40, 40,155 | 20 | - | 13,16, 19 | - | - | 0 | too short |
| Ontario | 02HC005 | Don River at York Mills | Don River | 50.09 | 14…20 | 85,65,x,60, 45,165,60 | 45 | - | 14,19 | - | - | 0 | too short |
| Ontario | 02HC009 | East Humber River near Pine Grove | Humber River | ~ 4 | 13…20 | 35,30,30, 35,30,45, 70,85 | 30 | - | 16,19 | - | - | 0 | too short |
| Ontario | 02HC013 | Highland Creek near West Hill | Rouge River | 25.12 | 13…19 | 75,50,45, 145,30, 70,25 | 25 | 20 | 13,16, 18 | 19 | - | 1 | - |
| Ontario | 02HC017 | Etobicoke Creek at Brampton | Etobicoke Creek | 59.16 | 13…19 | 25,25,x,10, 45,10,25 | 10 | 14,17 | - | 17 | - | 1 | - |
| Ontario | 02HC018 | Lynde Creek near Whitby | Duffins Creek | 35.44 | 14…19 | 20,40,20, 25,x,65 | 20 | - | 15,18 | - | 15 | 2 | - |
| Ontario | 02HC019 | Duffins Creek above Pickering | Duffins Creek | 27.43 | 13…20 | 45,40,50, 40,45,90, 95,95 | 40 | 18,20 | - | - | - | 0 | too short |
| Ontario | 02HC022 | Rouge River near Markham | Rouge River | 48.05 | 13…20 | 45,15,30, 40,20,75, 85,75 | 15 | - | 13,16, 18 | - | 16 | 2 | - |
| Ontario | 02HC024 | Don River at Todmorden | Don River | 50.09 | 13…19 | 50,30,150, 35,35,180, 205 | 30 | - | 15,18, 19 | - | - | 0 | too short |
| Ontario | 02HC025 | Humber River at Elder Mills | Humber River | ~ 4 | 13…20 | 25,30,35, 50,30, 50,60 | 25 | 14 | 16,19 | - | - | 0 | too short |
| Ontario | 02HC028 | Little Rouge Creek near Locust Hill | Rouge River | 48.05 | 13…20 | 25,10,20, 15,25,45, 55,40 | 10 | 13,15 | 18,19 | 15 | 18 | 2 | - |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Ontario | 02HC029 | Little Don River at Don Mills | Don River | 50.09 | 14…19 | 70,15,70, 30,x,55 | 15 | 19 | 14,16 | - | - | 0 | too short |
| Ontario | 02HC030 | Etobicoke Creek below Queen Elizabeth Highway | Etobicoke Creek | 59.16 | 13…20 | 40,30,45, 45,10,25, 65,45,60 | 10 | 18 | 15 | - | 15 | 2 | - |
| Ontario | 02HC031 | West Humber River at Highway No. 7 | Humber River | ~ 4 | 13…20 | 30,45,15, 15,20,25, 37,90 | 15 | 17,20 | 14 | - | - | 0 | too short |
| Ontario | 02HC032 | East Humber River at King Creek | Humber River | ~ 4 | 13…19 | 80,15,65, 35,45, 85,35 | 15 | 13,17, 18 | 15 | - | - | 0 | too short |
| Ontario | 02HC033 | Mimico Creek at Islington | Mimico Creek | 33.93 | 13…19 | 80,20,10, 35,20,15, 40,130 | 10 | 12,15, 16 | 19 | 15,16 | - | 1 | - |
| Ontario | 02HC038 | West Duffins Creek above Green River | West Duffins Creek | 27.43 | 13…19 | 30,20,30, 15,25, 45,55 | 15 | 15,17 | - | - | - | 1 | - |
| Ontario | 02HC047 | Humber River near Palgrave | Humber River | ~ 4 | 14…19 | 45,40,50, 40,105,60 | 40 | 16 | 18 | - | - | 0 | too short |
| Ontario | 02HC049 | Duffins Creek at Ajax | Duffins Creek | 27.43 | 13…19 | 45,45,45, 30,50, 50,40 | 30 | 15 | 13,17 | - | - | 0 | too short |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Ontario | 02HC053 | Little Rouge River near Dicksons Hill | Rouge River | 48.05 | 14…19 | 10,40,15, x,x,65 | 10 | 15,19 | - | 15 | - | 1 | - |
| Ontario | 02HC054 | Lynde Creek at Brooklin | Duffins Creek | 35.44 | 14…19 | 10,40,x, 20,20,60 | 10 | 15,19 | - | - | - | 1 | - |
| Ontario | 02HC055 | Lynde Creek Tributary near Kinsale | Duffins Creek | 35.44 | 14…19 | 40,25, 30,x,60 | 20 | 15,19 | - | 15 | - | 1 | - |
| Ontario | 02HD003 | Ganaraska River near Osaca | Ganaraska River | ~ 75 | 14…19 | 35,45,40, 40,x,100 | 35 | 15,18 | - | 15,18 | - | 1 | - |
| Ontario | 02HD004 | North West Ganaraska River near Osaca | Ganaraska River | ~ 75 | 14…19 | 25,75,25, 40,x,95 | 25 | - | 15,18 | - | 15,18 | 2 | - |
| Ontario | 02HD006 | Bowmanville Creek at Bowmanville | Bowmanville Creek | ~ 30 | 14…19 | 20,35,40, 30,45,70 | 20 | 15 | - | 15 | - | 1 | - |
| Ontario | 02HD008 | Oshawa Creek at Oshawa | Oshawa Creek | ~ 30 | 14…20 | 40,30,60, 40,25, 130,110 | 25 | - | 16,19 | - | - | 0 | too short |
| Ontario | 02HD009 | Wilmot Creek near Newcastle | Wilmot Creek | ~ 30 | 15…19 | 55,35, 50,x,150 | 5 | - | 19 | - | - | 0 | too short |
| Ontario | 02HD010 | Shelter Valley Brook near Grafton | Shelter Valley Creek | ~ 30 | 13…19 | 20,20,60, 25,50, 50,55 | 20 | - | 15,17, 18 | - | - | 0 | too short |
| Ontario | 02HD012 | Ganaraska River above Dale | Ganaraska River | ~ 75 | 14…19 | 35,15,30, 55,110,95 | 35 | 14,17, 18 | - | 14,17 | - | 1 | - |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Ontario | 02HD013 | Harmony creek at Oshawa | Harmony Creek | ~ 20 | 14…19 | 25,40,15, 15,60,15 | 15 | 15 | 18 | - | - | 0 | too short |
| Ontario | 02HD014 | Farewell Creek at Oshawa | Farewell Creek | ~ 20 | 14…19 | 20,35,30, 25,x,70 | 20 | 15 | 18 | - | - | 0 | too short |
| Ontario | 02HD019 | Cobourg Brook at Cobourg | Cobourg Brook | ~ 5 | 14…18 | 40,105, 55,x,95 | 40 | - | 15 | - | - | 0 | too short |
| Ontario | 02HE001 | Bloomfield Creek at Bloomfield | Bloomfield Creek | 17.79 | 13…19 | 15,15,15, 15,10,x,30 | 10 | 14,16, 19 | - | 14,16 | - | 1 | - |
| Ontario | 02HE004 | Black Creek at Milford | Black Creek | 12.77 | 11…19 | 5,15,10,x, x,5,x,x,x | 5 | 12,19 | - | - | - | 0 | - |
| Ontario | 02HK004 | Trent River at Glen Ross | Trent River | ~ 90 | 14…20 | 20,30,60, 55,55, 100,80 | 20 | - | 17,19 | - | 17,19 | 2 | - |
| Ontario | 02HK011 | Mayhew Creek near Trenton | Mayhew Creek | ~ 5 | 12…19 | 20,45,10,x, 10,10,x,x | 10 | 13 | - | - | - | 0 | too short |
| Ontario | 02HK902 | Trent River at Healey Falls(spillway) | Trent River | ~ 90 | 14…18 | 15,20,20, 10,50 | 10 | 14,16, 18 | - | 16,18 | - | 1 | - |
| Ontario | 02HL001 | Moira River near Foxboro | Moira River | ~ 3 | 12…20 | 70,x,20,15, 15,15,10, 35,90 | 10 | 16 | 20 | - | - | 0 | too short |
| Ontario | 02HL005 | Moira River near Deloro | Moira River | ~ 3 | 13…20 | 30,15,15,3 0,15,15, 35,35 | 15 | 16,19 | - | - | - | 0 | too short |
| Ontario | 02HM003 | Salmon River near Shannonville | Salmon River | ~ 3 | 13…20 | 80,20,30,2 0,15,20, 55,70 | 15 | 13,15 | 20 | - | - | 0 | too short |
| Ontario | 02HM004 | Wilton Creek near Napanee | Wilton Creek | 59.26 | 14…19 | 10,20,30, x,20,5 | 10 | 16 | - | 16 | - | 1 | - |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| Ontario | 02HM005 | Collins creek near Kingston | Collins Creek | 37.65 | 12…19 | 70,30,15, 30,25,10, 30,44,x | 10 | 12,15, 16,18 | - | 15,16, 18 | - | 1 | - |
| Ontario | 02HM006 | Millhaven Creek near Millhaven | Millhaven Creek | 54.81 | 12…19 | 30,15,20, 15,10,10, 25,155 | 10 | 12,14 | 19 | - | - | 0 | - |
| Ontario | 02HM007 | Napanee River at Camden East | Napanee River | ~ 7 | 12…19 | 70,60,25, 25,20,15, 30,40 | 15 | 13,16, 18 | - | - | - | 0 | too short |
| Ontario | 02HM009 | West Branch Little Cataraqui Creek at Kingston | Little Cataraqui Creek | 8.35 | 13…19 | 10,230,x,5, 15,20,35 | 5 | 17 | 14 | - | - | 0 | too short |
| Ontario | 02HM010 | Salmon River at Tamworth | Salmon River | ~ 3 | 13…20 | 75,x,x,25, x,15,25,x | 15 | - | 13 | - | - | 0 | too short |
| Ontario | 02HM011 | Millhaven Creek at Sydenham | Millhaven Creek | 54.81 | 13…19 | 30,x,x,20, x,5,30 | 5 | 13,16, 19 | - | 16,19 | - | 1 | - |
| St. Lawrence | 02MB010 | Buells Creek at Brockville | Butlers Creek | 19.93 | 12…19 | 15,30,45, 5,10,15, 25,40 | 5 | 14,17, 19 | - | 17 | - | 1 | - |
| St. Lawrence | 02MC001 | Raisin River near Williamstown | Raisin River | 78.25 | 12…20 | 25,20,20, 10,20,10, 20,15,60 | 10 | 12,14, 16,18, 20 | - | 16,18, 20 | - | 1 | - |
| St. Lawrence | 02MC026 | Riviere Beaudette near Glen Nevis | Riviere Beaudette | 54.36 | 12…20 | 50,15,25, 10,20,10, 10,x,50 | 10 | 12,14, 16 | 19 | 14,16, 18,20 | 19 | 2 | - |
| St. Lawrence | 02MC028 | Riviere Delisle near alexandria | Riviere Delisle | 26.8 | 12…20 | 30,20,35, 5,20,10, 5,15,45 | 5 | 14,16, 20 | - | 16,20 | - | 1 | - |

| Basin | Station Number | Station Description | Major Tributary | Unimpounded Length (km) | Biweeks > 17 °C | Min Length (km) Required (in order of biweek > 17 °C) | Min Length Required (km) | Biweeks with Flow Spike | Biweeks with Flow Spike > 0.7 m/s | Possible Spawning | | Suitability | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Bi-weeks | Bi-weeks > 0.7m/s | | |
| St. Lawrence | 02MC036 | Riviere Delisle near Glen Norman | Riviere Delisle | 26.8 | 15…20 | x,15,10,10, 10,30 | 10 | 16,20 | - | 16 | - | 1 | - |

## APPENDIX 3. TRIBUTARY NAMES IN FIGURE 8

| Basin | Tributary | Label ID |
|---|---|---|
| Erie | Big Creek | 1 |
| Erie | Big Otter Creek | 2 |
| Erie | Canard River | 3 |
| Erie | Catfish Creek | 4 |
| Erie | Grand River | 5 |
| Erie | Kettle Creek | 6 |
| Erie | Little River | 7 |
| Erie | Lynn River | 8 |
| Erie | Nanticoke Creek | 9 |
| Erie | Ruscom River | 10 |
| Erie | Sturgeon Creek | 11 |
| Erie | Sydenham River | 12 |
| Erie | Thames River | 13 |
| Erie | Turkey Creek | 14 |
| Huron | Ausable River | 15 |
| Huron | Bayfield River | 16 |
| Huron | Beaver River | 17 |
| Huron | Bighead River | 18 |
| Huron | Copeland Creek | 19 |
| Huron | Cow Creek | 20 |
| Huron | French River | 21 |
| Huron | Garden River | 22 |
| Huron | Hog Creek | 23 |
| Huron | Lucknow River | 24 |
| Huron | Magnetawan River | 25 |
| Huron | Maitland River | 26 |
| Huron | Mississagi River | 27 |
| Huron | Moon River | 28 |
| Huron | North (Coldwater) River | 29 |
| Huron | Nottawasaga River | 30 |
| Huron | Penetangore River | 31 |
| Huron | Pine River | 32 |
| Huron | Pretty River | 33 |
| Huron | Sauble River | 34 |
| Huron | Saugeen River | 35 |
| Huron | Serpent River | 36 |
| Huron | Severn River | 37 |

| Basin | Tributary | Label ID |
|---|---|---|
| Huron | Spanish River | 38 |
| Huron | Stokes River | 39 |
| Huron | Sturgeon River | 40 |
| Huron | Sydenham River | 41 |
| Huron | Wanapitei River | 42 |
| Huron | Wye River | 43 |
| Ontario | Ancaster Creek | 44 |
| Ontario | Black Creek | 45 |
| Ontario | Bloomfield Creek | 46 |
| Ontario | Bowmanville Creek | 47 |
| Ontario | Bronte Creek | 48 |
| Ontario | Cobourg Brook | 49 |
| Ontario | Collins Creek | 50 |
| Ontario | Credit River | 51 |
| Ontario | Don River | 52 |
| Ontario | Duffins Creek | 53 |
| Ontario | Etobicoke Creek | 54 |
| Ontario | Farewell Creek | 55 |
| Ontario | Four Mile River | 56 |
| Ontario | Fourteen Mile Creek | 57 |
| Ontario | Ganaraska River | 58 |
| Ontario | Grindstone Creek | 59 |
| Ontario | Harmony Creek | 60 |
| Ontario | Highland Creek | 61 |
| Ontario | Humber River | 62 |
| Ontario | Little Cataraqui Creek | 63 |
| Ontario | Mayhew Creek | 64 |
| Ontario | Millhaven Creek | 65 |
| Ontario | Mimico Creek | 66 |
| Ontario | Moira River | 67 |
| Ontario | Napanee River | 68 |
| Ontario | Oshawa Creek | 69 |
| Ontario | Oswego Creek | 70 |
| Ontario | Redhill Creek | 71 |
| Ontario | Rouge River | 72 |
| Ontario | Salmon River | 73 |
| Ontario | Shelter Valley Creek | 74 |
| Ontario | Sixteen Mile Creek | 75 |
| Ontario | Spencer Creek | 76 |

| Basin | Tributary | Label ID |
|---|---|---|
| Ontario | Stoney Creek | 77 |
| Ontario | Trent River | 78 |
| Ontario | Twenty Mile Creek | 79 |
| Ontario | Welland River | 80 |
| Ontario | West Duffins Creek | 81 |
| Ontario | Wilmot Creek | 82 |
| Ontario | Wilton Creek | 83 |
| St. Lawrence | Butlers Creek | 84 |
| St. Lawrence | Raisin River | 85 |
| St. Lawrence | Riviere Beaudette | 86 |
| St. Lawrence | Riviere Delisle | 87 |
| Superior | Batchawana River | 88 |
| Superior | Big Carp River | 89 |
| Superior | Current River | 90 |
| Superior | Dog River | 91 |
| Superior | Goulais River | 92 |
| Superior | Gravel River | 93 |
| Superior | Little Pic River | 94 |
| Superior | McIntyre River | 95 |
| Superior | Mission (Kaministiquia) River | 96 |
| Superior | Pic River | 97 |
| Superior | Pukaskwa River | 98 |
| Superior | Steel River | 99 |