GREEN-DUWAMISH WATERSHED WATER TEMPERATURE REPORT

An Assessment of Surface Water Temperature Conditions

June 2004

Prepared by:
Taylor Associates, Inc. and
King County Water and
Land Resources Division

King County
Department of
Natural Resources and Parks
Water and Land Resources Division

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EXECUTIVE SUMMARY

King County is currently completing the Green-Duwamish Watershed Water Quality Assessment (GD-WQA). This report provides an assessment of surface water temperature conditions as part of the larger assessment of the Green-Duwamish watershed. All temperature conditions presented in this report are based on data collected between July 2001 and September 2003 at 93 surface water monitoring stations distributed throughout the watershed. Data were collected by King County, City of Kent, Tacoma Public Utilities, and the University of Washington. Due to some site duplication by the various monitoring entities, the 93 monitoring stations represent 86 discrete locations in the watershed. Of the 86 discrete locations, 17 stations are on the mainstem and 69 are tributary stations.

Because of the listing of *Oncorhynchus tshawytscha* (Chinook) under the Federal Endangered Species Act (ESA), the potential impairment of salmonid migration (including adult Chinook), incubation, and rearing due to elevated surface water temperatures is a concern in the watershed. As part of the WRIA 9 habitat plan (which includes the Green-Duwamish watershed), conservation measures will be added to address habitat conditions, including water quality and temperature conditions that affect salmonids. These measures will likely focus on water temperature needs for both spawning and rearing of salmonids.

Section 303(d) of the Clean Water Act requires the State to identify those water bodies that do not meet water quality standards. Numerous stream systems throughout the Green-Duwamish watershed are listed for temperature on the State's 303(d) list of impaired water bodies. The State is responsible for prioritizing the list and developing Total Maximum Daily Loads (TMDLs) or "Water Cleanup Plans" for every water body on the list. In the Green-Duwamish watershed, 18 water body segments have been listed for temperature, including segments in the Green River mainstem, Mill Creek (Auburn), Mullen Slough, Springbrook Creek, Soos Creek, Gale Creek, and Smay Creek for failing to meet standards.

This assessment was completed using available surface water temperature data for the watershed. Data for each monitoring station were organized by major river section or subbasin, with the appropriate temperature criteria being applied to each section or subbasin. Daily minimum, daily mean, 1-DMax (one day daily maximum), and 7-DADMax (7-day average daily maximum) values were plotted for each station using the

continuous data set. For each month, average minimum, mean, 1-DMax and 7-DADMax values were calculated and summarized in tabular form. Additionally, total days exceeding selected criteria and average number of degrees Celsius above criteria were calculated for each water year.

Based on this assessment, several key findings were identified, including:

- All 17 mainstem locations exceeded the associated 1997 or 2003 State water quality temperature criteria for 10 or more days during the 2001, 2002, and/or 2003 water years.
- Based on all stations, the maximum number of days the various temperature criteria was exceeded ranged from 84 to 130 days depending on the criterion and water year. The maximum number of degrees the various temperature criteria was exceeded ranged from 3.7°C to 6.8°C depending on the criterion and water year. Average temperature exceedances ranged from 1.1°C to 1.8°C.
- Temperature data for 55 of the 86 monitoring stations violated the 1997 temperature criterion applicable to the subbasins on some or frequent occasions.
- Temperature data for 52 of the 86 monitoring stations violated the 2003 State temperature criterion applicable to the subbasins on some or frequent occasions.
- Station tm-7 (Meridian Valley Creek) had the highest temperature exceedance with an average exceedance temperature of 23.1°C which has potential for lethality for salmonids. Stations CO1 (Covington Creek) and GRT02 (Springbrook Creek) had average exceedance temperatures of 21.5°C and 21.4°C, respectively, which have the potential for blockage to migration.
- An additional 29 stations had average exceedance temperatures between 18 and 21°C (potential for impairment), with four sites greater than 20°C: tm-2 (Lake Meridian outlet), TPU_479 (North Fork Green River), and GRT31 (Duwamish River at North Wind Weir), and GRT22 (Green River at Van Doren Landing).

Based on the 2003 criteria, the temperature exceedances observed for the Green-Duwamish Watershed, were variable. Fifty-two of the 86 monitoring stations violated the 2003 temperature criteria applicable to the subbasin. Of the 52 stations, 20 had exceedances that averaged less than 1°C, while 26 stations had exceedances of 1°C to 3°C above the applicable criterion. The remaining six stations had the greatest exceedances, ranging from 3.0°C to 5.6°C above the applicable criteria. Three stations (tm-7, CO1, GRT02) have the greatest risk of migration blockage or lethality to

salmonids. Thirty-four of the locations monitored indicated no current temperature related risks to salmonid migration.

Because returning adult salmonids must pass through the mainstem to reach tributaries, adult migration is a key life history stage affected by current temperature exceedances. Areas where mainstem exceedances occur should be prioritized for management action. Exceedances during adult migration may also indicate inadequate early fall cooling required to support adequate spawning, incubation, and rearing temperatures.

Oncorhynchus kisutch (coho) subyearlings that remain in freshwater throughout the summer after emergence are another key life stage affected by temperature exceedances. Elevated temperatures in tributaries and mainstem segments that limit coho migration and rearing during the summer should also be prioritized for action.

Efforts to reduce surface water temperatures should be focused on areas most likely to benefit ESA listed fish species (Puget Sound Ecologically Significant Unit Chinook salmon). Areas specifically used by Chinook for migration may be of particular importance. Any sites with exceedances that overlap with Chinook distribution should be targeted for temperature reduction measures. Site-specific recommendations will require more fieldwork to assess local conditions and the potential for protection or acquisition of riparian areas, revegetation, restoration, and local management of water diversions or withdrawals.

1.0 INTRODUCTION

King County is currently completing the Green-Duwamish Watershed Water Quality Assessment (GD-WQA). This report provides an assessment of surface water temperature conditions as part of this larger assessment of water quality conditions in the Green-Duwamish watershed. This report is based on data collected between July 2001 and September 2003 at 93 surface water monitoring stations distributed throughout the watershed. These data were compiled from several data sets, collected either as part of specialized temperature studies or from ongoing surface water monitoring programs. Data were collected by King County, City of Kent, Tacoma Public Utilities, and the University of Washington. Due to some site duplication by the various monitoring entities, the 93 monitoring stations represent 86 discrete locations in the watershed.

This assessment focuses on evaluating potential temperature related impacts to anadromous and resident salmonid populations. Previously, water temperature was identified as a possible or probable factor of decline on the mainstem and tributaries to the Green-Duwamish River (Kerwin and Nelson, 2000).

Through this more comprehensive assessment of surface water temperature, the extent and duration of elevated temperature conditions watershed-wide can be evaluated. Subsequently, results from this assessment can be used to develop recommendations made to support protection of salmonids at key life stages and protect or restore areas where cooler refuge areas exist.

1.1 PROJECT PURPOSE AND DESCRIPTION

The purpose of this project was to assess surface water temperature conditions in the Green-Duwamish watershed. Continuous temperature data from several monitoring studies were used to create a watershed-wide description of temperature conditions along the lower, middle, and upper Green River; Duwamish River; and associated tributaries. Data from each monitoring station were summarized and compared to state water quality criteria for temperature.

Exceedances of these criteria were identified for each station and summarized for each subbasin as well as for the three major subwatersheds (upper, middle, and lower Green River). Mainstem stations only were also analyzed separately. All major exceedances were identified and were used to guide recommendations for maintaining or reducing temperature in affected areas of the watershed.

1.2 REGULATORY IMPLICATIONS

In the Puget Sound region, stocks of many wild salmonid species have declined. In 1999, the National Marine Fisheries Service, under the authority of the Endangered Species Act (ESA), listed *Oncorhynchus tshawytscha* (Chinook salmon) as a threatened species. During the same year, the U.S. Fish and Wildlife Service similarly listed *Salvelinus confluentus* (bull trout) as a threatened species under ESA. The Green-Duwamish watershed, which is part of Water Resource Inventory Area (WRIA) 9, is included in the geographic region affected by the listing of both of these species.

With the listing of these species, the WRIA 9 Steering Committee was formed to study and develop a habitat plan. This committee along with representatives from the Washington Conservation Commission, King County, and other entities worked together to develop the Habitat Limiting Factors and Reconnaissance Assessment Report (Kerwin and Nelson, 2000). This report provided a current conditions description of the existing salmonid species and the habitat conditions that may limit the natural production of salmonids in WRIA 9. The report identified water temperature as a possible or probable factor of decline for salmonids in some subwatersheds or mainstem reaches. The report suggested that elevated water temperatures in portions of the Green-Duwamish River were likely impairing habitat conditions for egg incubation, juvenile salmonid rearing, and summer migration of adult summer *Oncorhynchus mykiss* (steelhead) and Chinook (Kerwin and Nelson, 2000).

Previous studies also concluded that water temperatures in portions of the Green-Duwamish River and its associated tributaries exceeded state criteria during the summer (King County, 1994; Caldwell, 1994). Additionally, severely elevated water temperatures have been observed downstream of the City of Auburn where the river is diked and riparian vegetation is largely non-existent. The absence of a riparian zone in this area of the river had reduced the quality of the habitat particularly for juvenile fish rearing and may have reduced survival or caused an early exodus of juvenile fish to the Duwamish Estuary (Grette and Salo, 1986).

Under the federal Clean Water Act (CWA), the State of Washington has the authority and responsibility to implement the objectives of the CWA. These objectives include regulating discharges of pollutants to the waters of the United States, implementing pollution control programs, and setting water quality standards for all contaminants in surface water.

With the recent revision and updating of Washington's water quality standards, the Department of Ecology (Ecology) has focused more specifically on parameters critical to the protection of aquatic life uses (particularly salmonids) and developing criteria relevant to preserving such uses. Temperature has been one of the water quality parameters that received particular attention as part of the standards update. This update of the temperature standards included the use of best-available science to develop temperature criteria protective of the various life stages associated with salmonids.

In Table 1, the relative temperature ranges are summarized for various life stages where impairment to a specific life stage is impacting or potentially impacting. These temperature ranges were excerpted from Ecology's guidelines which were used for updating of the State's water quality standards (Ecology, 2002).

Table 1. Summary of Temperature Ranges and Potential Impacts to Various Salmonid Life Stages (adapted from Ecology, 2002).

Life Stage	Impairment Temperature Range as Daily Average or Maximum	Potential Impacts
Prespawning	average >14-16°C	-Reduce egg and sperm health
Egg	average >8-10°C maximum >13-15°C	-Reduced survival and emergence of healthy fry
Fry	average >13-15°C maximum >17-19°C	-Reduced survival
Parr to smolts	average >12-13°C Daily average >15-16°C	-Reduce support for smoltification -Halting of development process altogether
Adult Migration	average >15°C and maximum >18-20°C average >21-22°C average >24-25°C Plumes >32-33°C	-Impairment of migration -Blockage of migration -Lethality if not acclimated -Instant lethality

From a regulatory standpoint, the temperatures of greatest interest in the Green-Duwamish watershed are the summer maximum temperatures which can pose some level of threat to salmonid migration. For example, average temperatures in the range of 18-20°C may periodically pose impairment to salmon migration while temperatures in the range of 21-22°C may result in a temperature related blockage to migration. Additionally,

average temperature values in the range of 24-25°C may result in lethality (Ecology, 2002).

The potential impairment of salmonid migration due to elevated surface water temperatures is a concern under ESA. As part of the habitat plan for WRIA 9, conservation actions targeting areas of elevated temperatures will be included.

Section 303(d) of the Clean Water Act requires the State to identify those water bodies that do not meet water quality standards. Numerous stream systems throughout the Green-Duwamish watershed are listed for temperature on the State's 1998 303(d) list of impaired water bodies. The State is responsible for prioritizing the list and developing Total Maximum Daily Loads (TMDLs) or Water Cleanup Plans for every water body on the list. In the Green-Duwamish watershed, 18 water body segments have been listed for temperature, including segments in the Green River mainstem, Mill Creek (Auburn), Mullen Slough, Springbrook Creek, Soos Creek, Gale Creek, and Smay Creek for failing to meet criteria.

The Department of Ecology is currently in the middle of a five-year planning process for developing TMDLs for WRIA 9. Scoping began in 2002/2003 with data collection occurring in 2003/2004. Data analysis is ongoing in 2004/2005 and draft TMDLs are to be completed in 2005/2006. In 2006/2007, the process will focus on implementation. A TMDL or Water Cleanup Plan includes the following components: (1) identification of the type, amount and sources of water pollution in a particular water body; (2) targets for how much the pollution needs to be reduced or eliminated to achieve clean water; (3) actions for reducing the pollution to target levels; and (4) a monitoring plan to assess effectiveness.

1.3 TEMPERATURE CRITERIA

In June 2003, Ecology finished its first major overhaul of the state's water quality standards (WAC-201A, 2003). This update to the state's standards takes into consideration the most recent scientific information available and reflects recent changes to both state and federal requirements. These updated standards include major changes to the temperature criteria and are consistent with recent guidance (EPA, 2003) provided by the U.S. Environmental Protection Agency (EPA).

The director of Ecology adopted these updated water quality standards (including temperature criteria) on June 30, 2003. Subsequently, these updated standards have been

submitted to EPA for approval. Until approval of the updated standards occurs by EPA (anticipated by summer 2004, www.ecy.wa.gov/programs/wq/swqs/rev_rule.html), the 1997 water quality standards remain applicable for federal Clean Water Act related actions (for example, in the protection or preservation of endangered species).

For the purposes of analyzing temperature related impacts to water quality on the Green-Duwamish River system, temperature criteria from both the 1997 and updated 2003 water quality standards were used in this report. Below, the applicable temperature criteria for both water quality standards are summarized for the Green-Duwamish watershed.

1.3.1 1997 Temperature Criteria

The 1997 water quality standards are applied based on surface water classifications (WAC 173-201A, 1997). These water quality classifications ranged from Class AA (extraordinary) to Class C (fair). For the Green-Duwamish watershed, the river system or waterway is broken into several sections which have different criteria applied depending upon the classification. Table 2 summarizes the temperature criteria that are applied to the various waterway sections. Comparisons are made between maximum daily temperatures and the appropriate criterion.

Table 2. 1997 Water Quality Temperature Criteria and Classifications for the Green-Duwamish Watershed.

Segment[a]	**Upper Green River (RM 42.3 to 59.1)**	**Lower Green River (RM 11 to RM 42.3)**	**Duwamish River (mouth to RM 11)**	**Duwamish Estuary**
Water Type	Freshwater	Freshwater	Freshwater	Marine
Classification	AA	A	B	A
Description	Extraordinary	Excellent	Good	Excellent
Temperature Criterion	16°C	18°C	21°C	16°C

[a] Segments are defined per WAC 173-201A-130 and WAC 173-201A-140 as follows: Upper Green River-from the west boundary of Sec. 27-T21N-R6E (west boundary of Flaming Geyser State park, river mile 42.3) to the west boundary of Sec. 13-T21N-R7E (river mile 59.1); Lower Green River-from Black River (river mile 11.0 and point where Duwamish River continues as the Green River) to west boundary of Sec. 27-T21N-R6E (west boundary of Flaming Geyser State park, river mile 42.3); Duwamish River from the mouth south of a line bearing 254° true from the NW corner of berth 3, terminal no. 37 to the Black River (river mile 11.0); and Duwamish Estuary-Elliott Bay east of a line between Pier 91 and the Duwamish head.

1.3.2 2003 Water Quality Standards

The 2003 water quality standards were substantially restructured from the class-based standards found in the 1997 version of the State's water quality standards to a use-based system. For the 2003 standards, use designations are based on a variety of beneficial uses and include aquatic life, recreational, water supply, and miscellaneous uses. This new use-based system is intended to provide more flexibility to designate uses of protection that are more consistent with the capabilities and limitations of a specific waterbody (Ecology, 2003). Table 3 illustrates the freshwater and marine use designations developed by Ecology for the Green-Duwamish watershed.

Table 3. Freshwater and Marine Use Designations for the Green-Duwamish Watershed (WRIA 9) by Major River Section (adapted from WAC 173-201A, 2003 Part VI-Use Designation for Waters of the State, Table 602).

USE DESIGNATION / WATERWAY SEGMENT	AQUATIC LIFE USES [a]						RECREATIONAL USES			WATER SUPPLY USES [b]				MISCELLANEOUS USES				
	Char	Core Salmon/Trout	Non-core Salmon/Trout	Salmon/Trout Rearing	Redband Trout	Warm Water Species	External Primary Contact	Primary Contact	Secondary Contact	Domestic Water	Industrial Water	Agricultural Water	Stock Water	Wildlife Habitat	Harvesting	Commerce/Navigation	Boating	Aesthetics
Duwamish River (mouth to RM 11)				X					X		X	X	X	X	X	X	X	X
Lower Green (RM 11 to RM 42.3)			X					X		X	X	X	X	X	X	X	X	X
Upper Green River (RM 42.3 to 59.1)		X					X			X	X	X	X	X	X	X	X	X
Green River and tributaries (RM 59.1 to headwaters, approx. RM 88), except Green, Sunday Creek, and Smay Creek.		X					X			X	X	X	X	X	X	X	X	X
Green River and Sunday Creek: All waters (including tributaries) above the junction.	X						X			X	X	X	X	X	X	X	X	X
Smay Creek and West Fork Smay Creek: All waters (including tributaries) above the junction.	X						X			X	X	X	X	X	X	X	X	X

[a] For the marine waters, Aquatic Life Uses are categorized as Extraordinary, Excellent, Good, or Fair rather than by specific fish usage. For Elliott Bay to the Duwamish Head, the Aquatic Life Use is designated as excellent.

[b] Not applicable for the marine waters.

1.3.2.1 2003 Freshwater Temperature Criteria

The water quality criteria for temperature were developed specifically around aquatic life uses. The categories for aquatic life uses include char; salmon and trout spawning, core rearing, and migration; salmon and trout spawning, non-core rearing, and migration; salmon and trout rearing and migration only; non-anadromous interior redband trout; and indigenous warm water species.

The 2003 temperature criteria are based on the 7-day average of the daily maximum temperature (7-DADMax). The 7-DADMax is the arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any specific day is calculated by averaging the previous three days, the specific day, and the next three days, daily maximum temperatures.

In Table 4, surface water temperature criteria are summarized for the six river sections and associated use designations defined in WAC 173-201A-600, 2003 (Table 2). For each section (river segment), one or two 7-DADMax summer maximum temperature criteria/criterion are applicable.

In addition to the 7-DADMax values provided as part of the 2003 temperature criteria, guidelines for preventing acute lethality and barriers to migration of salmonids are also outlined in WAC-201A, 2003. To some extent, these temperature guidelines may also be applicable to the Green-Duwamish watershed at the discretion of Ecology (per WAC 173-201A-200, 2003) and are summarized as follows:

(A) moderately acclimated (16-20°C) adult and juvenile salmonids will generally be protected from acute lethality by discrete human actions maintaining the 7-DADMax temperature at or below 22°C and the 1-DMax temperature at or below 23°C;

(B) lethality to developing embryos can be expected to occur at a 1-DMax temperature greater that 17.5°C;

(C) to protect aquatic organisms, discharge plume temperatures must be maintained such that fish could not be entrained (based on plume travel time) for more than two seconds at temperatures above 33°C to avoid creating areas that will cause near instantaneous lethality; and

(D) barriers to adult salmonid migration are assumed to exist any time the 1-DMax temperature is greater than 22°C and adjacent downstream temperatures are 3°C or more cooler.

Table 4. Applicable Temperature Criteria per Location and Use Designation for Char, Salmon, and Trout (adapted from WAC 173-201A, 2003, Table 200 and 602).

River	Location	Begin RM	End RM	Use Designation	7-DADMax (°C)
Duwamish	Mouth to Black River	0	11	Salmon/trout migration and rearing	
				migration	17.5
				rearing	17.5
Green	Black River to Flaming Geyser State Park	11	42.3	Salmon/trout spawning, **non-core** rearing, and migration	
				migration	17.5
				non-core rearing	17.5
				spawning	13
				incubation [a]	13
Green	Flaming Geyser State Park to RM 59.1	42.3	59.1	Salmon/trout spawning, **core** rearing, and migration	
				migration	16
				core rearing	16
				spawning	13
				incubation [a]	13
Green	RM 59.1 to Green River Sunday Creek Confluence	59.1	84.15	Salmon/trout spawning, **core** rearing, and migration	
				migration	16
				core rearing	16
				spawning	13
				incubation [a]	13
Green	Green River and Sunday Creek: all waters	Sunday Creek RM-84.15	headwaters	Char	
				migration	12
				rearing	12
	Smay Creek and West Fork Smay Creek: all waters	Smay Creek RM-75.3	headwaters	spawning	9
				incubation	9

[a] Salmon and trout incubation covers all months of the year because salmon incubate fall through spring and trout spring through summer.

1.4 DATA SOURCES

Multiple temperature studies have been conducted over the past decade by various entities. For this evaluation, data were provided by King County Department of Natural Resources and Parks (and its predecessors such as Metro and the Surface Water Management Division), the Muckleshoot Indian Tribe (MIT), U.S. Army Corps of Engineers, U.S. Geological Survey, the University of Washington, and the cities of Tacoma and Kent. A summary of these historical temperature studies can be found in King County Water and Land Resources Division (2002).

1.5 WATERSHED DESCRIPTION AND LOCATION

The 483 square mile Green-Duwamish watershed is located in the southeast portion of the Puget Sound Basin. The watershed includes all subbasins and associated tributaries for the Green and Duwamish Rivers. The watershed is located approximately 30 miles east of Tacoma and 35 miles north of Mount Rainier in King County, Washington.

The Green River originates in the Cascade mountain range south of Stampede Pass at an elevation of about 4,500 feet. The highest elevation in the basin is at 5,750 feet on Blowout Mountain along the Cascade divide. The river flows northwest approximately 90.5 miles through the Duwamish estuary, eventually entering Elliott Bay and passing through both freshwater and marine ecosystems (adapted from http://www.epa.gov/owow/showcase/duwamish/location.html). Two dams are located on the Green River: Howard Hanson dam at RM 64.5 and Tacoma Diversion dam at RM 61.

The watershed is typically divided into four main sections. These sections include the Upper Green River, Middle Green River, Lower Green River, and Duwamish River. Major subbasins in the Upper Green River include Sunday Creek, Smay Creek, and the North Fork. The Middle Green River includes the Newaukum Creek and Soos Creek (including Covington and Jenkins creeks) subbasins, while the Lower Green River includes the Mill Creek, Black River (Springbrook Creek), Lower Green-West, and Lower Green-East subbasins.

Reproducing native populations of trout and salmon in the watershed include Chinook salmon (*Oncorhynchus tshawytscha)*, coho salmon (*O. kisutch*), chum salmon (*O. keta*), pink salmon (*O. gorbuscha*), sockeye salmon (*O. nerka*), steelhead trout (*O. mykiss*), and cutthroat trout (*O. clarki*). Currently there are no known reproducing char populations in

the Green/Duwamish watershed. However, individual char have been observed or captured as far upstream as Newaukum Creek.

2.0 METHODS

This section of the report details the methods used by several agencies to collect data for use in assessing the effects of temperature in the Green-Duwamish watershed on salmonids. The methods used to summarize the analysis of the temperature data are also included in this section.

2.1 DATA COLLECTION

Within the Green-Duwamish watershed, several entities are collecting water temperatures at numerous locations, including the 93 monitoring stations shown in Figure 1 and summarized in Table 5. The entities contributing data to this report include King County, City of Kent, Tacoma Public Utilities, and the University of Washington. Data from each of these entities have been complied into this report to obtain a comprehensive evaluation of water temperature throughout the GD-WQA study area.

Table 5. Station Information for Green-Duwamish Watershed Water Temperature Monitoring Stations.

Site_ID	Name	Basin	River Mile	Class	Use	Subwatershed
GRT01	Duwamish Rvr @ South Park Marina	Duwamish River	5.1	B	Rearing	Duwamish River
GRT02	Springbook at mouth	Black River	0.1	A	Non-core	Lower Green
GRT03	Olsen Creek	Lower Green River - East	0.1	A	Non-core	Lower Green
GRT04	Green Rvr @ Porter Levee	Middle Green River	34.3	A	Non-core	Middle Green
GRT05	Mill Cr.@ the deadzone	Mill Creek	5.5	A	Non-core	Lower Green
GRT06	Burns Creek	Middle Green River	0.2	A	Non-core	Middle Green
GRT07	O'Grady Creek	Middle Green River	0.2	A	Non-core	Middle Green
GRT09	Newaukum Creek @ 212th Ave SE	Newaukum Creek	1.1	A	Non-core	Middle Green
GRT10	Green Rvr @Whitney Bridge	Middle Green River	42.8	AA	Core	Middle Green
GRT11	Newaukum trib (wq site B322)	Newaukum Creek	0.1	A	Non-core	Middle Green
GRT12	Newaukum Cr, lower fork (Forested)	Newaukum Creek	11.5	A	Non-core	Middle Green
GRT13	Icy Creek	Middle Green River	0.2	AA	Core	Middle Green
GRT14	Green Rvr, near Coal Downstream	Middle Green River	49.0	AA	Core	Middle Green

Table 5 continues on next page

Table 5. Continued.

GRT16	Green Rvr @ Palmer Ponds	Middle Green River	58.0	AA	Core	Middle Green
GRT17	Green Rvr, below HHD	Upper Green River	65.5	AA	Core	Upper Green
GRT18	Green Rvr @ Fort Dent Park(wq site A310)	Lower Green River - West	12.0	A	Non-core	Lower Green
GRT19	Black River Riparian Forest	Black River	0.5	A	Non-core	Lower Green
GRT20	Green Rvr, DS off Mill Cr	Lower Green River - West	24.5	A	Non-core	Lower Green
GRT21	Mill Creek	Mill Creek	0.3	A	Non-core	Lower Green
GRT22	Green Rvr @ Van Doran Landing	Lower Green River - West	19.5	A	Non-core	Lower Green
GRT23	Palmer Ponds Spring	Middle Green River	0.1	AA	Core	Middle Green
GRT24	Newaukum Cr.@ SE 416th	Newaukum Creek	5.8	A	Non-core	Middle Green
GRT25	Spring Creek	Newaukum Creek	0.1	A	Non-core	Middle Green
GRT26	Newaukum Cr.@ SE 244th	Newaukum Creek	7.0	A	Non-core	Middle Green
GRT27	Newaukum Cr.@ SE 248th	Newaukum Creek	7.6	A	Non-core	Middle Green
GRT28	North Fork Newaukum @ 292nd Ave	Newaukum Creek	12.0	A	Non-core	Middle Green
GRT29	Newaukum Cr.@ SE 416th & 278th	Newaukum Creek	10.3	A	Non-core	Middle Green
GRT31	Duwamish River (North Wind Weir)	Duwamish River	8.1	B	Rearing	Duwamish River
GRT33	Springbrook Cr.@ SW 43rd St	Black River	3.0	A	Non-core	Lower Green
GRT34	Panther Cr.(wq site A326)	Black River	1.0	A	Non-core	Lower Green
GRT35	Green Rvr @ North Grn Rvr Park	Lower Green River - East	29.0	A	Non-core	Lower Green
GRT36	Green Rvr @ Flaming Geyser	Middle Green River	44.0	AA	Core	Middle Green
03G	Springbrook @ O'Grady, A317	Black River	1.5	A	Non-core	Lower Green
09A	Covington Creek near Mouth, @ 168th WY SE	Covington Creek	1.3	A	Non-core	Middle Green
26A	Jenkins Creek near Mouth	Jenkins Creek	0.4	A	Non-core	Middle Green
40D	Crisp Creek @ Green River Rd, F321	Middle Green River	0.8	A	Non-core	Middle Green
44F	Newaukum trib, I322B	Newaukum Creek	0.2	A	Non-core	Middle Green
44G	Newaukum trib, D322	Newaukum Creek	0.5	A	Non-core	Middle Green
44H	Newaukum Cr, North Fork	Newaukum Creek	12.5	A	Non-core	Middle Green
54A	Soos Creek @ Mouth	Soos Creek	1.1	A	Non-core	Middle Green
54C	Soos Cr. Y320	Soos Creek	3.8	A	Non-core	Middle Green
54H	Soosette Creek Above SR 18	Soos Creek	1.3	A	Non-core	Middle Green
54I	Little Soos Creek @ 164thAV SE	Soos Creek	0.3	A	Non-core	Middle Green
HA5	Hamm Creek South Fork, A307	Duwamish River	0.5	A	Non-core	Duwamish River

Table 5 continues on next page

Table 5. Continued.

mf1	Mill Creek (south) near Peasley Canyon	Mill Creek	6.1	A	Non-core	Lower Green
BS1	Big Soos #1	Soos Creek	8.8	A	Non-core	Middle Green
BS1.5	Big Soos #1.5	Soos Creek	7.7	A	Non-core	Middle Green
BS2	Big Soos #2	Soos Creek	6.5	A	Non-core	Middle Green
BS3	Big Soos #3	Soos Creek	5.2	A	Non-core	Middle Green
BS4	Big Soos #4	Soos Creek	1.1	A	Non-core	Middle Green
CO1	Covington #1	Covington Creek	6.5	A	Non-core	Middle Green
CO2	Covington #2	Covington Creek	2.8	A	Non-core	Middle Green
CT1	Covington trib	Covington Creek	0.5	A	Non-core	Middle Green
GR1	Green River #1	Middle Green River	33.5	A	Non-core	Middle Green
GR3-4	Green River #3-4	Middle Green River	42.8	AA	Core	Middle Green
GR5	Green River #5	Middle Green River	44.5	AA	Core	Middle Green
GR6	Green River #6	Middle Green River	58.0	AA	Core	Middle Green
GR7	Green River #7	Middle Green River	63.0	AA	Core	Middle Green
JE1	Jenkins #1	Jenkins Creek	1.1	A	Non-core	Middle Green
JE2	Jenkins #2	Jenkins Creek	6.0	A	Non-core	Middle Green
LS1	Little Soos #1	Soos Creek	0.3	A	Non-core	Middle Green
LS2	Little Soos #2	Soos Creek	4.7	A	Non-core	Middle Green
ST1	Soosette Creek	Soos Creek	0.8	A	Non-core	Middle Green
tm-1	Big Soos @ 256th	Soos Creek	7.7	A	Non-core	Middle Green
tm-1.5	Big Soos @ Kent-Kangley	Soos Creek	7.0	A	Non-core	Middle Green
tm-2	Lk. Meridian Outlet	Soos Creek	1.5	A	Non-core	Middle Green
tm-7	Meridian Val. Cr. @ 144	Soos Creek	0.3	A	Non-core	Middle Green
tm-8	Meridian Val. @ Irr. Pond	Soos Creek	1.1	A	Non-core	Middle Green
tm-9	Meridian Val. @ 240th	Soos Creek	1.5	A	Non-core	Middle Green
tm-10	Soosette @ 288th	Soos Creek	2.1	A	Non-core	Middle Green
tm-11	Mill Creek @ Sr. Ctr.	Black River	4.0	A	Non-core	Lower Green
tm-12	Mill Creek @ Diversion	Black River	2.9	A	Non-core	Lower Green
tm-16	Mill Creek @ 204th	Black River	1.6	A	Non-core	Lower Green
tm-17	Mill Creek @ mouth	Black River	0.1	A	Non-core	Lower Green
tm-18	Garrison Creek @ 194th	Black River	0.1	A	Non-core	Lower Green
tm-19	Springbrook @ 192nd	Black River	5.2	A	Non-core	Lower Green
tm-20	Springbrook @ E. Valley	Black River	5.0	A	Non-core	Lower Green
tm-21	Garrison Creek @ 218th	Black River	2.0	A	Non-core	Lower Green
tm-22	Springbrook @ SW 16th	Black River	1.6	A	Non-core	Lower Green
tm-23	Mill Cr.-Auburn @ 262nd	Mill Creek	0.3	A	Non-core	Lower Green
tm-24	Mullen Slough @ SR 516	Lower Green River-West	0.1	A	Non-core	Lower Green
tm-25	Midway Cr. @ Green River	Lower Green River-West	0.1	A	Non-core	Lower Green

Table 5 continues on next page

Table 5. Continued.

tm-26(02)	Olson Cr. @ Green River Rd.	Lower Green River-East	0.2	A	Non-core	Lower Green
tm-27	Johnson Cr. @ Green River	Lower Green River-West	0.1	A	Non-core	Lower Green
TPU_475	Gale Creek	Upper Green River	0.4	AA	Core	Upper Green
TPU_477	Upper Green River	Upper Green River	89.3	AA	Char	Upper Green
TPU_478	Green River, US of McCain Cr	Upper Green River	83.0	AA	Core	Upper Green
TPU_479	North Fork Green River	Upper Green River	1.9	AA	Core	Upper Green
TPU_480	Charley Creek	Upper Green River	1.0	AA	Core	Upper Green
TPU_481	Bear Creek	Middle Green River	0.2	AA	Core	Middle Green
TPU_482	Sunday Creek	Upper Green River	0.2	AA	Char	Upper Green
TPU_483	Green River @ bridge 71	Upper Green River	73.0	AA	Core	Upper Green
TPU_484	Friday Creek	Upper Green River	0.1	AA	Core	Upper Green

Figure 1: Continuous Temperature Monitoring Locations within the Green-Duwamish Watershed.

2.2 SAMPLE COLLECTION PROCEDURES

The water temperature monitoring devices used in this report are either newly refurbished Onset Optic StowAway™ or new Onset StowAway Tidbit™ thermistors. The manufacture's specifications of this equipment are as follows:

Onset Optic StowAway

- 6 year replaceable battery
- Size: cylindrical, 5.2" long x 0.8" tall x 1.0" thick
- Temperature range: -4 °C to +37 °C
- Sampling interval from 0.5 seconds to 9 hours
- Time accuracy: +/-1 minute per week
- Temperature accuracy: +/- 0.2 °C
- Response time in water: 4 min (90 percent)
- Response time in still air: 18 min (90 percent)
- NIST-traceable temperature accuracy certification available

Onset StowAway Tidbit

- 5 year non replaceable battery
- Size: circular, 1.2" wide x 1.6" tall x 0.65" thick
- Temperature range: -4 °C to +37 °C
- Sampling interval from 0.5 seconds to 9 hours
- Time accuracy: +/-1 minute per week
- Temperature accuracy: +/- 0.2 °C
- Response time in water: 5 min (90 percent)
- Response time in still air: 50 min (90 percent)
- NIST-traceable temperature accuracy certification available

The following method was used by King County to collect temperature data. The other entities used similar methods for deploying thermistors in the water for their monitoring stations. For the King County stations, the thermistors were deployed on the streambed in 0.5 feet to 3 feet of water adjacent to the stream bank, with the exception of GRT01, which was suspended one-meter below the marina dock. The thermistors were housed inside polyethylene foam pipe insulation sleeves, which were then bolted into 12-inch lengths of perforated steel signposts. These housings were cabled onto trees or shrubs located in the riparian area or adjacent infrastructure (typically a bridge abutment).

Additional efforts were made to conceal the cabling and the thermistor unit to reduce the chance of vandalism and theft.

Data were recorded at primarily 15-minute intervals during the sampling period. Other time steps (1 hour or 30 minute time intervals) were also recorded for non-summer periods or by other entities. Through the sampling period, data downloads occurred every three to four months on average.

2.3 TIME PERIOD

The study period for this report is from July 1, 2001 to September 30, 2003. Water data (including water temperature) is typically presented in a Water Year (WY) format. A water year is from October 1 of a given year until September 30 of the following year. For this report, the data collection includes WY 2002 and WY 2003 as well as July, August, and September 2001 (the last quarter of WY 2001). Each agency collected data for variable time periods during the study period and shared their results. In Table 6, the temperature monitoring stations are listed according to the entity that collected the data with the period of collection for each station as well as any data gaps are summarized.

Table 6. Data Record Summary for Green-Duwamish Watershed Water Temperature Monitoring Stations.

Site_ID	Name	Basin	Source	Date Range		2001			Water Year 2002												Water Year 2003											
						J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
GRT01	Duwamish Rvr @ South Park Marina	Duwamish River	Green WQA	07/27/01	9/30/03	27			25				20	14			10															
GRT02	Springbook at mouth	Black River	Green WQA	07/23/01	9/30/03	23			25				20	14			10															
GRT03	Olsen Creek	Lower Green River - East	Green WQA	07/27/01	9/30/03	27			25				20	14			10															
GRT04	Green Rvr @ Porter Levee	Middle Green River	Green WQA	07/27/01	9/30/03	27			25				20	14			10															
GRT05	Mill Cr.@ the deadzone	Mill Creek	Green WQA	07/23/01	9/30/03	23			25				20	14			10												7-24			
GRT06	Burns Creek	Middle Green River	Green WQA	07/24/01	9/30/03	24			25				20	14			10															
GRT07	O'Grady Creek	Middle Green River	Green WQA	07/27/01	9/30/03	27			25				20	14			10												7-24			
GRT09	Newaukum Creek @ 212th Ave SE	Newaukum Creek	Green WQA	07/23/01	9/30/03	23			25				20	14			10															
GRT10	Green Rvr @Whitney Bridge	Middle Green River	Green WQA	07/24/01	9/30/03	24		7		15			20	14			10											13	28			
GRT11	Newaukum trib (wq site B322)	Newaukum Creek	Green WQA	07/27/01	9/30/03	27			25				20	14			10															
GRT12	Newaukum Cr, lower fork (Forested)	Newaukum Creek	Green WQA	07/27/01	9/30/03	27			25				20	*	*	31	10			27	*	*	*	*	*	*	*	*	27			
GRT13	Icy Creek	Middle Green River	Green WQA	07/31/01	9/30/03	31			25				20	14					16										6-13			
GRT14	Green Rvr, near Coal Downstream	Middle Green River	Green WQA	07/24/01	9/30/03	*	*	*	*	*	*	*	*	15					16	26	*	*	*	*	*	*	*	*	6-26	29		
GRT16	Green Rvr @ Palmer Ponds	Middle Green River	Green WQA	07/24/01	9/23/03	24			25				20	14			10															23
GRT17	Green Rvr, below HHD	Upper Green River	Green WQA	07/24/01	9/30/03	24			25				20	14			10															
GRT18	Green Rvr @ Fort Dent Park(wq site A310)	Lower Green River -West	Green WQA	07/09/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	9											3-18	30	*	17
GRT19	Black River Riparian Forest	Black River	Green WQA	07/09/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	9														
GRT20	Green Rvr, DS off Mill Cr	Black River	Green WQA	07/10/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	10			14	*	26				10	*	26		26	6-30
GRT21	Mill Creek	Mill Creek	Green WQA	07/10/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	10											30	*	*	*
GRT22	Green Rvr @ Van Doran Landing	Lower Green River -West	Green WQA	07/11/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	11														
GRT23	Palmer Ponds spring	Middle Green River	Green WQA	07/11/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	11														
GRT24	Newaukum Cr.@ SE 416th	Newaukum Creek	Green WQA	07/12/02	8/13/03	-	-	-	-	-	-	-	-	-	-	-	-	12													13	*
GRT25	Spring Creek	Newaukum Creek	Green WQA	07/12/02	8/14/03	-	-	-	-	-	-	-	-	-	-	-	-	12													14	*
GRT26	Newaukum Cr.@ SE 244th	Newaukum Creek	Green WQA	07/12/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	12														
GRT27	Newaukum Cr.@ SE 248th	Newaukum Creek	Green WQA	07/12/02	9/26/02	-	-	-	-	-	-	-	-	-	-	-	-	12		26	*	*	*	*	*	*	*	*	*	*	*	*
GRT28	North Fork Newaukum @ 292nd Ave	Newaukum Creek	Green WQA	07/12/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	12														
GRT29	Newaukum Cr.@ SE 416th & 278th	Newaukum Creek	Green WQA	07/12/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	12														
GRT31	Duwamish River (North Wind Weir)	Duwamish River	Green WQA	07/12/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	12		20	*	*	*	*	*	*	*	*	*	15		
GRT33	Springbrook Cr.@ SW 43rd st	Black River	Green WQA	07/25/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	25														
GRT34	Panther Cr.(wq site A326)	Black River	Green WQA	07/25/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	25														
GRT35	Green Rvr @ North Grn Rvr Park	Lower Green River - East	Green WQA	08/01/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	-	1													
GRT36	Green Rvr @ Flaming Geyser	Middle Green River	Green WQA	02/21/03	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21							
03G	Springbrook @ O'Grady, A317	Black River	KC gauging	11/01/01	9/30/03	-	-	-	-	1																						11
09A	Covington Creek near Mouth, @ 168th WY SE	Covington Creek	KC gauging	07/01/01	9/18/03	1			15-17							22																18
26A	Jenkins Creek near Mouth	Jenkins Creek	KC gauging	07/01/01	9/30/03	1																										
40D	Crisp Creek @ Green River Rd, F321	Middle Green River	KC gauging	07/01/01	9/30/03	1																										
44F	Newaukum trib, I322B	Newaukum Creek	KC gauging	07/01/01	9/30/03	1		18	*	*	4											25	11						11	*	15	
44G	Newaukum Cr, D322	Newaukum Creek	KC gauging	07/01/01	9/30/03	3	*	13																								
44H	Newaukum Cr, North Fork	Newaukum Creek	KC gauging	07/25/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	25														
54A	Soos Creek @ Mouth	Soos Creek	KC gauging	07/01/01	9/30/03	1		1																								
54C	Soos Cr, Y320	Soos Creek	KC gauging	07/01/01	9/30/03	1		13-30											30	*	*	*	5						1	*	*	11
54H	Soosette Creek Above SR 18	Soos Creek	KC gauging	07/01/01	9/30/03	1		11-16																			14	17				
54I	Little Soos Creek @ 164thAV SE	Soos Creek	KC gauging	07/01/01	9/30/03	1																										
HA5	Hamm Creek South Fork, A307	Duwamish River	KC gauging	07/01/01	9/30/03	1																									11	*
mf1	Mill Creek (south) near Peasley Canyon	Mill Creek	KC gauging	07/01/01	9/30/03	1							7	18						12	21											
BS1	Big Soos #1	Soos Creek	UW	07/01/01	9/12/02	1			27								18			12	-	-	-	-	-	-	-	-	-	-	-	-
BS1.5	Big Soos #1.5	Soos Creek	UW	07/01/01	9/12/02	1		10	*	*	*	*	*	28						12	-	-	-	-	-	-	-	-	-	-	-	-
BS2	Big Soos #2	Soos Creek	UW	07/01/01	9/12/02	1			18										8	12	-	-	-	-	-	-	-	-	-	-	-	-
BS3	Big Soos #3	Soos Creek	UW	07/01/01	9/12/02	1			18								22			12	-	-	-	-	-	-	-	-	-	-	-	-
BS4	Big Soos #4	Soos Creek	UW	07/01/01	9/12/02	1			18								22			12	-	-	-	-	-	-	-	-	-	-	-	-
CO1	Covington #1	Covington Creek	UW	07/01/01	9/12/02	1		10	*	*	*	*	*	27						12	-	-	-	-	-	-	-	-	-	-	-	-
CO2	Covington #2	Covington Creek	UW	07/01/01	9/12/02	1			18								22			12	-	-	-	-	-	-	-	-	-	-	-	-
CT1	Covington trib	Covington Creek	UW	07/01/01	9/12/02	1			18								22			12	-	-	-	-	-	-	-	-	-	-	-	-
GR1	Green River #1	Middle Green River	UW	07/01/01	9/12/02	1			*	11									8	12	-	-	-	-	-	-	-	-	-	-	-	-
GR3-4	Green River #3-4	Middle Green River	UW	07/24/01	9/12/02	24			17	*	*	*	*	*	*	*	*	29		12	-	-	-	-	-	-	-	-	-	-	-	-
GR5	Green River #5	Middle Green River	UW	07/24/01	9/17/01	24			17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GR6	Green River #6	Middle Green River	UW	07/24/01	9/12/02	24			17	*	*	*	*	*	*	*	*	29		12	-	-	-	-	-	-	-	-	-	-	-	-
GR7	Green River #7	Middle Green River	UW	07/24/01	9/12/02	24			18											12	-	-	-	-	-	-	-	-	-	-	-	-
JE1	Jenkins #1	Jenkins Creek	UW	07/01/01	9/26/01	1			26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JE2	Jenkins #2	Jenkins Creek	UW	07/01/01	9/12/02	1			26								22			12	-	-	-	-	-	-	-	-	-	-	-	-
LS1	Little Soos #1	Soos Creek	UW	09/12/01	9/12/02	-	-	12	18	*	*	*	*	*	*	*	22			12	-	-	-	-	-	-	-	-	-	-	-	-
LS2	Little Soos #2	Soos Creek	UW	07/01/01	9/12/02	1			26										8	12	-	-	-	-	-	-	-	-	-	-	-	-
ST1	Soosette Creek	Soos Creek	UW	07/01/01	9/26/01	1			26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
tm-1	Big Soos @ 256th	Soos Creek	City of Kent	04/03/02	9/10/02	-	-	-	-	-	-	-	-	-	3						10	-	-	-	-	-	-	-	-	-	-	-
tm-1.5	Big Soos @ Kent-Kangley	Soos Creek	City of Kent	04/03/02	9/10/02	-	-	-	-	-	-	-	-	-	3						10	-	-	-	-	-	-	-	-	-	-	-
tm-2	Lk. Meridian Outlet	Soos Creek	City of Kent	04/03/02	9/10/02	-	-	-	-	-	-	-	-	-	3				2	*	*	-	-	-	-	-	-	-	-	-	-	-
tm-7	Meridian Val. Cr. @ 144	Soos Creek	City of Kent	04/03/02	9/10/02	-	-	-	-	-	-	-	-	-	3						10	-	-	-	-	-	-	-	-	-	-	-
tm-8	Meridian Val. @ Irr. Pon	Soos Creek	City of Kent	04/03/02	9/10/02	-	-	-	-	-	-	-	-	-	3						10	-	-	-	-	-	-	-	-	-	-	-
tm-9	Meridian Val. @ 240th	Soos Creek	City of Kent	04/05/02	9/10/02	-	-	-	-	-	-	-	-	-	5						10	-	-	-	-	-	-	-	-	-	-	-
tm-10	Soosette @ 288th	Soos Creek	City of Kent	04/05/02	9/10/02	-	-	-	-	-	-	-	-	-	5						10	-	-	-	-	-	-	-	-	-	-	-
tm-11	Mill Creek @ Sr. Ctr.	Black River	City of Kent	04/21/02	9/10/02	-	-	-	-	-	-	-	-	-	21						10	-	-	-	-	-	-	-	-	-	-	-
tm-12	Mill Creek @ Diversion	Black River	City of Kent	04/21/02	9/10/02	-	-	-	-	-	-	-	-	-	21						10	-	-	-	-	-	-	-	-	-	-	-
tm-16	Mill Creek @ 204th	Black River	City of Kent	04/21/02	8/17/02	-	-	-	-	-	-	-	-	-	21					17	*	-	-	-	-	-	-	-	-	-	-	-
tm-17	Mill Creek @ mouth	Black River	City of Kent	04/21/02	9/10/02	-	-	-	-	-	-	-	-	-	21				2	*	*	-	-	-	-	-	-	-	-	-	-	-
tm-18	Garrison Creek @ 194th	Black River	City of Kent	04/21/02	9/10/02	-	-	-	-	-	-	-	-	-	21						10	-	-	-	-	-	-	-	-	-	-	-
tm-19	Springbrook @ 192nd	Black River	City of Kent	04/21/02	9/10/02	-	-	-	-	-	-	-	-	-	21						10	-	-	-	-	-	-	-	-	-	-	-
tm-20	Springbrook @ E. Valley	Black River	City of Kent	04/21/02	9/10/02	-	-	-	-	-	-	-	-	-	21						10	-	-	-	-	-	-	-	-	-	-	-
tm-21	Garrison Creek @ 218th	Black River	City of Kent	04/21/02	9/10/02	-	-	-	-	-	-	-	-	-	21						10	-	-	-	-	-	-	-	-	-	-	-
tm-22	Springbrook @ SW 16th	Black River	City of Kent	04/21/02	9/10/02	-	-	-	-	-	-	-	-	-	21						10	-	-	-	-	-	-	-	-	-	-	-
tm-23	Mill Cr.-Auburn @ 262nd	Mill Creek	City of Kent	04/26/02	9/10/02	-	-	-	-	-	-	-	-	-	26				1	23	10	-	-	-	-	-	-	-	-	-	-	-
tm-24	Mullen Slough @ SR 516	Lower Green River -West	City of Kent	04/26/02	9/10/02	-	-	-	-	-	-	-	-	-	26						10	-	-	-	-	-	-	-	-	-	-	-
tm-25	Midway Cr. @ Green River	Lower Green River -West	City of Kent	04/26/02	9/10/02	-	-	-	-	-	-	-	-	-	26		24	11			10	-	-	-	-	-	-	-	-	-	-	-
tm-26(02)	Olson Cr. @ Green River Rd.	Lower Green River - East	City of Kent	04/26/02	9/10/02	-	-	-	-	-	-	-	-	-	26						10	-	-	-	-	-	-	-	-	-	-	-
tm-27	Johnson Cr. @ Green River	Lower Green River -West	City of Kent	04/26/02	9/10/02	-	-	-	-	-	-	-	-	-	26						10	-	-	-	-	-	-	-	-	-	-	-
TPU_475	Gale Creek	Upper Green River	TPU	09/20/02	9/15/03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20										15	*	*
TPU_477	Upper Green River	Upper Green River	TPU	09/20/02	9/30/03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20												
TPU_478	Green River, US of McCain Cr	Upper Green River	TPU	07/18/03	9/26/03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18		26
TPU_479	North Fork Green River	Upper Green River	TPU	09/20/02	9/25/03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20									19	*	*	*
TPU_480	Charley Creek	Upper Green River	TPU	09/20/02	9/25/03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20												25
TPU_481	Bear Creek	Upper Green River	TPU	09/20/02	9/25/03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20												25
TPU_482	Sunday Creek	Upper Green River	TPU	09/20/02	7/15/03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20										15	*	*
TPU_483	Green River @ bridge 71	Upper Green River	TPU	09/20/02	9/25/03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20												25
TPU_484	Friday Creek	Upper Green River	TPU	09/20/02	7/14/03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20										15	*	*

Colors:
- white - not collected
- gray - missing data (greater than 1 day)
- green - hourly (or 30 minute) collected data
- blue - 15 minute data collection

NOTES:
- "-" data no collected during this time period
- "*" data missing
- "3" refers to a day of the month when started or ended.
- 6-26 - refers to time period in this month **with** data
- 6-26 - refers to time period in this month **without** data

Prior to 2001, King County was collecting continuous temperature data at 12 stations as part of its stream gauging program. In July 2001 (at the beginning of this temperature study), King County added 15 continuous water temperature monitoring stations for a total of 27 stations. In July 2002, an additional 18 stations were added to the King County monitoring network.

From April through September 2002, data were also collected at 21 stations in the City of Kent (primarily in the Soos Creek and Green River mainstem areas). At the nine Tacoma Public Utilities temperature monitoring stations, data were collected from September 2002 through September 2003. During the study period, the University of Washington collected data from 18 stations between July 2001 and September 2002 (website: http://depts.washington.edu/strmtemp/) as part of its assessment of stream temperature in the Pacific Northwest streams.

2.4 DATA GAPS

Gaps in data collection occurred throughout the monitoring period (Table 6). Only 25 monitoring stations have a nearly continuous data record for the study monitoring period. The primary reason for data gaps during the selected study period was due to the different study lengths for the various temperature monitoring efforts as noted above. Data gaps also occurred as a result of out of water temperature recordings or loss of thermistors through vandalism or theft. Some locations (for example, KC_54C) had extremely low flow or sub-surface flow during the summer months and the thermistors recorded air temperatures for a portion of the study period. Other stations (for example, KC_GRT14) had abundant data gaps due to removal of thermistors in an area that had heavy fishing and boating traffic.

2.5 DATA REVIEW AND ANALYSIS

All recorded data were downloaded via proprietary software and exported as text files. These raw data text files were collated into an Excel spreadsheet and temperature records graphed. Graphing allowed the data to be examined for problematic periods including recording of air temperatures. After the data were reviewed, daily maximums (1-DMax), minimums, and averages were calculated for each station.

Using the 1-DMax values, a moving 7-day average of the daily maximum temperatures (7-DADMax) was calculated. For all stations, the 1-DMax and 7-DADMax for each individual station were graphed on a standard scale (July 2001 through September 2003)

representing the data collection period chosen for this analysis (even though some stations had shorter data collection periods during the period of interest). The graphs for each station demonstrate the range and magnitude of daily and seasonal temperature fluctuations (Appendix A). For each month of record, the maximum 1-DMax, minimum of the daily minimums, average of the daily averages, and the maximum 7-DADMax were summarized for each station in tabular format (Appendix B). Additional data for each individual station, such as the average temperature above specific temperature criteria, are also included in Appendix B.

2.6 NORMALIZATION OF DATA

The continuous temperature data were normalized to the average number of days and average number of degrees above the site specific temperature criterion. This normalization was done for the warm season only where temperature exceedances typically occurred. The warm season was defined as June 1 through September 30 for water years 2002 and 2003 and July 1 through September 30 for water year 2001 since data collection began in July that year.

This normalization of the water year data by season was completed to reduce bias associated with comparing the varying time records for the three water years. Data were normalized for all sites, however, only the sites that had at least a 70 percent complete data record during the warm season were presented. This threshold of 70 percent was chosen because when the data were less than 70 percent complete and there were days above the criteria, the normalization process over estimated the average number of days above the criteria per season. Additionally, when the data were less than 70 percent complete and there were no exceedances, insufficient data was likely collected to accurately represent site conditions during a given season.

Normalizing the temperature data required numerous steps. For a typical warm season, the following steps were taken with the data to develop the average number of days and average degrees above the site specific temperature criterion:

1. Sum the number of days data were collected during the warm season (June to September). The total possible number is 122 days for June through September and 92 days for July and September. In order for the data to be normalized, the total number of days had to be 85 days or greater for the period June through September 2002 and/or 2003 or 64 days or greater for July through September 2001.

2. The temperature criterion varied depending on the location and use(s) associated with the monitoring site. For example, the 1997 temperature criteria, is based on three classifications: Class AA, Class A, and Class B. For comparison with each of the applicable 1997 temperature criteria, the 1-day daily maximum (1-DMax) temperature was used.
3. The 1-DMax was compared to the temperature criterion on a daily basis for the time period. The total number of days above the criterion was summed and the average number of degrees above the applicable criterion was calculated for each warm season.
4. The total number of days above the criterion was divided by the total number of days of data collected. For sites that did not have any exceedances to the criterion, this number was zero. For some sites, this number would be equal to one if every day had an exceedance. For all other sites, this step produced a fraction.
5. The fraction of total number of days above the criterion divided by the total number of days was normalized to one warm season. For 2001 data, the 92 possible days were divided by the total number of days data were collected multiplied by the above fraction. For 2002/2003, the 122 possible days were divided by the total number of days data were collected multiplied by this fraction.
6. This fraction of normalized data per season was averaged by the total number of seasons that meet the initial threshold of total number of days of data collected, resulting in an average fraction for that specific season.
7. This average fraction was multiplied by 122 (or 92 for 2001 data) to obtain the average number of days above the temperature criterion.
8. The average degrees above the applicable criterion were averaged over the number of seasons to yield an average degree above the criterion per season.

2.7 APPLICATION OF TEMPERATURE CRITERIA

For the Green-Duwamish watershed temperature data, monitoring stations were organized by major river sections and/or subbasins with the applicable temperature criterion being applied for that section/subbasin as summarized in Table 7. Minimum, mean, 1-DMax, and 7-DADMax values were plotted for each station using the continuous data set. For each month, average minimum, mean, 1-DMax, and 7-DADMax values were calculated and summarized in tabular form. Additionally, total days above the selected criterion and average number of degrees above the criterion were calculated for each water year and the corresponding criteria from Table 7.

Table 7. Applicable Criteria by Class or Use Designation (vary by river mile and/or fish presence).

ECOLOGY DESIGNATED WATERWAY SEGMENT	APPLICABLE RIVER SECTION/ SUBBASIN	1997 CRITERIA WITH CLASS-BASED USE (°C)	2003 7-DADMAX USE-BASED CRITERIA FOR APPROPRIATE SALMONID USE (°C)
Smay Creek and West Fork Smay Creek: All waters (including tributaries) above the junction.	Upper Green River	16	12
Green River and Sunday Creek: All waters (including tributaries) above the junction.	Upper Green River	16	12
Green River and tributaries from west boundary of Sec. 13-T21N-R7E (river mile 59.1) to headwaters, except for waters specifically listed in this table: Green River and Sunday Creek, and Smay Creek.	Upper Green River	16	16
Green River from the west boundary of Sec. 27-T21N-R6E (west boundary of Flaming Geyser State park, river mile 42.3) to the west boundary of Sec. 13-T21N-R7E (river mile 59.1)	Upper Middle Green River	16	16
Green River from Black River (river mile 11.0 and point where Duwamish River continues as the Green River) to west boundary of Sec. 27-T21N-R6E (west boundary of Flaming Geyser State park, river mile 42.3).	Lower Middle Green River: Soos Creek, Covington Creek, Jenkins Creek, and Newaukum Creek subbasins Lower Green River: Black River (Springbrook Creek), Lower Green-West, Mill Creek, and Lower Green-East subbasin	18	17.5
Duwamish River from the mouth south of a line bearing 254° true from the NW corner of berth 3, terminal no. 37 to the Black River (river mile 11.0).	Duwamish River	21	17.5

Using this information, criterion exceedances were mapped by major river section or subbasin and summarized for each water year on a section or subbasin level (depending

upon the number of monitoring stations in a specific geographic area and the applicable temperature criterion). A narrative summary of the frequency and degree of exceedances was developed for each major river section or subbasin.

3.0 RESULTS

This section of the report details the results of the analysis for 86 surface water temperature monitoring stations in the Green-Duwamish watershed for data collected between July 2001 and September 2003. The results are organized by three subwatershed areas and their respective tributaries: Upper Green River, Middle Green River, and Lower Green-Duwamish River. A separate reporting of the river's mainstem monitoring stations results is also included as a fourth section. Each of these three main sections includes a description of the river and a listing of the number of monitoring stations associated with the section.

For the Middle Green and Lower Green-Duwamish subwatershed sections, the results are partitioned further either as mainstem and other tributaries or as major subbasins. For the Middle Green River, the subbasins include, Soos Creek, Covington Creek, Jenkins Creek, and Newaukum Creek. For the Lower Green-Duwamish River, the subbasins include the Black River and Mill Creek.

3.1 DATA PRESENTATION

For each subwatershed or subbasin, the temperature data are summarized in three forms: (1) total days that the 1997 and 2003 temperature criteria were exceeded by station and water year; (2) average number of degrees that the 1997 and 2003 temperature criteria were exceeded by station and water year; and (3) average days and degrees that the 1997 and 2003 temperature criteria were exceeded by station normalized for the summer season (June-September). Additionally, the normalized temperature data are graphically illustrated for the summer time period for each subwatershed or subbasin.

3.1.1 Temperature Exceedances

For each subwatershed or subbasin, temperature criteria exceedances were categorized in several ways. First, all stations that exceeded the applicable criterion were highlighted in the text results. Second, critical temperatures for salmonid migration were identified using Ecology's guidelines (Ecology, 2002). The guideline temperature ranges identified by Ecology were modified slightly to include all temperature values possible between the upper protective criterion (17.5°C) and the range where lethality (24-25°C) could occur.

The final temperature ranges used to analyze exceedances critical to migration thresholds are identified and discussed further in Section 3.1.3.

3.1.2 Duration of Exceedances

In addition to highlighting the severity of temperature exceedances, the duration of exceedances was also highlighted. An initial threshold of ten days was chosen for inclusion in the text discussion. Duration of exceedances is presented graphically in five categories: None, 0-10 days, 10-25 days, 25-50 days, and Over 50 days.

3.1.3 Exceedances Critical to Migration

To assess thermal protection of ecological use of these surface waters as habitat, particularly for salmonid migration, a general review of Ecology's (2002) guidance for narrative expression of effect was used to establish the following temperature thresholds of suitability.

- Less than 18°C — no impairment of migration
- 18°C to 21°C — potential impairment of migration
- 21°C to 23°C — potential blockage of migration
- greater than 23°C — potential lethality

To evaluate each station's temperature exceedances for potential impacts to migration, the average number of degrees a station exceeded the criterion value was added to the respective 2003 criterion value (17.5°C, 16°C, or 12°C depending upon the location of the station in the study area). After this calculation, the station was then classified into one of the four above categories based on the maximum temperature value obtained.

3.2 UPPER GREEN RIVER

This section of the results includes a physical description of the Upper Green River subwatershed and the associated monitoring results. The results for the Upper Green River are presented for the entire river section, which includes drainage from the North Fork Green River, Charley Creek, Gale Creek, Smay Creek, Friday Creek, and Sunday Creek.

3.2.1 Description of RM 60.5 to Headwaters

This description is summarized from Kerwin and Nelson (2000). The Upper Green River subwatershed is situated on the west side of the central Cascade Mountains divide, approximately 23 miles (34 km) east of Enumclaw, Washington and entirely within King

County. The base elevation of the Upper Green River and Sunday Creek is approximately 1,700 feet (519 meters) at the confluence of Sunday Creek. The subbasins rise to the top of the Cascade divide with an average basin elevation of 5,400 ft (1,646m). Sunday Creek begins at its confluence with the Green River (at RM 84.2) and continues in a northeast direction for approximately 7.9 miles to the divide at Stampede Pass. Sunday Creek has numerous tributaries that contribute an additional 29.5 linear miles of stream to the mainstem Sunday Creek (Williams et al. 1975). The mainstem Green River extends upstream to the headwaters in the vicinity of Blowout Mountain (approximately 10 linear miles). Numerous tributaries contribute over 41 linear miles of stream to the drainage.

The Upper Green River subwatershed is nearly 100 percent utilized for commercial forestry. No permanent settlements currently exist in this subwatershed and public access is restricted in some areas. Human development is characterized by large forestry operations, the Howard Hanson Dam and Reservoir (at RM 64.5) operated by the Army Corps of Engineers, the Tacoma Headworks Dam (at RM 61), the Burlington Northern Santa Fe railroad, and a major electric utility transmission line (USACE 1997).

3.2.2 Monitoring Results

The Upper Green River basin contains nine monitoring stations (GRT17, TPU_480, TPU_479, TPU_475, TPU_483, TPU_478, TPU_484, TPU_482, and TPU_477) which are shown in Figure 2. The data record for the nine stations varies; data record length and data gaps for each station are summarized in Table 6. Graphs of 1-DMax and 7-DADMax temperatures for each site are presented in Appendix A. Monthly temperature summary information for each station is presented in Appendix B along with applicable temperature exceedance criteria.

Six of the nine temperature monitoring stations (GRT17, TPU_479, TPU_483, TPU_478, TPU_482, and TPU_477) had temperature values that exceeded the 1-DMax (16°C based on the 1997 criteria) or 7-DADMax (12°C or 16°C based on the 2003 criteria) for 10 or more days during the 2001, 2002, and/or 2003 water years (Table 8). Average temperature exceedances for all stations ranged between 0.2°C and 6.8°C. Station TPU_483 had the most days above the 1997 criterion at 76 days occurring in Water Year 2003 and had the second most days above the 2003 criterion at 125 days also occurring in Water Year 2003. Station TPU_477 had the highest number of days above the 2003 criterion at 86 days. Station TPU_479 had the greatest exceedance of its respective 1997 criterion at 6.8°C and had the greatest exceedance of its respective 2003 criterion, at 4.3°C; both of these exceedances occurred during Water Year 2003. Other stations

showing greater than one degree exceedance measured by average temperature included GRT17, TPU_483, TPU_482, and TPU_477.

The data from each station were normalized by season (June-September) and averaged as described in Section 2.0. The normalized data are summarized in Table 8. Figure 3 and Figure 4 display the data normalized relative to the 1997 temperature criterion and the 2003 migration and rearing temperature criterion, respectively. Stations TPU_479, TPU_475, TPU_478, TPU_484, and TPU_482 did not have sufficient data for normalization. Station TPU_480 had no exceedance of either the 1997 or the 2003 criteria. Stations GRT17, and TPU_477 had exceedances of the 1997 and/or the 2003 criteria for more than 10 days. Station TPU_483 had exceedances of greater than 1°C (measured by average temperature) and of greater than 10 days duration for at least one of the two criteria (1997 and 2003).

Based on the assessment of migration suitability described above, stations GRT17, TPU_480, TPU_475, TPU_478, TPU_484, TPU_482, and TPU_477 demonstrated no impairment to salmonid migration and rearing while stations TPU_479 and TPU_483 demonstrated some potential impairment to migration and rearing. However, stations TPU_482, and TPU_477 did exceed the temperature criterion of 12°C for char.

Table 8. Upper Green River Basin. Total number of days exceeding the temperature criteria by water year and the average number of days and degrees above the criteria during the warm season.

Site ID	Name	Total Days above Criteria						Normalized data: average days and degrees above criteria				
		1997 Class			2003 Migration & Rearing			# of seasons	1997 Class		2003 Migration & Rearing	
		2001	2002	2003	2001	2002	2003		Avg days	Avg °C	Avg days	Avg °C
GRT17	Green River, below HH Dam	0*	6	45	0*	8	46	3	17.0	0.4	18.0	0.4
TPU_480	Charley Creek	*ND*	0^	0	*ND*	0^	0	1	0	0.0	0	0.0
TPU_479	North Fork Green River	*ND*	0^	19*	*ND*	0^	19*	none	--	6.8	--	4.3
TPU_475	Gale Creek	*ND*	0^	0*	*ND*	0^	0*	none	--	--	--	--
TPU_483	Green River @ bridge 71	*ND*	0^	76	*ND*	0^	125	1	82.6	2.8	124	4.8
TPU_478	Green River, US of McCain Cr	*ND*	*ND*	46*	*ND*	*ND*	3*	none	--	--	--	--
TPU_484	Friday Creek	*ND*	0^	0*	*ND*	0^#	0*#	none	--	--	--	--
TPU_482	Sunday Creek	*ND*	0^	0*	*ND*	3^#	26*#	none	--	--	--	--
TPU_477	Upper Green River	*ND*	0^	17	*ND*	0^#	86#	1	17.6	0.5	88.9#	2.9#

"*" : Limited dataset during this year's warm season (June-September).

"^" : Incomplete dataset - For this Water Year, data collected only during September.

"ND" : No data collected at this location for a given time period.

"#" : Migrating & Rearing Criterion for these sites is 12°C due to the presence of Char.

Table 8 continues on next page.

Table 8 continued.

The classification for this basin is "AA" that has a criterion (1997) of 16° C. The migration and rearing criterion (2003) for this basin has a temperature threshold of 16°C except for where noted. This table contains two related items of temperature data exceedances. The first is the total number of days above a specific criterion by water year for each site. The total number of days can be dependent on the data record; see Table 6 [in the main document] for each site's data record length and data gaps. The other data presented include the average number of days and degrees above the criteria during the warm season. These data have been normalized to an "average" warm season of June through September (July through September for 2001 data); see Methods section 2.6 for explanation of the normalization. The number of seasons refers to the number of normalized seasons that were averaged. The "avg days" refers to the average number of days above criteria. The "Avg °C" refers to the average temperature in degree Celsius above the criteria.

Figure 2. Upper Green River Subwatershed: Monitoring Locations.

Figure 3. Upper Green River Subwatershed: Temperature Data with Average Number of Days and Degrees above 1997 Temperature Criterion of 16°C.

Figure 4. Upper Green River Subwatershed: Temperature Data with Average Number of Days and Degrees above 2003 Migration and Rearing Criterion of 16°C (Station TPU_477 has a criterion of 12°C).

3.3 MIDDLE GREEN RIVER

This section includes a physical description of the Middle Green River subwatershed and the monitoring results for the mainstem of the Middle Green River, associated tributaries, and major subbasins. The subbasins summarized below include Soos Creek, Covington Creek, Jenkins Creek, and Newaukum Creek.

3.3.1 Description RM 32.5 to 60.5

This description is summarized from Kerwin and Nelson (2000). tributaries to the Middle Green River include Soos Creek (RM 33.6), Burns Creek (RM 38), O'Grady Creek (RM 39), Crisp Creek (RM 40.1, locally referred to as Keta Creek), and Newaukum Creek (RM 40.7), as well as numerous other locally named or unnamed tributaries. The Middle Green River subwatershed is roughly split between residential development (50 percent) and a mix of commercial forestry (27 percent) and agriculture (12 percent). Most of the upper portion is rural residential, forestry, and agriculture while cities and unincorporated urban areas dominate the lower portion of this subwatershed, including all or portions of the cities of Auburn, Black Diamond, Covington, Enumclaw, Kent, and Maple Valley. Additionally, twenty-two percent of the Middle Green River subwatershed is in the Urban Growth Area.

Cumulatively, approximately 84 percent of the riparian zone along the mainstem of the Middle Green River subwatershed still supports stands of native deciduous or coniferous forest. However, only 53 percent of the Middle Green River has an intact riparian zone at least 300 feet wide. The unconfined floodplain channel segment between RM 58 and RM 61 is forested. However, the vegetation stands immediately adjacent to the channel are composed primarily of small deciduous trees, which became established on formerly active bar surfaces and channel margins following initiation of flood control at HHD in 1964. Most of the riparian zone associated with the Green River Gorge (RM 45 to RM 57) is intact and composed of large, mixed coniferous and deciduous trees. Agricultural development and flood control structures (levees and revetments) have altered the riparian community somewhat in the wide valley associated with the floodplain channel between RM 32 and RM 45. However, riverside parks (including Metzler-O'Grady Park RM 38.5 to RM 40 and Flaming Geyser Park RM 43 to RM 45) and the adjacent steep bluffs, which the river impinges on in several locations, still support largely intact stands of small to medium sized deciduous trees, and mixed coniferous and deciduous forest.

3.3.2 Monitoring Results

The monitoring results for the Middle Green River, associated tributaries, and major subbasins are presented in this section. The major subbasins included as part of the Middle Green River results include Soos Creek, Covington Creek, Jenkins Creek, and Newaukum Creek.

3.3.2.1 Middle Green River Basin

The Middle Green River basin contains 13 monitoring stations (GRT04, GRT06, GRT07, 40D, GRT10, GRT36, GR5, GRT13, GRT14, GRT16, GRT23, GR7, and TPU_481) as shown in Figure 5. The data record for these stations varies; data record length and data gaps for each station are summarized in Table 6. Graphs of 1-DMax and 7-DADMax temperatures for each site are presented in Appendix A. Monthly temperature summary information for each station is presented in Appendix B along with applicable temperature exceedance criteria.

The Middle Green River has a change of classification near Flaming Geyser State Park at RM 42.3. The 1997 criterion changes from 16°C to 18°C downstream of the confluence of Newaukum Creek (near Flaming Geyser). The 2003 criterion changes from 16°C to 17.5°C for stations downstream of Flaming Geyser State Park.

Ten of the thirteen temperature monitoring stations (GRT04, GRT10, GRT36, GR5, GRT14, GRT16, and GR7) had temperature values that exceeded the 1-DMax (18°C or 16°C based on the 1997 criteria, depending on station location) or 7-DADMax (17.5°C or 16°C based on the 2003 criteria, depending on station location) for 10 or more days during the 2001, 2002, and/or 2003 water years (Table 9). Average temperature exceedances for all stations ranged between 0.2°C and 3.5°C. Station GRT36 had the most days above the 1997 criterion at 97 days occurring in Water Year 2003 and also had the most days above the 2003 criterion at 96 days also occurring in Water Year 2003. Station GRT36 had the greatest exceedance of the 1997 criterion at 3.5°C and also had the greatest exceedance of the 2003 criterion at 3.5°C; both of these exceedances occurred during Water Year 2003, the only year of record for this station. Other stations showing greater than one-degree exceedance, measured by average temperature, included GRT04, GRT10, GR5, GRT14, and GRT16.

The data from each station were normalized by season (June-September) and averaged as described in Section 2.0. The normalized data are summarized in Table 9. Figure 6 and Figure 7 display the data normalized relative to the 1997 temperature criterion and the

2003 Migration & Rearing temperature criteria, respectively. All stations have sufficient data for normalization. Stations GRT06, GRT07, 40D, GRT13, and GRT23 had no exceedance of either the 1997 or the 2003 criteria. Stations GRT04 and GR7 showed exceedances of the 1997 and/or the 2003 criteria for more than 10 days. Stations GRT10, GRT36, GR5, GRT14, GRT16, and GR6 showed average exceedances of the criterion greater than 1°C and durations greater than 10 days for at least one of the two criteria (1997 and 2003).

Based on the assessment of migration suitability described above, stations GRT06, GRT07, 40D, GR5, GRT13, GRT14, GRT23, GR7, and TPU_481 demonstrated no impairment to migration and stations GRT04, GRT10, GRT36, and GRT16 demonstrated potential impairment to migration.

The classification for this basin is "AA", with a 1997 criterion of 16°C except where noted. The migration and rearing criterion (2003) for this basin has a temperature threshold of 16°C except where noted. Further table explanation is presented in Table 8.

Table 9. Middle Green River Basin. Total number of days exceeding the temperature criteria by water year and the average number of days and degrees above the criteria during the warm season.

Site ID	Name	Total Days above Criteria						Normalized data: average days and degrees above criteria				
		1997 Class			2003 Migration & Rearing			# of seasons	1997 Class		2003 Migration & Rearing	
		2001	2002	2003	2001	2002	2003		Avg days	Avg °C	Avg days	Avg °C
GRT04	Green Rvr @ Porter Levee	17*[A]	23[A]	75[A]	19*[#]	29[#]	75[#]	3	47.3[A]	1.2[A]	51[#]	1.4[#]
GRT06	Burns Creek	0*[A]	0[A]	0[A]	0*[#]	0[#]	0[#]	3	0[A]	0.0[A]	0[#]	0.0[#]
GRT07	O'Grady Creek	0*[A]	0[A]	0[A]	0*[#]	0[#]	0[#]	3	0[A]	0.0[A]	0[#]	0.0[#]
40D	Crisp Creek @ Green River Rd	0*[A]	0[A]	0[A]	0*[#]	0[#]	0[#]	3	0[A]	0.0[A]	0[#]	0.0[#]
GRT10	Green Rvr @Whitney Bridge	40*	63	60	23*[#]	43[#]	40[#]	1	63	2.3	43[#]	1.3[#]
GRT36	Green Rvr @ Flaming Geyser	*ND*	*ND*	97	*ND*	*ND*	77	1	97	3.5	96	3.5
GR5	Green River #5	48*	0^^	*ND*	15*	0^^	*ND*	1	85.3	1.4	90.7	1.0
GRT13	Icy Creek	0*	0	0	0*	0	0	3	0	0.0	0	0.0
GRT14	Green Rvr, near Coal Downstream	*ND*	42*	43*	*ND*	9*	21*	1	44.9	1.2	39.6	1.0
GRT16	Green Rvr @ Palmer Ponds	42*	52	48	9*	22	31	3	82.5	1.8	82.7	1.5
GRT23	Palmer Ponds spring	*ND*	0*	0	*ND*	0*	0	1	0	0.0	0	0.0
GR7	Green River #7	46*	36*	*ND*	0*	0*	*ND*	2	79.5	0.7	80.4	0.6
TPU_481	Bear Creek	*ND*	0^	1	*ND*	0^	0	1	1.1	0.2	0	0.0

"*" : Limited dataset during this year's warm season (June-September).

"^" : Incomplete dataset - For this Water Year, data collected only during September.

"ND" : No data collected at this location for a given time period.

"A" : Classification for these sites is "A" which has a criterion of 18° C.

"#" : Migrating & Rearing Criterion for these sites is 17.5° C.

Figure 5. Middle Green River Subwatershed: Monitoring Locations.

Figure 6. Middle Green River Basin: Temperature Data with Average Number of Days and Degrees above 1997 Temperature Criterion of 18°C (downstream of Flaming Geyser Park; criterion upstream is 16°C).

Figure 7. Middle Green River Basin: Temperature Data with Average Number of Days and Degrees above 2003 Migration and Rearing Criterion of 17.5°C (downstream of Flaming Geyser Park; criterion upstream is 16°C).

3.3.2.2 Newaukum Creek

Twelve temperature monitoring stations (GRT09, 44G, GRT24, GRT11, GRT11o [the location of station GRT11 in 2001], GRT25, GRT26, 44F, GRT27, GRT29, GRT12, GRT28, and 44H) are located throughout the basin (Figure 5). The data record for the twelve stations varies; data record length and data gaps for each station are summarized in Table 6. Graphs of 1-DMax and 7-DADMax temperatures for each site are presented in Appendix A. Monthly temperature summary information for each station is presented in Appendix B along with temperature exceedance criteria.

Four of the twelve temperature monitoring stations (GRT09, GRT11, 44F, and GRT 28) had temperature values that exceeded the 1-DMax (18°C based on the 1997 criteria) or 7-DADMax (17.5 °C based on the 2003 criteria) for 10 or more days during the 2001, 2002, and/or 2003 water years (Table 10). The average value of temperature exceedances for all stations ranged from 0.1°C to 1.7°C. Station GRT28 had the most days above the criteria with 58 (1997 criteria) and 67 days (2003 criteria) occurring during Water Year 2003 (Table 10). The temperature exceedance at this station averaged 1.6°C for both the 1997 and 2003 criteria (Table 10).

The data from each station were normalized by season (June-September) and averaged as described in Section 2.0. The normalized data are summarized in Table 10. Figure 8 and Figure 9 display the data normalized relative to the 1997 temperature criterion and the 2003 migration and rearing temperature criterion, respectively. Stations GRT24, GRT25 and GRT27 did not have sufficient data for normalization. Stations GRT26, GRT29 and GRT12 did not have any exceedances. Station GRT11 had no exceedances during 2001 but had exceedances in 2003 after relocation. Station GRT09 had exceedances above both criteria but were less than one degree above each criterion. Two stations, GRT11 and 44F, were above both criteria in excess of 10 days, but averaged less than one degree above the criteria. GRT28 had greater than 50 days on average above both criteria during the warm season. GRT28 was the only location in this basin where average exceedances were greater than one degree. Two other stations, 44G and 44H, exceeded only the 1997 temperature criteria, but for less than 10 days and less than one degree.

Based on the assessment of migration suitability described in Section 3.1, stations 44G, GRT24, GRT11, GRT25, GRT26, GRT27, GRT29, and GRT12 demonstrated no impairment to migration and stations GRT09, GRT11, 44F, GRT28, and 44H demonstrated potential impairment to migration.

Table 10. Newaukum Creek Basin. Total number of days exceeding the temperature criteria by water year and the average number of days and degrees above the criteria during the warm season.

Site ID	Name	Total Days above Criteria						Normalized data: average days and degrees above criteria				
		1997 Class			2003 Migration & Rearing			# of seasons	1997 Class		2003 Migration & Rearing	
		2001	2002	2003	2001	2002	2003		Avg days	Avg °C	Avg days	Avg °C
GRT09	Newaukum Creek @ 212th Ave SE	0*	0	13	0*	2	18	3	4.3	0.2	6.7	0.3
44G	Newaukum trib, D322	0*	4	0	0*	0	0	2	2	0.01	0	0.0
GRT24	Newaukum Cr.@ SE 416th	*ND*	0*	0	*ND*	0*	0	none	--	--	--	--
GRT11o	Newaukum trib (2001 location)	0*	NA	NA	0*	NA	NA	1	0	0.0	0	0.0
GRT11	Newaukum trib (wq site B322)	NA	1	48	NA	0	51	2	24.5	0.8	25.5	0.8
GRT25	Spring Creek	*ND*	0*	0	*ND*	0*	0	none	--	--	--	--
GRT26	Newaukum Cr.@ SE 244th	*ND*	0*	0	*ND*	0*	0	1	0	0.0	0	0.0
44F	Newaukum trib, I322B	8	22	10*	6	19	7*	2	18	0.8	16.4	0.5
GRT27	Newaukum Cr.@ SE 248th	*ND*	0*	*ND*	*ND*	0*	*ND*	none	--	--	--	--
GRT29	Newaukum Cr.@ SE 416th & 278th	*ND*	0*	0	*ND*	0*	0	1	0	0.0	0	0.0

Table 10 continues on next page.

Table 10 continued.

GRT12	Newaukum Cr, Lower Fork	0*	0	0	0*	0	0	3	0	0.0	0	0.0
GRT28	Newaukum Cr, North Fork @ 292nd	*ND*	17*	58	*ND*	18*	67	1	58	1.6	67	1.6
44H	Newaukum Cr, North Fork	*ND*	0*	1	*ND*	0*	0	1	1	0.4	0	0.0

"*" : Limited dataset during this year's warm season (June-September).

"*ND*" : No data collected at this location for a given time period.

"NA" : Not Applicable; site location moved.

Figure 8. Newaukum Creek Basin: Temperature Data with Average Number of Days and Degrees above 1997 Temperature Criterion of 18°C.

Figure 9. Newaukum Creek Basin: Temperature Data with Average Number of Days and Degrees above 2003 Migration and Rearing Criterion of 17.5°C.

The classification for this basin is "A" with a 1997 criterion of 18°C. The migration and rearing criterion (2003) for this basin has a temperature threshold of 17.5^{o}C. Further table explanation is presented in Table 8.

3.3.2.3 Soos Creek

Sixteen temperature monitoring stations (54A, ST1, 54H, tm-2, tm-10, 54C, BS3, 54I, LS2, BS2, tm-1.5, tm-1, tm-7, tm-8, tm-9, BS1.5, and BS1) are located throughout the basin (Figure 5). The data record for the 17 stations varies; data record length and data gaps for each station are summarized in Table 6. Graphs of 1-DMax and 7-DADMax temperatures for each site are presented in Appendix A. Monthly temperature summary information for each station is presented in Appendix B along with temperature exceedance criteria.

Eight of the 17 temperature monitoring stations (54A, 54C, tm-2, 54I, LS2, tm-7, tm-8, tm-9, and BS1) had temperature values that exceeded the 1-DMax (18°C based on the 1997 criteria) or 7-DADMax (17.5°C based on the 2003 criteria) for 10 or more days during the 2001, 2002, and/or 2003 water years (Table 11). Average temperature exceedances for all stations ranged between 0.1°C and 5.7°C. Station tm-7 had the most days above the 1997 criterion at 119 days and the most days above the 2003 criterion at 129 days; both of these conditions occurred in Water Year 2002. Station tm-7 also had the greatest exceedance of the 1997 and 2003 criteria at 5.7°C and 5.6°C, respectively; both of these conditions occurred in Water Year 2002. The average value of exceedances was greater than one degree at stations 54C, 54I, tm-2, LS2, and tm-8.

Data from each station were normalized by season (June-September) and averaged as described in Section 2.0. The normalized data are summarized in Table 11. Figure 10 and Figure 11 display the data normalized relative to the 1997 temperature criterion and the 2003 migration and rearing temperature criterion, respectively. Station tm-2 did not have sufficient data for normalization. Stations ST1, 54H, BS3, BS2, and tm-1.5 had no exceedance of either the 1997 or the 2003 criteria. Stations 54A, tm-9, and BS1 had exceedances of the 1997 and/or the 2003 criteria for more than 10 days. Stations 54C, 54I, LS2, tm-7, and tm-8 showed average exceedances of the criterion greater than one degree and durations greater than 10 days for at least one of the two criteria (1997 and 2003).

Table 11. Soos Creek Basin. Total number of days exceeding the temperature criteria by water year and the average number of days and degrees above the criteria during the warm season.

Site ID	Name	Total Days above Criteria						Normalized data: average days and degrees above criteria				
		1997 Class			2003 Migration & Rearing			# of seasons	1997 Class		2003 Migration & Rearing	
		2001	2002	2003	2001	2002	2003		Avg days	Avg °C	Avg days	Avg °C
54A	Soos Creek @ Mouth	7	9	23	6	10	24	3	15.3	0.5	15.3	0.5
ST1	Soosette Creek	0	0^	*ND*	0	0^	*ND*	1	0	0.0	0	0.0
54H	Soosette Creek Above SR 18	0*	0	0	0*	0	0	3	0	0.0	0	0.0
tm-10	Soosette @ 288th	*ND*	0	0^	*ND*	0	0^	1	0	0.0	0	0.0
54C	Soos Cr, Y320	35*	20*	13*	37*	18*	13*	1	46.4	2.2	49.1	2.0
BS3	Big Soos #3	0	0*	*ND*	0	0*	*ND*	2	0	0.0	0	0.0
tm-2	Lk. Meridian Outlet	*ND*	73*	*ND*	*ND*	81*	*ND*	none	--	--	--	--
54I	Little Soos Creek @ 164thAV SE	58	67	85	69	85	89	3	76.3	1.8	88.5	1.8
LS2	Little Soos #2	84	82*	*ND*	85	81*	*ND*	2	112.1	1.5	112.1	1.9
BS2	Big Soos #2	0	0*	*ND*	0	0*	*ND*	2	0	0.0	0	0.0
tm-1.5	Big Soos @ Kent-Kangley	*ND*	0	0^	*ND*	0	0^	1	0	0.0	0	0.0
tm-1	Big Soos @ 256th	*ND*	6	0^	*ND*	6	0^	1	6	0.5	6	0.1

Table 11 continues on next page.

Table 11 continued.

tm-7	Meridian Val. Cr. @ 144	*ND*	119	0^	*ND*	129	0^	1	106	5.7	112	5.6
tm-8	Meridian Val. @ Irr. Pond	*ND*	67	0^	*ND*	82	0^	1	65	1.9	80	1.6
tm-9	Meridian Val. @ 240th	*ND*	17	0^	*ND*	22	0^	1	17	0.9	22	0.5
BS1.5	Big Soos #1.5	0*	4*	*ND*	0*	0*	*ND*	2	2.8	0.2	0	0.0
BS1	Big Soos #1	5	13*	*ND*	5	14*	*ND*	2	12.3	0.5	13	0.2

"*" : Limited dataset during this year's warm season (June-September).

"^" : Incomplete dataset - For this Water Year, data collected only during October.

"*ND*" : No data collected at this location for a given time period.

Figure 10. Soos Creek Basin: Temperature Data with Average Number of Days and Degrees above 1997 Temperature Criterion of 18°C.

Figure 11. Soos Creek Basin: Temperature Data with Average Number of Days and Degrees above 2003 Migration and Rearing Criterion of 17.5°C.

Based on the assessment of migration suitability described above, stations ST1, 54H, tm-10, BS3, BS2, tm-1.5, tm-1, tm-9, BS1.5, and BS1 demonstrated no impairment to migration; stations 54A, 54C, 54I, tm-2, LS2, and tm-8 demonstrated potential impairment to migration; and station tm-7 demonstrated potential lethality.

The classification for this basin is "A" with a 1997 criterion of 18°C. The migration and rearing criterion (2003) for this basin has a temperature threshold of 17.5^{o}C. Further table explanation is presented in Table 8.

3.3.2.4 Covington Creek

The Covington Creek subbasin contains four monitoring stations (09A, CT1, CO2, and CO1) as shown in Figure 5. The data record for the four stations varies; data record length and data gaps for each station are summarized in Table 6. Graphs of 1-DMax and 7-DADMax temperatures for each site are presented in Appendix A. Monthly temperature summary information for each station is presented in Appendix B along with temperature exceedance criteria.

Three of the four temperature monitoring stations (CT1, CO2, and CO1) had temperature values that exceeded the 1-DMax (18 °C based on the 1997 criteria) or 7-DADMax (17.5 °C based on the 2003 criteria) for 10 or more days during the 2001, 2002, and/or 2003 water years (Table 12). Average temperature exceedances for all stations ranged between 0.3°C and 4.2°C. Station CO1 had the most days above the 1997 criterion at 102 days and the most days above the 2003 criterion at 99 days; both of these conditions occurred in Water Year 2002. Station CO1 had the greatest exceedance of the 1997 and 2003 criteria at 3.7°C and 4.2°C, respectively; both of these conditions occurred in Water Year 2001. Station CT1 measured an average temperature exceedance of greater than one degree.

The data from each station were normalized by season (June-September) and averaged as described in Section 2.0. The normalized data are summarized in Table 12. Figure 12 and Figure 13 display the data normalized relative to the 1997 temperature criterion and the 2003 migration and rearing temperature criterion, respectively. All stations have sufficient data for normalization. Station 09A had no exceedance of either the 1997 or the 2003 criteria. Station CO2 had exceedances of the 1997 and/or the 2003 criteria for more than 10 days. Stations CT1 and CO1 had exceedances of greater than 1°C on average and of greater than 10 days duration for at least one of the two criteria (1997 and 2003).

Table 12. Covington and Jenkins Creek Basins. Total number of days exceeding the temperature criteria by water year and the average number of days and degrees above the criteria during the warm season.

Site ID	Name	Total Days above Criteria						Normalized data: average days and degrees above criteria				
		1997 Class			2003 Migration & Rearing			# of seasons	1997 Class		2003 Migration & Rearing	
		2001	2002	2003	2001	2002	2003		Avg days	Avg °C	Avg days	Avg °C
09A	Covington Creek, near mouth	0	0	0*	0	0	0*	3	0.0	0.0	0.0	0.0
CT1	Covington trib	38	20	*ND*	43	24	*ND*	2	39.8	1.6	46.0	1.4
CO2	Covington #2	8	10	*ND*	8	4	*ND*	2	12.6	0.6	8.2	0.4
CO1	Covington #1	71	102	*ND*	66	99	*ND*	2	145.4	3.6	137.1	4.0
26A	Jenkins Creek, near mouth	0	0	7	0	0	14	3	2.3	0.2	4.7	0.1
JE1	Jenkins #1	0	*ND*	*ND*	0	*ND*	*ND*	1	0.0	0.0	0.0	0.0
JE2	Jenkins #2	0	0	*ND*	0	0	*ND*	2	0.0	0.0	0.0	0.0

"*" : Limited dataset during this year's warm season (June-September).

"*ND*" : No data collected at this location for a given time period.

Figure 12. Covington and Jenkins Creek Basins: Temperature Data with Average Number of Days and Degrees above 1997 Temperature Criterion of 18°C.

Figure 13. Covington and Jenkins Creek Basins: Temperature Data with Average Number of Days and Degrees above 2003 Migration and Rearing Criterion of 17.5°C.

Based on the assessment of migration suitability described above, station 09A demonstrated no impairment to migration; stations CT1 and CO2 demonstrated potential impairment to migration; and station CO1 demonstrated potential blockage to migration.

The classification for these basins is "A" with a 1997 criterion of 18°C. The migration and rearing criterion (2003) for these basins has a temperature threshold of 17.5^{o}C. Further table explanation is presented in Table 8.

3.3.2.5 Jenkins Creek

The Jenkins Creek subbasin contains three monitoring stations 26A, JE1, and JE2 (Figure 5). The data record for the three stations varies; data record length and data gaps for each station are summarized in Table 6. Graphs of 1-DMax and 7-DADMax temperatures for each site are presented in Appendix A. Monthly temperature summary information for each station is presented in Appendix B along with temperature exceedance criteria.

Only one of the three temperature monitoring stations (26A) had temperature values that exceeded the 7-DADMax (17.5°C based on the 2003 criteria) for 10 or more days and then only during Water Year 2003 (Table 12). No station had an average exceedance greater than one degree for its available data record.

The data from each station were normalized by season (June-September) and averaged as described in Section 2.0. The normalized data are summarized in Table 12. Figure 12 and Figure 13 display the data normalized relative to the 1997 temperature criterion and the 2003 migration and rearing temperature criterion, respectively. All stations have sufficient data for normalization. Stations JE1 and JE2 had no exceedance of either the 1997 or 2003 criteria.

Based on the assessment of migration suitability described above, no station demonstrated impairment to migration.

3.4 LOWER GREEN RIVER AND DUWAMISH RIVER SUBWATERSHED

This section of the results includes a physical description of the Lower Green River and Duwamish River subwatershed and the monitoring results for these areas including the associated tributaries and major subbasins. The subbasins summarized below are the Black River and Mill Creek.

3.4.1 Description of RM 0 to 32.5

This description is summarized from Kerwin and Nelson (2000). The Lower Green River valley has experienced a dramatic increase in urbanization. Farmlands from Auburn to Tukwila were converted to warehouses, malls, and industry due to the proximity of roadway systems, the reduced threat of flooding, and the flat, easy to develop land. Between 1965 and 1989, agricultural land uses in the Lower Green River subwatershed dropped by 70 percent (from 11,172 acres to 3,447 acres) while industrial and warehouse areas increased by more than 500 percent (from 1,226 acres to 6,559 acres) (Scarey 1994).

The Lower Green River subwatershed primarily consists of residential development (50 percent), industrial development (17 percent), and commercial development (10 percent). Most of the land area is incorporated in the cities of Algona, Auburn, Federal Way, Kent, Renton, SeaTac, and Tukwila. In this subwatershed, it is estimated that 80 percent of the Green River from RM 17 to RM 33 has been leveed or revetted on at least one bank for flood protection (Perkins 1993). Most of the floodplain has been filled, drained and developed. About five percent of the Lower Green River subwatershed is in King County's Agricultural Production District and nearly 100 percent of the subwatershed is in the Urban Growth Area.

The Duwamish Estuary subwatershed begins at the confluence with the Black River (RM 11). This area is characterized primarily by industrial development (43 percent) and residential development (39 percent). The cities of Seattle and Tukwila, operations of the Port of Seattle (the fifth largest port in the U.S.), and the region's largest industrial complexes are in this subwatershed. The loss of estuarine and riparian habitat has been extensive in the lower portion of the estuary. The shoreline has been dramatically altered: 21,000 feet have been lost due to straightening of the channel and 53,000 feet have been filled and developed. Only 19,000 feet of vegetated riparian shoreline remains in the Estuary. The once extensive 3,850 acres of tidal mudflats, marshes, and swamps have been reduced to only 45 acres. Ninety-seven percent of the estuary has been filled (USACE 1997). This entire subwatershed is in the UGA.

3.4.2 Monitoring Results

The monitoring results for the Lower Green River, Duwamish River, their associated tributaries, and major subbasins are presented in this section. The major subbasins included as part of the Lower Green River results include the Black River and Mill Creek.

3.4.2.1 Lower Green River Subwatershed

The Lower Green River subwatershed contains eight monitoring stations GRT18, tm-27, GRT22, tm-25, tm-24, GRT20, GRT35, and GRT03 (Figure 14). The data record for the eight stations varies; data record length and data gaps for each station are summarized in Table 6. Graphs of 1-DMax and 7-DADMax temperatures for each site are presented in Appendix A. Monthly temperature summary information for each station is presented in Appendix B along with applicable temperature exceedance criteria.

Four of the eight temperature monitoring stations (GRT18, GRT22, GRT20, and GRT35) had temperature values that exceeded the 1-DMax (18°C based on the 1997 criteria) or 7-DADMax (17.5°C based on the 2003 criteria) for 10 or more days during the 2001, 2002, and/or 2003 water years (Table 13). Average exceedances for all stations ranged between 0.1°C and 2.6°C. Station GRT22 had the most days above the 1997 criterion at 75 days and the most days above the 2003 criterion at 76 days; both of these conditions occurred in Water Year 2003. Station GRT18 had the greatest exceedance of the 1997 and 2003 criteria at 3.0°C and 3.3°C, respectively; both of these conditions occurred in Water Year 2003. The average value of exceedances was greater than one degree at stations GRT22, GRT20, and GRT35.

The data from each station were normalized by season (June-September) and averaged as described in Section 2.0. The normalized data are summarized in Table 13. Figure 15 and Figure 16 display the data normalized relative to the 1997 temperature criterion and the 2003 migration and rearing temperature criterion, respectively. Stations GRT18 and GRT20 did not have sufficient data for normalization. Stations tm-25, tm-24, GRT03, and tm-26(02) had no exceedance of either the 1997 or 2003 criteria. Stations GRT22 and GRT35 had average exceedances greater than one degree and durations greater than 10 days for at least one of the two criteria (1997 and 2003).

Based on the assessment of migration suitability described above, stations tm-27, tm-25, tm-24, GRT03, and tm-26(02) demonstrated no impairment to migration and stations GRT18, GRT22, GRT20, and GRT35 demonstrated potential impairment to migration.

Table 13. Lower Green River, Duwamish River and Mill Creek Basins. Total number of days exceeding the temperature criteria by water year and the average number of days and degrees above the criteria during the warm season.

Site ID	Name	Total Days above Criteria						Normalized data: average days and degrees above criteria				
		1997 Class			2003 Migration & Rearing			# of seasons	1997 Class		2003 Migration & Rearing	
		2001	2002	2003	2001	2002	2003		Avg days	Avg °C	Avg days	Avg °C
GRT01	Duwamish Rvr @ South Park Marina	1*[B]	2[B]	14[B]	25*	56	82	3	6.2[B]	0.5[B]	67.5	1.6
HA5	Hamm Creek South Fork, A307	0	3	0*	0	0	0*	3	1	0.3	0	0.0
GRT31	Duwamish River (North Wind Weir)	*ND*	2*[B]	24*[B]	*ND*	45*	81*	1	24[B]	0.9[B]	81	2.7
GRT18	Green Rvr @ Fort Dent Park	*ND*	37*	36*	*ND*	49*	33*	none	--	--	--	--
tm-27	Johnson Cr. @ Green River	*ND*	4	0^	*ND*	1	0^	1	4	0.2	1	0.0
GRT22	Green Rvr @ Van Doran Landing	*ND*	27*	75	*ND*	38*	76	1	75	2.2	76	2.6
tm-25	Midway Cr. @ Green River	*ND*	0	0^	*ND*	0	0^	1	0	0.0	0	0.0
tm-24	Mullen Slough @ SR 516	*ND*	0	0^	*ND*	0	0^	1	0	0.0	0	0.0
GRT20	Green Rvr, DS off Mill Cr	*ND*	28*	49	*ND*	34*	45	none	--	--	--	--
GRT21	Mill Creek	*ND*	39*	78	*ND*	46*	100	1	91.8	1.9	118.6	1.8
GRT05	Mill Cr.@ the deadzone	0*	6	26*	0*	7	36*	2	13	0.3	18	0.3
mf1	Mill Creek (south) near Peasley Canyon	0	1*	3	0	0*	0	3	1.1	0.4	0	0.0
GRT35	Green Rvr @ North Grn Rvr Park	*ND*	11*	63	*ND*	16*	74	1	63	1.4	74	1.6
GRT03	Olsen Creek	0*	0	0	0*	0	0	3	0	0.0	0	0.0

"*" : Limited dataset during this year's warm season (June-September).

"^" : Incomplete dataset - For this Water Year, data collected only during October.

"*ND*" : No data collected at this location for a given time period.

"B" : Classification of these sites is "B" which has a criterion of 21°C.

Figure 14. Duwamish River, Lower Green River, Mill Creek, and Black River Basins: Monitoring Locations.

Figure 15. Duwamish River, Lower Green River, and Mill Creek Basins: Temperature Data with Average Number of Days and Degrees above 1997 Temperature Criterion of 18°C (Duwamish River criterion is 21°C).

Figure 16. Duwamish River, Lower Green River, and Mill Creek Basins: Temperature Data with Average Number of Days and Degrees above 2003 Migration and Rearing Criterion of 17.5°C.

The classification for these basins is "A" with a 1997 criterion of 18°C except for where noted. The migration and rearing criterion (2003) for these basins has a temperature threshold of 17.5^{o}C. Further table explanation is presented in Table 8.

3.4.2.2 Duwamish River

The Duwamish River contains 3 monitoring stations (GRT01, HA5, and GRT31) as shown in Figure 14. The data record for the three stations varies; data record length and data gaps for each station are summarized in Table 6. Graphs of 1-DMax and 7-DADMax temperatures for each site are presented in Appendix A. Monthly temperature summary information for each station is presented in Appendix B along with temperature exceedance criteria.

Two of the three temperature monitoring stations (GRT01 and GRT31) had temperature values that exceeded the 1-DMax (21°C based on the 1997 criteria) or 7-DADMax (17.5°C based on the 2003 criteria) for 10 or more days during the 2001, 2002, and/or 2003 water years (Table 13). Average temperature exceedances for all stations ranged between 0.0°C and 2.7°C. Station GRT31 had the most days above the 1997 criterion at 24 days and station GRT01 had the most days above the 2003 criterion at 82 days; both of these conditions occurred in Water Year 2003. Station GRT01 had the greatest exceedance of the 1997 criterion at 1.1°C and station GRT31 had the greatest exceedance of the 2003 criterion at 2.7°C; both of these conditions also occurred in Water Year 2003.

The data from each station were normalized by season (June-September) and averaged as described in Section 2.0. The normalized data are summarized in Table 13. Figure 15 and Figure 16 display the data normalized relative to the 1997 temperature criterion and the 2003 migration and rearing temperature criterion, respectively. All stations have sufficient data for normalization. All stations had some exceedance of the 1997 or 2003 criteria. Stations GRT01 and GRT31 had exceedances of greater than 1°C average and of greater than 10 days duration for at least one of the two criteria (1997 and 2003).

Based on the assessment of migration suitability described above, station HA5 demonstrates no impairment to migration and stations GRT01 and GRT31 demonstrate potential impairment to migration.

3.4.2.3 Mill Creek

The Mill Creek subbasin in Auburn contains three monitoring stations (GRT21, GRT05, and mf1) as shown in Figure 14. The data record for the three stations varies; data record length and data gaps for each station are summarized in Table 6. Graphs of 1-DMax and 7-DADMax temperatures for each site are presented in Appendix A. Monthly temperature summary information for each station is presented in Appendix B along with temperature exceedance criteria.

Two of the three temperature monitoring stations (GRT21 and GRT05) had temperature values that exceeded the 1-DMax (18°C based on the 1997 criteria) or 7-DADMax (17.5°C based on the 2003 criteria) for 10 or more days during the 2001, 2002, and/or 2003 water years (Table 13). Average temperature exceedances for all stations ranged between 0.1°C and 1.9°C. Station GRT21 had the most days above the 1997 and 2003 criteria at 78 and 100 days, respectively; both of these conditions occurred in Water Year 2003. Station GRT21 had the greatest average exceedance of the 1997 and 2003 criteria at 1.9°C and 1.8°C, respectively; both of these conditions occurred in Water Year 2003. Exceedances at station mf1 also averaged greater than one degree.

The data from each station were normalized by season (June-September) and averaged as described in Section 2.0. The normalized data are summarized in Table 13. Figure 15 and Figure 16 display the data normalized relative to the 1997 temperature criterion and the 2003 migration and rearing temperature criterion, respectively. Stations GRT05 showed exceedances of the 1997 and/or the 2003 criteria for more than 10 days. Stations GRT21 showed exceedances of greater than one degree average and of greater than 10 days duration for at least one of the two criteria (1997 and 2003).

Based on the assessment of migration suitability described above, station mf1 demonstrated no impairment to migration and stations GRT21 and GRT05 demonstrated potential impairment to migration.

3.4.2.4 Black River

The Black River subbasin contains 13 monitoring stations (GRT02, GRT19, 03G, GRT34, GRT33, tm-21, tm-20, tm-19, tm-18, tm-17, tm-16, tm-12, and tm-11) as shown in Figure 14. The data record for the three stations varies; data record length and data gaps for each station are summarized in Table 6. Graphs of 1-DMax and 7-DADMax temperatures for each site are presented in Appendix A. Monthly temperature summary

information for each station is presented in Appendix B along with temperature exceedance criteria.

Nine of the 13 temperature monitoring stations (GRT02, GRT19, 03G, GRT34, GRT33, tm-21, tm-18, tm-16, and tm-12) had temperature values that exceeded the 1-DMax (18°C based on the 1997 criteria) or 7-DADMax (17.5°C based on the 2003 criteria) for 10 or more days during the 2001, 2002, and/or 2003 water years (Table 14). Average temperature exceedances for all stations ranged between 0.2°C and 4.8°C. Station GRT02 had the greatest average exceedance of the 1997 and 2003 criteria at 4.8°C and 4.7°C, respectively; both of these conditions occurred in Water Year 2003. The average value of exceedances was greater than one degree at stations GRT19, GRT34, tm-21, and tm-16.

The data from each station were normalized by season (June-September) and averaged as described in Section 2.0. The normalized data are summarized in Table 14. Figure 17 and Figure 18 display the data normalized relative to the 1997 temperature criterion and the 2003 migration and rearing temperature criterion, respectively. Station tm-17 does not have sufficient data for normalization. Station tm-20 had no exceedance of the 1997 or 2003 criteria. Stations 03G, GRT33, and tm-18 had exceedances of the 1997 and/or the 2003 criteria for more than 10 days. Stations GRT02, GRT19, GRT34, tm-21, tm-16, and tm-12 had exceedances of greater than one degree average and of greater than 10 days duration for at least one of the two criteria (1997 and 2003).

Based on the assessment of migration suitability described above, stations 03G, tm-20, tm-19, tm-17, and tm-11 demonstrated no impairment to migration; stations GRT19, GRT34, GRT33, tm-18, tm-21, tm-16, and tm-12 demonstrated potential impairment to migration; and station GRT02 demonstrated potential blockage to migration.

Table 14. Black River Basin. Total number of days exceeding the temperature criteria by water year and the average number of days and degrees above the criteria during the warm season.

Site ID	Name	Total Days above Criteria						Normalized data: average days and degrees above criteria				
		1997 Class			2003 Migration & Rearing			# of seasons	1997 Class		2003 Migration & Rearing	
		2001	2002	2003	2001	2002	2003		Avg days	Avg °C	Avg days	Avg °C
GRT02	Springbook Creek @ mouth	42*	111	100*	47*	124	108*	3	101.7	1.6	113.7	2.9
GRT19	Black River Riparian Forest	*ND*	57	49	*ND*	65	65	1	49	1.0	65	1.1
03G	Springbrook Cr.@ O'Grady, A317	*ND*	11	20	*ND*	17	41	2	18.3	0.2	34.7	0.2
GRT34	Panther Cr.(wq site A326)	*ND*	2	33	*ND*	2	57	1	33	1.3	57	0.9
GRT33	Springbrook Cr.@ SW 43rd st	*ND*	5	43	*ND*	7	62	1	43	1.0	62	1.0
tm-21	Garrison Creek @ 218th	*ND*	57	0^	*ND*	85	0^	1	57	1.4	82	1.2
tm-20	Springbrook Cr.@ E. Valley	*ND*	0	0^	*ND*	0	0^	1	0	0.0	0	0.0
tm-19	Springbrook Cr.@ 192nd	*ND*	2	0^	*ND*	4	0^	1	2	0.3	4	0.2
tm-18	Garrison Creek @ 194th	*ND*	21	0^	*ND*	31	0^	1	21	0.6	31	0.6
tm-17	Mill Creek @ mouth	*ND*	4	0	*ND*	7	0	none	--	--	--	--
tm-16	Mill Creek @ 204th	*ND*	72*	*ND*	*ND*	96*	*ND*	1	88.1	1.7	114.9	1.6
tm-12	Mill Creek @ Diversion	*ND*	86	0^	*ND*	102	0^	1	86	2.0	102	2.0
tm-11	Mill Creek @ Sr. Ctr.	*ND*	2	0^	*ND*	0	0^	1	2	0.7	0	0.0

"*" : Limited dataset during this year's warm season (June-September).

"^" : Incomplete dataset - For this Water Year, data collected only during October.

"*ND*" : No data collected at this location for a given time period.

Figure 17. Black River Basin: Temperature Data with Average Number of Days and Degrees above 1997 Temperature Criterion of 18°C.

Figure 18. Black River Basin: Temperature Data with Average Number of Days and Degrees above 2003 Migration and Rearing Criterion of 17.5°C.

The classification for this basin is "A" with 1997 criterion of 18°C. The migration and rearing criterion (2003) for this basin has a temperature threshold of 17.5^{o}C. Further table explanation is presented in Table 8.

3.5 GREEN-DUWAMISH RIVER MAINSTEM STATIONS

This section compiles all the stations on the mainstem Green-Duwamish River. A total of 17 monitoring stations (GRT01, GRT31, GRT18, GRT22, GRT20, GRT35, GRT04, GRT10, GRT36, GR5, GRT14, GRT16, GR7, GRT17, TPU_483, TPU_478, and TPU_477) are shown in Figure 19.

All 17 temperature monitoring stations had temperature values that exceeded the 1-DMax (21°C, 18°C, or 16°C based on the 1997 criteria, depending on station location) or 7-DADMax (17.5°C or 16°C or 12°C based on the 2003 criteria, depending on station location) for 10 or more days during the 2001, 2002, and/or 2003 water years (Tables 2-8). Temperature exceedances for all stations ranged between 0.1°C and 3.5°C. Station GRT36 had the most days above the 1997 and 2003 criteria at 97 and 96 days, respectively, both occurring in Water Year 2003. Station GRT36 also had the greatest exceedance of the 1997 and 2003 criteria (16°C) at 3.5°C for both criteria.

The normalized data are summarized in Table 15. The normalized data are presented in a series of figures previously presented relative to the 1997 temperature criteria and the 2003 migration and rearing temperature criteria (Figures 3, 4, 6-13, 15-18). Stations GRT18, GRT20, TPU_479, and TPU_478 did not have sufficient data for normalization. All stations (14) with sufficient data exceeded both the 1997 and the 2003 criteria. The 1997 criterion was exceeded for more than 10 days on average for all stations except for GRT01 (Table 15). Seven of these stations had average temperatures greater than 1°C above their criteria. Fourteen stations had sufficient data to show exceedances of the 2003 criteria for more than 10 days (Table 15). Twelve of these stations had average temperatures of at least 1°C above their criteria.

Figure 19. Compilation of Temperature Data along the Green-Duwamish River (2003 Migration and Rearing Criteria ranges from 17.5°C to 12°C; in addition, refer to Figures 4, 7, and 16).

Table 15. Mainstem only: Average number of days and degrees above the criteria during the warm season for normalized data.

Station_ID	Location name	Total Seasons Averaged	1997 criteria		2003 Criteria	
			Total Days Above	Avg ° Above	Total Days Above	Avg ° Above
	Duwamish River		**(21°C)**		**(17.5 °C)**	
GRT01	Duwamish Rvr @ South Park Marina	3	6.2	0.4	67.5	1.2
GRT31	Duwamish River (North Wind Weir)	1	24.0	0.9	81.0	2.7
	Lower Green River		**(18°C)**		**(17.5 °C)**	
GRT18	Green Rvr @ Fort Dent Park	none				
GRT22	Green Rvr @ Van Doran Landing	1	75.0	2.2	76.0	2.6
GRT20	Green Rvr, DS off Mill Cr	none				
GRT35	Green Rvr @ North Grn Rvr Park	1	63.0	1.4	74.0	1.6
	Middle Green River (lower)		**(18°C)**		**(17.5 °C)**	
GRT04	Green Rvr @ Porter Levee	3	47.3	0.6	51.0	1.0
GRT10	Green Rvr @ Whitney Bridge	1	63.0	2.3	43.0	1.3
	Middle Green River (upper)		**(16°C)**		**(16 °C)**	
GRT36	Green Rvr @ Flaming Geyser	1	97.0	3.5	96.0	3.5
GR5	Green River #5	1	85.3	1.4	90.7	1.0
GRT14	Green Rvr, near Coal Downstream	1	44.9	1.2	39.6	1.0
GRT16	Green Rvr @ Palmer Ponds	3	82.5	0.8	82.7	1.3
GR7	Green River #7	2	79.5	0.7	80.4	0.6
	Upper Green River		**(16°C)**		**(16 °C)**	
GRT17	Green Rvr, below HHD	3	17.0	0.4	18.0	0.4
TPU_483	Green River @ Bridge 71	1	82.6	2.8	124	4.8
TPU_478	Green River, US of McCain Cr	none				
TPU_477	Upper Green River	1	17.6	0.5	88.9##	2.9##

"##" : Migrating & Rearing Criterion for this site is 12°C due to the presence of Char.

4.0 DISCUSSION

This section of the report includes a discussion regarding the biological implications of temperatures exceeding the designated temperature criteria. The interpretation of the larger data set across the watershed is included as part of this discussion. This interpretation includes a closer examination of exceedances for the 1997 and 2003 criteria, identification of the highest temperature values, exceedances by subbasin, and an all-station summary.

4.1 IMPLICATIONS OF EXCEEDANCES

Ecology's development of the 2003 water quality standards and the associated use-based temperature criteria for aquatic life was founded on the best available science. In its technical development and evaluation of the temperature criteria, Ecology found 16°C to be the central estimate of a temperature criterion that would represent the highest fully protective summer temperature for salmon and trout (Ecology, 2003). The summer criterion of 17.5°C, which is applied to non-core rearing, spawning, and migration areas, represents the upper end of the temperature range that remains fully protective of salmon and trout. As temperatures exceed the 17.5°C criterion, the ideal summer thermal requirements are surpassed and the threat of impairment increases.

Salmonid migration is the primary usage impacted by elevated summer surface water temperatures in the Green-Duwamish watershed. When summer average temperatures exceed 15°C and maximums exceed 18°C, migration can be impaired. Temperatures above 21-22°C can block migration altogether, especially when fish have not become acclimatized to warmer temperatures (Ecology, 2002). Monitoring stations where maximum temperatures exceed 18°C represent areas of the watershed where temperature may be a limiting factor for salmonid migration.

Char is the other use designation afforded a specific temperature criterion in the Green-Duwamish watershed. The summer criterion of 12°C is designed to protect the high quality char habitat in the upper watershed. These areas include the Green River and Sunday Creek (and all waters upstream), and Smay Creek and West Fork Smay Creek (and all waters upstream). When summer temperatures exceed the criterion value of 12°C, habitat quality for rearing can be impaired for char. Currently there are no known reproducing char populations in the Green-Duwamish watershed; however, individual char have been observed or captured as far upstream as Newaukum Creek.

In order to describe the specific habitat needs of char, bull trout temperature requirements are described here. Bull trout require water temperatures below 15°C (Wydoski and Whitney, 2003). However, bull trout may utilize habitats with water temperatures greater than 15°C for short time periods (USFWS, 1998). Spawning is initiated in the fall when water temperatures drop below 9-10°C, although the threshold for north Puget Sound is believed to be 8°C (USFWS, 1998). Survival of incubating eggs has been found to be optimal at constant temperatures of 2-4°C, with mortality increasing markedly above 8°C (USFWS, 1998). Optimal juvenile rearing temperatures range between 4-10°C. For migratory corridors, bull trout typically prefer water temperatures ranging between 10-12°C. Bull trout will migrate in stream segments with higher water temperatures and are found in areas offering thermal refuge, such as confluences with cold tributaries (USFWS, 1998).

The duration of the temperature exceedance is also an important factor to consider when evaluating the potential impact of elevated temperatures on salmonid migration. The longer the duration, the more likely the usage will be impacted when elevated temperatures occur. The 7-day average of the daily maximum temperatures (7-DADMax) incorporates duration into Ecology's temperature criteria. This metric of temperature was chosen by Ecology for several reasons. These reasons include (1) sublethal chronic biologic effects generally take more than a week's exposure to become meaningful, (2) the metric allows for an acceptable level of temperature fluctuation to occur without regulatory repercussions, and (3) the metric avoids erasing or diminishing the benefits of otherwise healthy average temperatures (Ecology, 2002). Using Ecology's guidance on duration (more than 7 days), temperature exceedances with a duration of 10 days or more were highlighted in the results section (see Section 3) of this report in both tabular and graphical formats.

4.2 INTERPRETATION OF DATA

This section summarizes and discusses the results in several formats, including (1) exceedances of the 1997 temperature criteria, (2) exceedances of the 2003 temperature criteria, (3) exceedances of salmonid migration thresholds, and (4) summary by subbasin.

The summaries focus on the average temperature exceedances above the criterion which is more useful for assessing the extent to which temperature may be a problem for salmonids. The discussion of the duration of exceedances is limited to only a few points in the last section since the regulatory framework focuses on the value of the exceedance

and not specifically duration. For the development of the State's water quality temperature criteria, duration was considered only as a function of the calculation of the 7DADMax. To confirm this correlation for the Green-Duwamish Watershed temperature data set, a simple linear regression was performed on the normalized data results for duration (normalized number of average days above criterion) versus degrees (normalized number of average degrees above criterion). Regression coefficient (R^2) values of 0.71 and 0.78, respectively, were obtained based on the regression of the data compared with the 1997 and 2003 criteria.

4.2.1 Exceedances of 1997 Criteria

Fifty-five of the 86 monitoring stations violated the 1997 temperature criterion applicable to the specific subbasin (Table 16). Of the 55 stations, 28 had exceedances that averaged less than 1°C, while 22 stations had exceedances of 1°C to 3°C above the applicable criterion. The remaining five stations had the greatest exceedances listed below:

Station Id	Station Name	Criteria	Average °C above
TPU_479	North Fork Green River	16°C	6.8
tm-7	Meridian Valley Cr.@ 144th	18°C	5.7
GRT02	Springbrook Cr.@ mouth	18°C	4.0
CO1	Covington Cr.@ Lake Sawyer	18°C	3.6
GRT36	Green River @ Flaming Geyser	16°C	3.5

The temperature data were presented as total number of days above the applicable temperature criterion as well as average number of days and degrees above the criterion during the warm season (Tables 8 - 14).

Table 16 presents all stations by major subbasins and water year relative to the average number of degrees above the applicable 1997 temperature criteria. This presentation is intended to highlight any annual differences in temperature exceedances. For stations that have multiple years of data, temperature generally increased from 2001 to 2003 with the highest average temperatures typically reported during Water Year 2003.

Table 16. All stations: Average Number of Degrees 1997 Temperature Criterion Exceeded by Station and Water Year. Normalized temperature data are the same as Tables 8-14. These data are presented to highlight the average number of days above the criterion.

Station Id	Station Name	Water Year			Normalized data		
		2001	2002	2003	no. of seasons	Avg. Days	Avg. °C above std.
Upper Green River				**(16°C)**			
GRT17	Green River, below HHD	0*	0.2	1.3	3	17.0	0.4
TPU_480	Charley Creek	*ND*	0^	0	1	0	0
TPU_479	North Fork Green River	*ND*	0^	6.8*	none	--	--
TPU_475	Gale Creek	*ND*	0^	0*	none	--	--
TPU_483	Green River @ Bridge 71	*ND*	0^	2.8	2	82.6	2.8
TPU_478	Green River, US of McCain Cr	*ND*	*ND*	0.9*	none	--	--
TPU_484	Friday Creek	*ND*	0^	0*	none	--	--
TPU_482	Sunday Creek	*ND*	0^	0*	none	--	--
TPU_477	Upper Green River	*ND*	0^	0.5	1	17.6	0.5
Middle Green River—Upper				**(16°C)**			
GRT10	Green River @ Whitney Bridge	2.3*	2.3	3.4*	1	63	2.3
GRT36	Green River @ Flaming Geyser	*ND*	*ND*	3.5	1	97	3.5
GR5	Green River #5	1.4*	0^^	*ND*	1	85.3	1.4
GRT13	Icy Creek	0*	0	0	3	0	0
GRT14	Green River, near Coal Downstream	*ND*	1.2	1.7*	1	44.9	1.2
GRT16	Green River @ Palmer Ponds	1.3*	1.5	2.5	3	82.5	1.8
GRT23	Palmer Ponds Spring	*ND*	0*	0	1	0	0
GR7	Green River #7	0.6*	0.8	*ND*	2	79.5	0.7
TPU_481	Bear Creek	*ND*	0^	0.2	1	1.1	0.2
Middle Green River—Lower				**(18°C)**			
GRT04	Green River @ Porter Levee	1.1*	0.9	1.7	3	47.3	1.2
GRT06	Burns Creek	0*	0	0	3	0	0
GRT07	O'Grady Creek	0*	0	0	3	0	0
40D	Crisp Creek @ Green River Rd	0	0	0	3	0	0
Soos Creek				**(18°C)**			
54A	Soos Creek @ Mouth	0.2	0.5	0.7	3	15.3	0.5
ST1	Soosette Creek	0	0^^	*ND*	1	0	0
54H	Soosette Creek Above SR 18	0	0	0	3	0	0
tm-10	Soosette @ 288th	*ND*	0	0^^	1	0	0
54C	Soos Cr., Y320	2.2	2.2*	2.9*	1	46.4	2.2

Table 16 continues on next page.

Table 16 continued.

BS3	Big Soos #3	0	0	*ND*	2	0	0
tm-2	Lk. Meridian Outlet	*ND*	2.9*	*ND*	none	--	--
54I	Little Soos Creek @ 164th Ave SE	1.5	2	1.9	3	76.3	1.8
LS2	Little Soos #2	1.0	2.0	*ND*	2	112.1	1.5
BS2	Big Soos #2	0	0	*ND*	2	0	0
tm-1.5	Big Soos @ Kent-Kangley	*ND*	0	0^^	1	0	0
tm-1	Big Soos @ 256th	*ND*	0.5	0^^	1	6	0.5
tm-7	Meridian Val. Cr. @ 144	*ND*	5.7	0^^	1	106	5.7
tm-8	Meridian Val. @ Irr. Pond	*ND*	1.9	0^^	1	65	1.9
tm-9	Meridian Val. @ 240th	*ND*	0.9	0^^	1	17	0.9
BS1.5	Big Soos #1.5	0	0.5	*ND*	2	2.8	0.2
BS1	Big Soos #1	0.2	0.9	*ND*	2	12.3	0.5
Covington Creek				**(18°C)**			
09A	Covington Creek near Mouth	0	0	0	3	0.0	0
CT1	Covington trib	1.8	1.5	*ND*	2	39.8	1.6
CO2	Covington #2	0.6	0.5	*ND*	2	12.6	0.6
CO1	Covington #1	3.7	3.6	*ND*	2	145.4	3.6
Jenkins Creek				**(18°C)**			
26A	Jenkins Creek near Mouth	0	0	0.5	3	2.3	0.2
JE1	Jenkins #1	0	0^^	*ND*	1	0.0	0
JE2	Jenkins #2	0	0	*ND*	2	0.0	0
Newaukum Creek				**(18°C)**			
GRT09	Newaukum Creek @ 212th Ave SE	0*	0	0.6	3	4.3	0.2
44G	Newaukum trib, D322	0*	0	0	2	0	0
GRT24	Newaukum Cr.@ SE 416th	*ND*	0*	0*	none	--	--
GRT11o	Newaukum trib (2001 location)	0*	*ND*	*ND*	1	0	0
GRT11	Newaukum trib (wq station B322)	*ND*	0.1	1.4	2	24.5	0.8
GRT25	Spring Creek	*ND*	0*	0*	none	--	--
GRT26	Newaukum Cr.@ SE 244th	*ND*	0*	0	1	0	0
44F	Newaukum trib, I322B	0.5	1.2	1.4*	2	18	0.8
GRT27	Newaukum Cr.@ SE 248th	*ND*	0*	*ND*	none	--	--
GRT29	Newaukum Cr.@ SE 416th & 278th	*ND*	0*	0	1	0	0
GRT12	Newaukum Cr, Lower Fork	0*	0*	0	3	0	0
GRT28	North Fork Newaukum @ 292nd	*ND*	1.0*	1.6	1	58	1.6
44H	Newaukum Cr, North Fork	*ND*	0*	0.4	1	1	0.4

Table 16 continues on next page.

Table 16 continued.

Black River							(18°C)
GRT02	Springbrook at Mouth	3.1*	4.2	4.8	3	101.7	4.0
GRT19	Black River Riparian Forest	*ND*	1.9*	1.0	1	49	1.0
03G	Springbrook @ O'Grady, A317	*ND*	0.3	0.4	2	18.3	0.2
GRT34	Panther Cr.(wq station A326)	*ND*	0.4*	1.3	1	33	1.3
GRT33	Springbrook Cr.@ SW 43rd	*ND*	0.5*	1.0	1	43	1.0
tm-21	Garrison Creek @ 218th	*ND*	0.6	*ND*	1	15	0.6
tm-20	Springbrook @ E. Valley	*ND*	0	0^^	1	0	0
tm-19	Springbrook @ 192nd	*ND*	0.3	0^^	1	2	0.3
tm-18	Garrison Creek @ 194th	*ND*	0.6	0^^	1	21	0.6
tm-17	Mill Creek @ Mouth	*ND*	1.4	0^^	1	57	1.4
tm-16	Mill Creek @ 204th	*ND*	1.7	*ND*	1	88.1	1.7
tm-12	Mill Creek @ Diversion	*ND*	2.0	0^^	1	86	2.0
tm-11	Mill Creek @ Sr. Cntr	*ND*	0.7	0^^	1	2	0.7
Mill Creek							**(18°C)**
GRT21	Mill Creek	*ND*	1.5*	1.9	1	91.8	1.9
GRT05	Mill Creek, near W. Main St	0*	0.8*	0.6	2	13	0.3
mf1	Mill Creek near Peasley Canyon	0	0.1	1.2	3	1.1	0.4
Lower Green River							**(18°C)**
GRT18	Green River @ Fort Dent Park	*ND*	1.3*	3.0*	none	--	--
tm-27	Johnson Cr. @ Green River	*ND*	0.5	0^^	1	4	0.5
GRT22	Green River @ Van Doran Landing	*ND*	1.2*	2.2	1	75	2.2
tm-25	Midway Cr. @ Green River	*ND*	0	0^^	1	0	0
tm-24	Mullen Slough @ SR 516	*ND*	0	0^^	1	0	0
GRT20	Green Rvr, DS of Mill Cr	*ND*	1.6*	2.0*	none	--	--
GRT35	Green Rvr @ North Grn Rvr Park	*ND*	0.8*	1.4	1	63	1.4
GRT03	Olsen Creek	0*	0	0	3	0	0
Duwamish River							**(21°C)**
GRT01	Duwamish River, South Park Marina	0*	0.5	1.1	3	6.2	0.5
HA5	Hamm Creek South Fork **(criterion is 18°C)**	0	0	0	3	1	0.3
GRT31	Duwamish River, North Wind Weir	*ND*	0.1*	0.9	1	24	0.9

"*" : Limited dataset during this year's warm season (June-September).

"^" : Incomplete dataset - For this Water Year, data collected only during September.

"^^" : Incomplete dataset - For this Water Year, data collected only during October.

"ND" : No data collected at this location for a given time period.

4.2.2 Exceedances of 2003 Criteria

Fifty-two of the 86 monitoring stations violated the 2003 temperature criterion applicable to the subbasin (Table 17). Of the 52 stations, 20 had exceedances that averaged less than 1°C, while 26 stations had exceedances of 1 to 3°C above the applicable criterion. The remaining six stations had the greatest exceedances listed below:

Station Id	Station Name	Criteria	Average °C above
tm-7	Meridian Valley Cr.@ 144th	17.5°C	5.6
TPU_479	North Fork Green River	16°C	4.3
CO1	Covington Cr.@ Lake Sawyer	17.5°C	4.0
GRT02	Springbrook Cr.@ mouth	17.5°C	3.9
GRT36	Green River @ Flaming Geyser	16°C	3.5
tm-2	Lake Meridian Outlet	17.5°C	3.0

Table 17. All Stations: Average Number of Degrees 2003 Temperature Criteria Exceeded by Station and Water Year. Normalized temperature data are the same as Tables 8-14. These data are presented to highlight the average number of days above the criterion.

Station Id	Station Name	Water Year			Normalized data		
		2001	2002	2003	# of seasons	Avg. Days	Avg. °C above std.
Upper Green River		**(16°C)**					
GRT17	Green River, below HHD	0*	0.0	1.2	3	18.0	0.4
TPU_480	Charley Creek	*ND*	0^	0	1	0	0
TPU_479	North Fork Green River	*ND*	0^	4.3*	none	--	--
TPU_475	Gale Creek	*ND*	0^	0*	none	--	--
TPU_483	Green River @ Bridge 71	*ND*	1.9^	4.8	2	124	4.8
TPU_478	Green River, US of McCain Cr	*ND*	*ND*	0.8*	none	--	--
TPU_484	Friday Creek	*ND*	0^	0*	none	--	--
Upper Green River		**(12°C)**					
TPU_482	Sunday Creek	*ND*	0.2^	1.5*	none	--	--
TPU_477	Upper Green River	*ND*	0^	2.9	1	88.9	2.9
Middle Green River—Upper		**(16°C)**					
GRT36	Green River @ Flaming Geyser	*ND*	*ND*	3.5	1	96	3.5
GR5	Green River #5	1.0*	0^^	*ND*	1	90.7	1.0
GRT13	Icy Creek	0*	0	0	3	0	0

Table 17 continues on next page.

Table 17 continued.

GRT14	Green River, near Coal Downstream	*ND*	1.0*	1.6*	1	39.6	1.0
GRT16	Green River @ Palmer Ponds	0.9*	1.3	2.4	3	82.7	1.5
GRT23	Palmer Ponds Spring	*ND*	0*	0	1	0	0
GR7	Green River #7	0.5*	0.8*	*ND*	2	80.4	0.6
TPU_481	Bear Creek	*ND*	0^	0.0	1	0	0
Middle Green River—Lower				**(17.5°C)**			
GRT04	Green River @ Porter Levee	1.1*	0.8	2.1	3	51	1.4
GRT06	Burns Creek	0*	0	0	3	0	0
GRT07	O'Grady Creek	0*	0	0	3	0	0
40D	Crisp Creek @ Green River Rd	0	0	0	3	0	0
GRT10	Green River @ Whitney Bridge	1.4*	1.3	2.8*	1	43	1.3
Soos Creek				**(17.5°C)**			
54A	Soos Creek @ Mouth	0.3	0.3	0.9	3	15.3	0.5
ST1	Soosette Creek	0	0^^	*ND*	1	0	0
54H	Soosette Creek Above SR 18	0	0	0	3	0	0
tm-10	Soosette @ 288th	*ND*	0	0^^	1	0	0
54C	Soos Cr., Y320	2.0	2.5*	1.4*	1	49.1	2.0
BS3	Big Soos #3	0	0	*ND*	2	0	0
tm-2	Lk. Meridian Outlet	*ND*	3.0*	*ND*	none	--	--
54I	Little Soos Cr @ 164th Ave SE	1.5	1.8	2.1	3	88.5	1.8
LS2	Little Soos #2	1.5	2.4	*ND*	2	112.1	1.9
BS2	Big Soos #2	0	0	*ND*	2	0	0
tm-1.5	Big Soos @ Kent-Kangley	*ND*	0	0^^	1	0	0
tm-1	Big Soos @ 256th	*ND*	0.1	0^^	1	6	0.1
tm-7	Meridian Val. Cr. @ 144	*ND*	5.6	0^^	1	112	5.6
tm-8	Meridian Val. @ Irr. Pond	*ND*	1.6	0^^	1	80	1.6
tm-9	Meridian Val. @ 240th	*ND*	0.5	0^^	1	22	0.5
BS1.5	Big Soos #1.5	0	0	*ND*	2	0	0
BS1	Big Soos #1	0.1	0.3	*ND*	2	13	0.2
Covington Creek				**(17.5°C)**			
09A	Covington Creek near Mouth	0	0	0	3	0.0	0
CT1	Covington trib	1.7	1.2	*ND*	2	46.0	1.4
CO2	Covington #2	0.6	0.3	*ND*	2	8.2	0.4
CO1	Covington #1	4.2	3.8	*ND*	2	137.1	4.0
Jenkins Creek				**(17.5°C)**			
26A	Jenkins Creek near Mouth	0	0	0.3	3	4.7	0.1
JE1	Jenkins #1	0	0^^	*ND*	1	0.0	0
JE2	Jenkins #2	0	0	*ND*	2	0.0	0
Newaukum Creek				**(17.5°C)**			
GRT09	Newaukum Creek @ 212th Ave SE	0*	0.1	0.7	3	6.7	0.3

44G	Newaukum trib, D322	0*	0	0	2	0	0
GRT24	Newaukum Cr.@ SE 416th	*ND*	0*	0*	none	--	--
GRT11o	Newaukum trib (2001 location)	0*	*ND*	*ND*	1	0	0
GRT11	Newaukum trib (wq station B322)	*ND*	0*	1.7	2	25.5	0.8
GRT25	Spring Creek	*ND*	0*	0*	none	--	--
GRT26	Newaukum Cr.@ SE 244th	*ND*	0*	0	1	0	0
44F	Newaukum trib, I322B	0.3	0.8	1.3*	2	16.4	0.5
GRT27	Newaukum Cr.@ SE 248th	*ND*	0*	*ND*	none	--	--
GRT29	Newaukum Cr.@ SE 416th & 278th	*ND*	0*	0	1	0	0
GRT12	Newaukum Cr, Lower Fork	0*	0	0	3	0	0
GRT28	North Fork Newaukum @ 292nd	*ND*	0.7*	1.6	1	67	1.6
44H	Newaukum Cr, North Fork	*ND*	0*	0	1	0	0
Black River				**(17.5°C)**			
GRT02	Springbrook at Mouth	3.0*	4.1	4.7	3	113.7	3.9
GRT19	Black River Riparian Forest	*ND*	2.0*	1.1	1	65	1.1
03G	Springbrook @ O'Grady, A317	*ND*	0.2	0.3	2	34.7	0.2
GRT34	Panther Cr.(wq station A326)	*ND*	0.1*	0.9	1	57	0.9
GRT33	Springbrook Cr.@ SW 43rd	*ND*	0.5*	1.0	1	62	1.0
tm-21	Garrison Creek @ 218th	*ND*	0.3	*ND*	1	26.3	0.3
tm-20	Springbrook @ E. Valley	*ND*	0	0^^	1	0	0
tm-19	Springbrook @ 192nd	*ND*	0.2	0^^	1	4	0.2
tm-18	Garrison Creek @ 194th	*ND*	0.6	0^^	1	31	0.6
tm-17	Mill Creek @ Mouth	*ND*	1.2	0^^	1	82	1.2
tm-16	Mill Creek @ 204th	*ND*	1.6	*ND*	1	114.9	1.6
tm-12	Mill Creek @ Diversion	*ND*	2.0	0^^	1	102	2.0
tm-11	Mill Creek @ Sr. Ctr.	*ND*	0	0^^	1	0	0
Mill Creek				**(17.5°C)**			
GRT21	Mill Creek	*ND*	1.4*	1.8	1	118.6	1.8
GRT05	Mill Creek, near W. Main St	0*	0.8*	0.6	2	18	0.3
mf1	Mill Creek near Peasley Canyon	0	0	0	3	0	0
Lower Green River				**(17.5°C)**			
GRT18	Green River @ Fort Dent Park	*ND*	1.2*	3.3*	none	--	--
tm-27	Johnson Cr. @ Green River	*ND*	0.1	0^^	1	1	0.1
GRT22	Green River @ Van Doran Landing	*ND*	1.0*	2.6	1	76	2.6
tm-25	Midway Cr. @ Green River	*ND*	0	0^^	1	0	0
tm-24	Mullen Slough @ SR 516	*ND*	0	0^^	1	0	0
GRT20	Green Rvr, DS of Mill Cr.	*ND*	1.5*	2.5*	none	--	--
GRT35	Green Rvr @ North Grn R. Park	*ND*	0.7*	1.6	1	74	1.6
GRT03	Olsen Creek	0*	0	0	3	0	0

Table 17 continues on next page.

Table 17 continued.

Duwamish River				**(17.5°C)**			
GRT01	Duwamish River, South Park Marina	1.1*	1.1	2.5	3	67.5	1.6
HA5	Hamm Creek South Fork	0	0	0	3	0	0
GRT31	Duwamish River, North Wind Weir	*ND*	1.3*	2.7	1	81	2.7

"*" : Limited dataset during this year's warm season (June-September).

"^" : Incomplete dataset - For this Water Year, data collected only during September.

"^^" : Incomplete dataset - For this Water Year, data collected only during October.

"ND" : No data collected at this location for a given time period.

4.2.3 Potential Impacts to Salmonid Migration

The four temperature categories (Ecology, 2002) listed below are the basis for assessing the potential impacts to salmonid migration. The average value of the temperature exceedances based on the 7-DADMax for each station and water year are highlighted based on the severity of the exceedance using:

- Potential lethality >23°C
- Potential for blockage 21°C to 23°C
- Potential for impairment 18°C to 21°C
- Presumably no impairment <18°C

4.2.3.1 Potential Lethality

Using these four categories, only one station demonstrated the most concern for adverse effects related to elevated temperatures. Station tm-7, on Meridian Valley Creek within the Soos Creek Basin, had the highest temperature exceedance with an average exceedance temperature of 23.1°C, which has potential for lethality. This site was monitored by the City of Kent from April 3, 2002 to September 10, 2002 so only 2002 data were available for analysis.. During this time period, the 7-DADMax value exceeded the criterion of 17.5°C on 129 days. The range of exceedances was from 0.1 to 13.7°C, with an average of 5.6°C. Having a large range of exceedance temperatures typically indicates a site may be recording out of water or an isolated pool condition. Continued monitoring of this location would be useful to see if the water temperatures are consistently elevated and allow the investigation of whether out of water (low flow or human interference) conditions exist at the site.

4.2.3.2 Potential for Blockage

Two sites have average exceedance temperatures between 21°C to 23°C and thus, are in the category of potential for blockage. The sites are CO1 - Covington Creek #1 with a 7-DADMax value of 21.5°C and GRT02 - Springbrook Creek, near mouth, with a 7-DADMax value of 21.4°C.

Site CO1, Covington Creek #1, was monitored by the University of Washington for two water years, Water Year 2001--July 1, 2001 to September 10, 2001, and Water Year 2002--March 27, 2002 to September 12, 2002. During this time period, the 7-DADMax value exceeded the criterion of 17.5°C for 66 days in Water Year 2001 and 99 days in Water Year 2002. The range of exceedances was from 0.1°C to 7.9°C, with an average of 4.0°C. This site is located near the outlet of Lake Sawyer. These elevated temperature measurements are a reflection of warmer surface water temperatures associated with discharge from the lake outlet. Covington Creek near the mouth and downstream of CO1 (site 09A) did not have any temperature exceedances.

Site GRT02, Springbrook Creek near mouth, was monitored by King County for all three water years: Water Year 2001--July 27 to September 30, 2001; Water Year 2002--October 1, 2001 to September 30, 2002; and Water Year 2003--October 1, 2002 to September 30, 2003. During this time period, the 7-DADMax values exceeded the criterion of 17.5°C on 47 days in Water Year 2001, 124 days in Water Year 2002, and 108 days in Water Year 2003. This location is tidally influenced and has periods of out of water conditions during extreme tidal cycles. In addition, there were problems at this site with the thermistor being moved to a shallower location in the stream channel.

4.2.3.3 Potential for Impairment

Twenty-nine sites had average exceedance temperatures between 18 to 21°C, the threshold of potential for impairment. The following is a list of these sites in decreasing order of average temperature.

Site ID/ Name	Avg. degrees above criteria (°C)	Avg. temperature (°C)
tm-2 - Lake Meridian Outfall	3.0	20.5
TPU_479 - North Fork Green River	4.3	20.3
GRT31 - Duwamish River @ North Wind Weir	2.7	20.2
GRT22 - Green River @ Van Dorans Park	2.6	20.1
GRT18 - Green River @ Fort Dent	2.2	19.7
GRT36 - Green River @ Flaming Geyser	3.5	19.5
54C - Soos Creek, Y320	2.0	19.5
GRT20 - Green River, DS of Mill Cr	2.0	19.5

tm-12 - Mill Creek @ diversion	2.0	19.5
LS2 - Little Soos Creek #2	1.9	19.4
54I - Little Soos Cr.@ 164th Ave SE	1.8	19.3
GRT21 - Mill Creek, near mouth	1.8	19.3
GRT28 - Newaukum Cr, North Fork	1.6	19.1
GRT35 - Green River @ North Grn Rvr Park	1.6	19.1
tm-8 - Meridian Valley Cr.@ Irr. Pond	1.6	19.1
tm-16 - Mill Creek @ 204th	1.6	19.1
CT1 - Covington Creek trib	1.4	18.9
GRT10 - Green River @ Whitney Bridge	1.3	18.8
GRT01 - Duwamish River @ South Park	1.2	18.7
TPU_483 - Green River @ Bridge 71	4.8	18.7
tm-21 - Garrison Creek @ 218th	1.2	18.7
GRT19 - Black River Riparian Forest	1.1	18.6
GRT04 - Green River @ Porter Levee	1.0	18.5
GRT33 - Springbrook Cr.@ SW 43rd	1.0	18.5
GRT34 - Panther Creek	0.9	18.4
GRT11 - Newaukum Creek trib	0.8	18.3
tm-18 - Garrison Creek @ 194th	0.6	18.1
44F - Newaukum Cr. trib	0.5	18.0
tm-9 - Meridian Valley Cr.@ 240th	0.5	18.0

4.2.3.4 No Impairment

Fifty-two sites had average temperature or exceedance temperatures <18°C, with presumably no impairment for salmonid migration. As stated previously, 32 of these sites had no exceedances of the applicable 2003 temperature criteria.

4.2.4 Subbasin Exceedance Summary

The data from each subbasin are summarized in Table 18 for both the 1997 and 2003 criteria. All subbasins monitored had at least one site that exceeded the applicable temperature criterion (1997 and/or 2003). The mainstem of the Green-Duwamish River is comprised of 17 monitoring stations. All mainstem sites had exceedances of the 1997 and 2003 temperature criteria appropriate for each location (Table 18).

4.2.4.1 Upper Green River

The Upper Green River subbasin had nine monitoring stations. The temperature criterion (1997 and 2003) for this subbasin is 16°C except for those locations that have a usage based on the presence of Char. These sites have a 2003 criterion of 12°C. Five of nine (56 percent) had exceedances of the 1997 criterion while four of seven (57 percent) had exceedances of the 2003 criterion (Table 18). Both stations (100 percent) that have the lower criterion of 12°C exceeded this threshold.

The station (TPU_479 - North Fork Green River) with the highest average temperature (6.8°C) above the 1997 criterion is in the Upper Green subbasin. This location has a limited data set from September 20, 2002 to June 19, 2003. A possible reason for these elevated temperatures could be out of water recordings; however, the actual reason for these highly elevated temperatures is unknown at this time.

4.2.4.2 Middle Green River

The Middle Green River subbasin has 13 monitoring stations. This subbasin was separated into an upper and lower section for each criterion. The upper section for the 1997 criterion had nine stations with a criterion of 16°C. Seven of these sites (78 percent) have temperatures exceeding 16°C (Table 18). The lower section of the Middle Green subbasin had four stations with a criterion of 18°C. Only one of these sites (25 percent) had temperatures greater than the criterion (Table 18).

The upper section of the Middle Green subbasin has eight stations with a 2003 criterion of 16°C. Five of these sites (63 percent) have temperatures exceeding 16°C (Table 18). The lower section of the Middle Green subbasin had five stations with a 2003 criterion of 17.5°C. Two of these sites (40 percent) had temperatures greater than this criterion (Table 18).

4.2.4.3 Soos Creek

The Soos Creek subbasin had 17 stations, the most stations of any subbasin. The 1997 criterion for this area is 18°C. Eleven of 17 stations (65 percent) had exceedances to this criterion while 10 stations (59 percent) had exceedances to the 2003 criterion (Table 18). The 2003 criterion for the Soos Creek subbasin is 17.5°C. Station tm-7, on Meridian Valley Creek, had the highest temperature exceedance for the 2003 criterion with an average exceedance temperature of 5.6°C.

4.2.4.4 Covington Creek

The Covington Creek subbasin had four monitoring stations. The same three of the four sites (75 percent) exceeded the 1997 criterion of 18°C and the 2003 criterion of 17.5°C (Table 18).

4.2.4.5 Jenkins Creek

The Jenkins Creek subbasin had three monitoring stations. Only one of the three (33 percent) exceeded the applicable temperature criteria. The same site exceeded both the 1997 criterion of 18°C and the 2003 criterion of 17.5°C (Table 18).

4.2.4.6 Newaukum Creek

The Newaukum Creek subbasin had 12 monitoring stations. The 1997 criterion for this area is 18°C. Five of 12 stations (42 percent) had exceedances of this criterion while four stations (31 percent) had exceedances to the 2003 criterion (Table 18). The 2003 criterion for the Newaukum Creek subbasin is 17.5°C. Newaukum Creek had the most stations (seven) that did not have any exceedances to either temperature criterion.

4.2.4.7 Lower Green River

The Lower Green River subbasin had eight monitoring stations. Five of the eight sites exceeded both temperature criteria (Table 18). The 1997 criterion for Lower Green River is 18°C and the 2003 criterion for this area is 17.5°C.

4.2.4.8 Mill Creek

The Mill Creek subbasin had three monitoring stations. All three locations (100 percent) exceeded the 1997 criterion of 18°C while two of the three (67 percent) exceeded the 2003 criterion of 17.5°C (Table 18).

4.2.4.9 Black River

The Black River subbasin had 12 monitoring stations. The 1997 criterion for this area is 18°C. Eleven of 12 stations (92 percent) had exceedances to this criterion while 10 stations (83 percent) had exceedances to the 2003 criterion (Table 18). The 2003 criterion for the Black River subbasin is 17.5°C.

4.2.4.10 Duwamish River

The Duwamish River subbasin had three monitoring stations. Two of these sites are Class B water with a 1997 criterion of 21°C. Both sites (100 percent) exceeded the 1997 criterion as well as the 2003 criterion of 17.5°C (Table 18). The third location has a 1997 criterion of 18°C. This location exceeded the 1997 criterion, but did not exceed the 2003 criterion of 17.5°C (due to differences in comparing 1-DMax (1997) verses 7-DADMax (2003) values with the respective criterion).

Overall a similar number of exceedances by subbasin were observed for both the 1997 and 2003 criteria (Table 18). The relative differences in observed exceedances by location are primarily due to the different metrics used for each criterion (1-DMax [1997 criteria] and 7-DADMax [2003 criteria]) and the different criterion values applicable to each subbasin.

Table 18. Subbasin Summary of Temperature Exceedances for 1997 and 2003 Criterion.

Subwatershed	Subbasin	No. of sites	1997 Criterion (°C)	Total no. of sites above std	Percent of sites above std.	Range above criterion	No. of sites	2003 Criterion (°C)	Total no. of sites above std.	percent of sites above std	Range above criterion
Upper Green	Upper Green	9	16	5	56	0.2 - 6.8	2	12	2	100	0.1 - 2.9
							7	16	4	57	0.1 - 4.3
Middle Green	Upper Middle Green	9	16	7	78	0.2 - 3.5	8	16	5	63	0.5 - 3.5
	Lower Middle Green	4	18	1	25	0.9 - 3.4	5	17.5	2	40	0.9 - 2.8
	Soos Creek	17	18	11	65	0.2 - 5.7	17	17.5	10	59	0.1 - 5.6
	Covington Creek	4	18	3	75	0.5 - 3.7	4	17.5	3	75	0.3 - 4.2
	Jenkins Creek	3	18	1	33	0.5	3	17.5	1	33	0.1
	Newaukum Creek	12	18	5	42	0.1-1.4	12	17.5	4	33	0.1 - 1.7
Lower Green/ Duwamish	Black River	12	18	11	92	0.3 - 4.8	12	17.5	10	83	0.1 - 4.7
	Lower Green	8	18	5	67	0.5 - 3.0	8	17.5	5	67	0.1 - 3.3
	Mill Creek	3	18	3	100	0.1 - 1.9	3	17.5	2	67	0.6 - 1.8
	Duwamish	3	21	3	100	0.1 - 1.1	3	17.5	2	67	1.1 - 2.7
Mainstem Only		17	16-21	17	100	0.1 - 3.5	17	12-17.5	17	100	0.1 - 3.5

4.2.5 All Station Summary

Eighty-six sites were monitored for surface water temperature within the Green-Duwamish Watershed during the time period of this report (July 2001 to September 2003). During this time period, the total number of sites varied by Water Year; each station's data record is summarized in Table 6. Water Year 2001 included the fewest sites at 39, yet had sufficient data to normalize 36 stations (92 percent normalized). Water Year 2002 included the greatest number of stations with 81 and 53 (65 percent) of these sites having sufficient data during the warm season to normalize. Water Year 2003 included 78 stations with only 40 sites (51 percent) normalized (Table 19).

Table 19. Total number of Stations per Water Year.

	Water Year 2001	Water Year 2002	Water Year 2003
Total number of stations[1]	39	81	78
Number of stations normalized[2]	36	53	40

"1" = A station was counted if data were recorded for one or more days per water year.

"2" = A station was normalized if data met the threshold of 70 percent during the warm season; see Section 2.6 for further details

The minimum, maximum, and average total days temperature criteria were exceeded and the minimum, maximum, and average temperature exceedances for all stations are summarized in Table 20 and Table 21. The maximum number of days the temperature criteria was exceeded ranged from 84 to 130 days depending on the criteria and water year (Table 20). The maximum number of degrees the temperature criteria was exceeded ranged from 3.7°C to 6.8°C depending on the criteria and water year. Average temperature exceedances ranges from 1.1°C to 1.8°C (Table 21).

Table 20. Summary for All Stations[a] of Minimum, Maximum, and Average Total Days Temperature was Exceeded for 1997 and 2003 Criterion.

	Total Days Criteria Exceeded					
	1997 Criteria (18°C)			2003 Criteria (17.5°C)		
	2001	2002	2003	2001	2002	2003
Minimum	0	0	0	0	0	0
Maximum	84	122	100	85	130	108
Average	16.6	20.1	19.1	12.9	22.1	20.2

"a" = Only a subset of the total number of stations monitored that had a criterion of 18°C and 17.5°C

Table 21. Summary for All Stations[a] of Minimum, Maximum, and Average Temperature Exceedances for 1997 and 2003 Criterion.

	Average Degrees Criteria Exceeded					
	1997 Criteria (18°C)			2003 Criteria (17.5°C)		
	2001	2002	2003	2001	2002	2003
Minimum	0.0	0.0	0.2	0.0	0.1	0.1
Maximum	3.7	5.7	6.8	4.2	5.6	4.7
Average	1.2	1.3	1.8	1.1	1.3	1.7

"a" = Only a subset of the total number of stations monitored that had a criterion of 18°C and 17.5°C

5.0 SUMMARY

The temperature exceedances observed for the Green-Duwamish Watershed are low level for most locations with 37 of the 86 monitoring locations posing some level of risk to salmonid migration. Of the 37 locations, only three have some level of risk of blockage of migration or lethality to salmonids. Of the remaining 48 locations monitored, no current temperature related risk to salmonid migration was indicated based on monitoring results.

The elevated summer surface water temperatures observed at many of the monitoring locations are reflective of the surrounding land use and alteration of the river, creek, and/or associated riparian area. Development of the surrounding watershed area from the historical forested conditions to a variety of rural, agricultural, residential, and urban uses has resulted in the loss of groundwater recharge to the river and creeks. Historically, groundwater recharge would have augmented summer low flow conditions, keeping summer surface water temperatures cooler than what is currently observed.

Alteration of the riparian area, including channelization and/or armoring of river and stream banks, has resulted in the loss of vegetation that would have historically contributed to shading and cooling of surface waters during peak summer air temperatures. Native revegetation of river and stream banks would certainly provide local benefits to reduce stream temperatures and provide higher quality habitat for salmonid and other aquatic life uses. In time, native revegetation would increase potential large woody debris recruitment and likely increase pool quantity and quality. Pools, especially those with thermal refuge, are important habitats for migrating salmon.

If adult migration is the main life history stage affected by current temperature exceedances, then areas where mainstem exceedances occur should be emphasized because fish must pass through the mainstem to reach tributaries. Exceedances during adult migration may also indicate inadequate early fall cooling required to support adequate spawning, incubation, and rearing temperatures. Coho subyearlings that remain in freshwater throughout the summer after emergence are another key life stage affected by temperature exceedances. Elevated temperatures in tributaries and mainstem segments that limit coho migration and rearing during the summer should also be prioritized for action.

Efforts to reduce surface water temperatures should be focused on areas most likely to benefit ESA listed fish species (Puget Sound ESU Chinook salmon). Areas specifically used by Chinook for migration may be of particular importance. Any sites with exceedances that overlap with Chinook distribution should be targeted for temperature reduction measures. Site-specific recommendations will require more fieldwork to assess local conditions and the potential for protection or acquisition of riparian areas, revegetation, restoration, and local management of water diversions or withdrawals.

With the exception of char, temperature reduction measures that are protective of Chinook temperature requirements should also be essentially protective of other salmonid species of concern. Protection of char species will require additional temperature reduction measures for locations where current surface water conditions do not meet surface water criteria for temperature.

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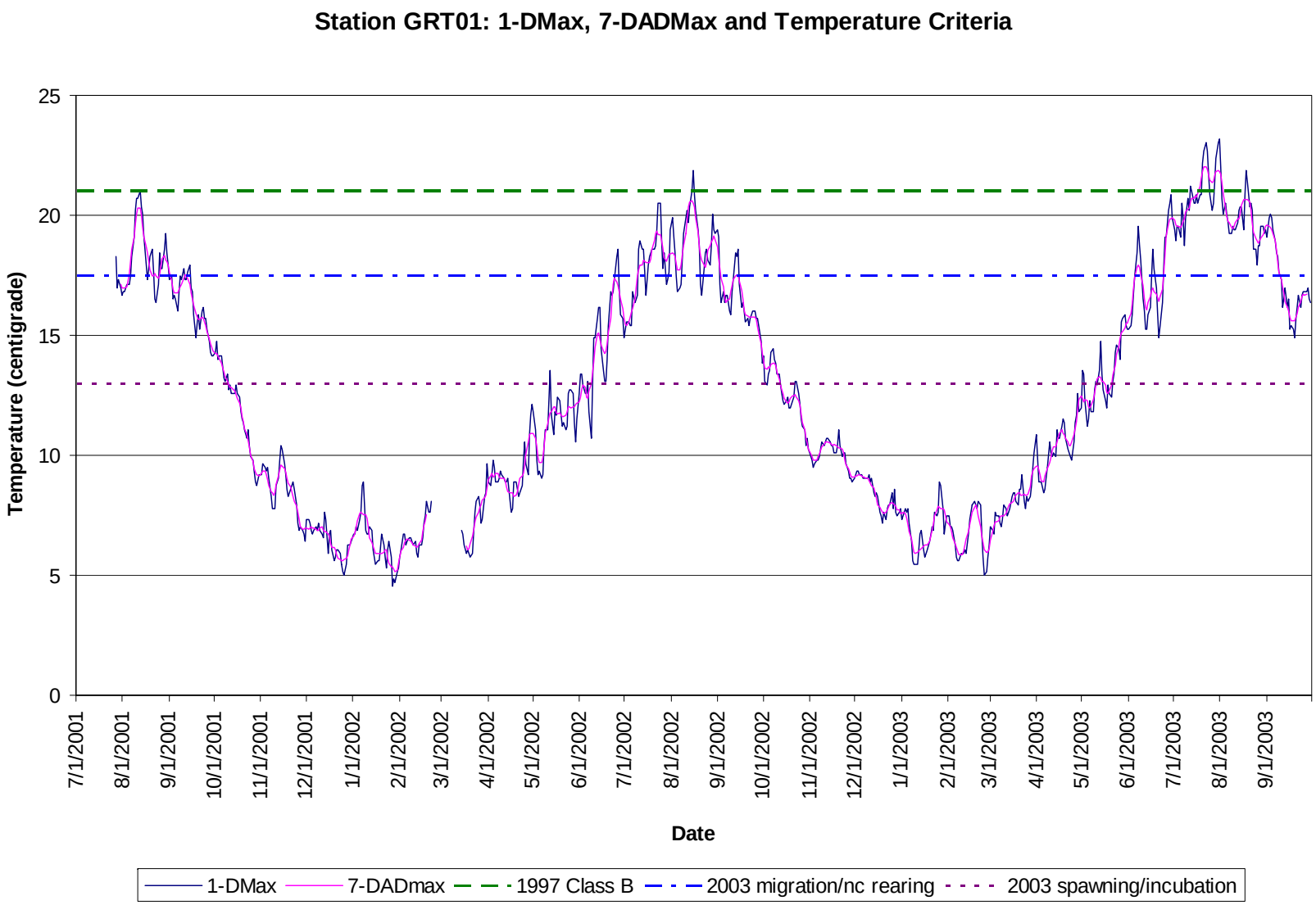
APPENDIX A: 1-DMAX AND 7-DADMAX TEMPERATURES GRAPHS

APPENDIX B: TEMPERATURE SUMMARY INFORMATION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15
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5
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8/1/2001
9/1/2001
10/1/2001
11/1/2001
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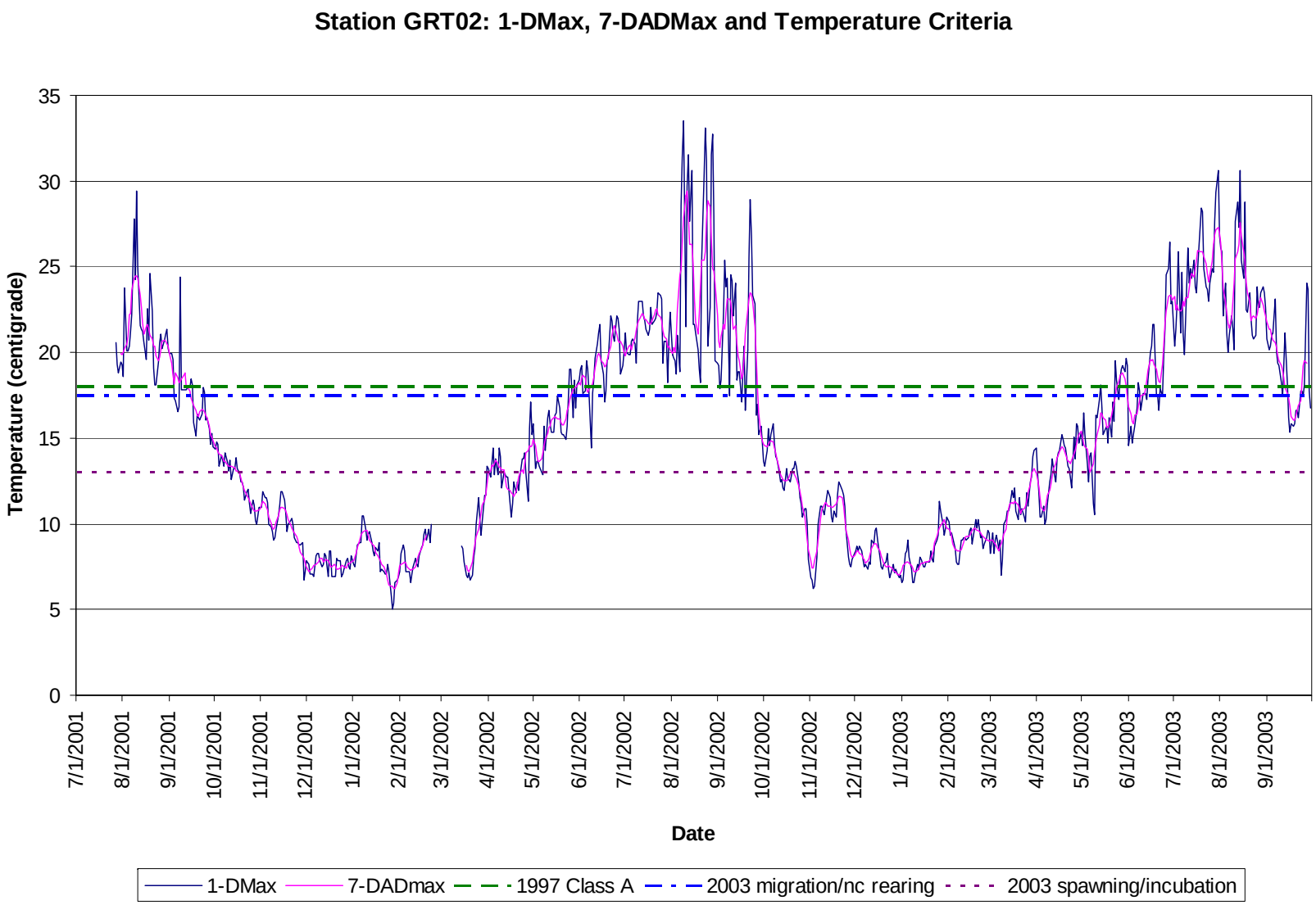
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class B
2003 migration/nc rearing
2003 spawning/incubation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30
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20
15
10
5
0
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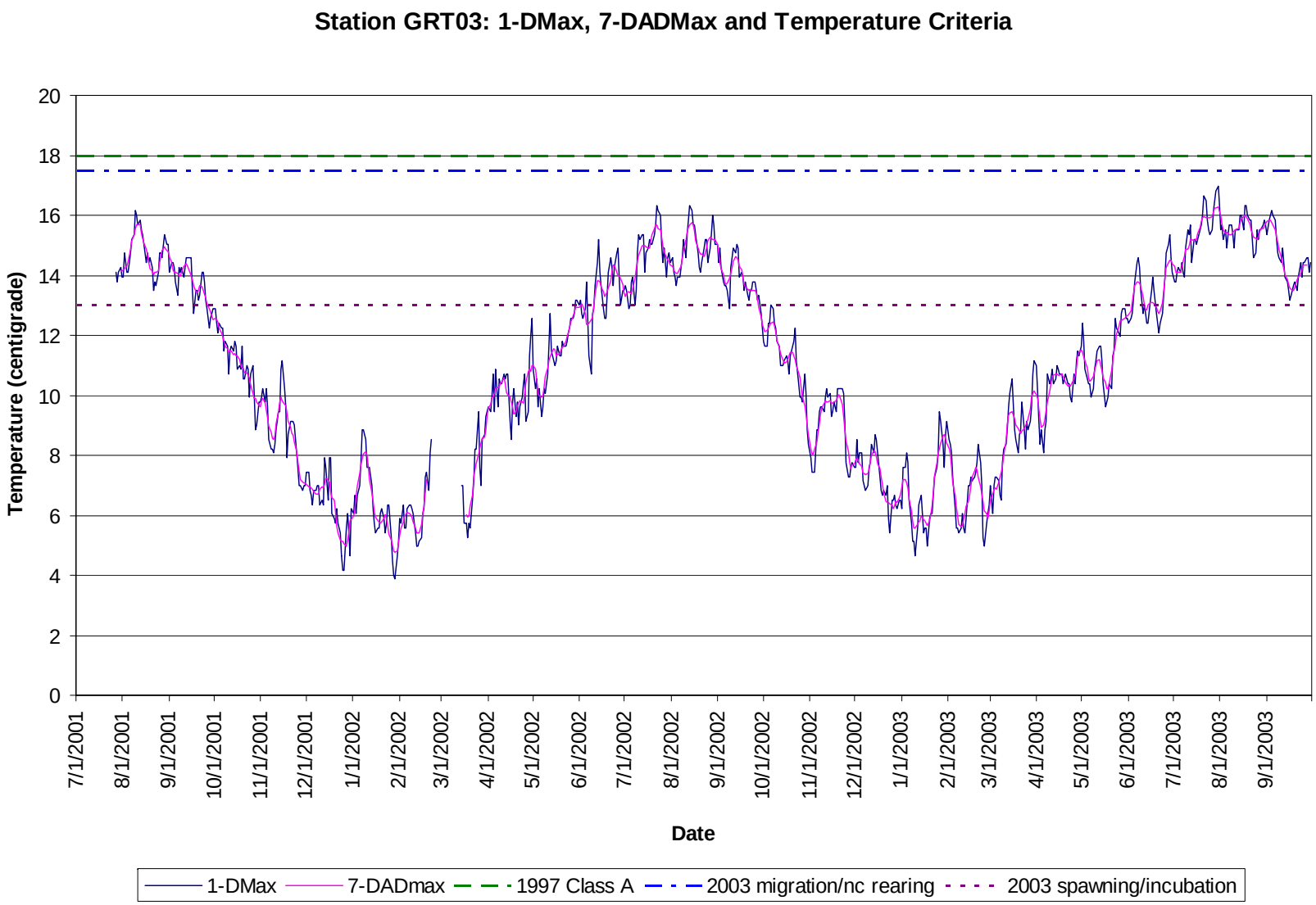
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation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Temperature (centigrade)
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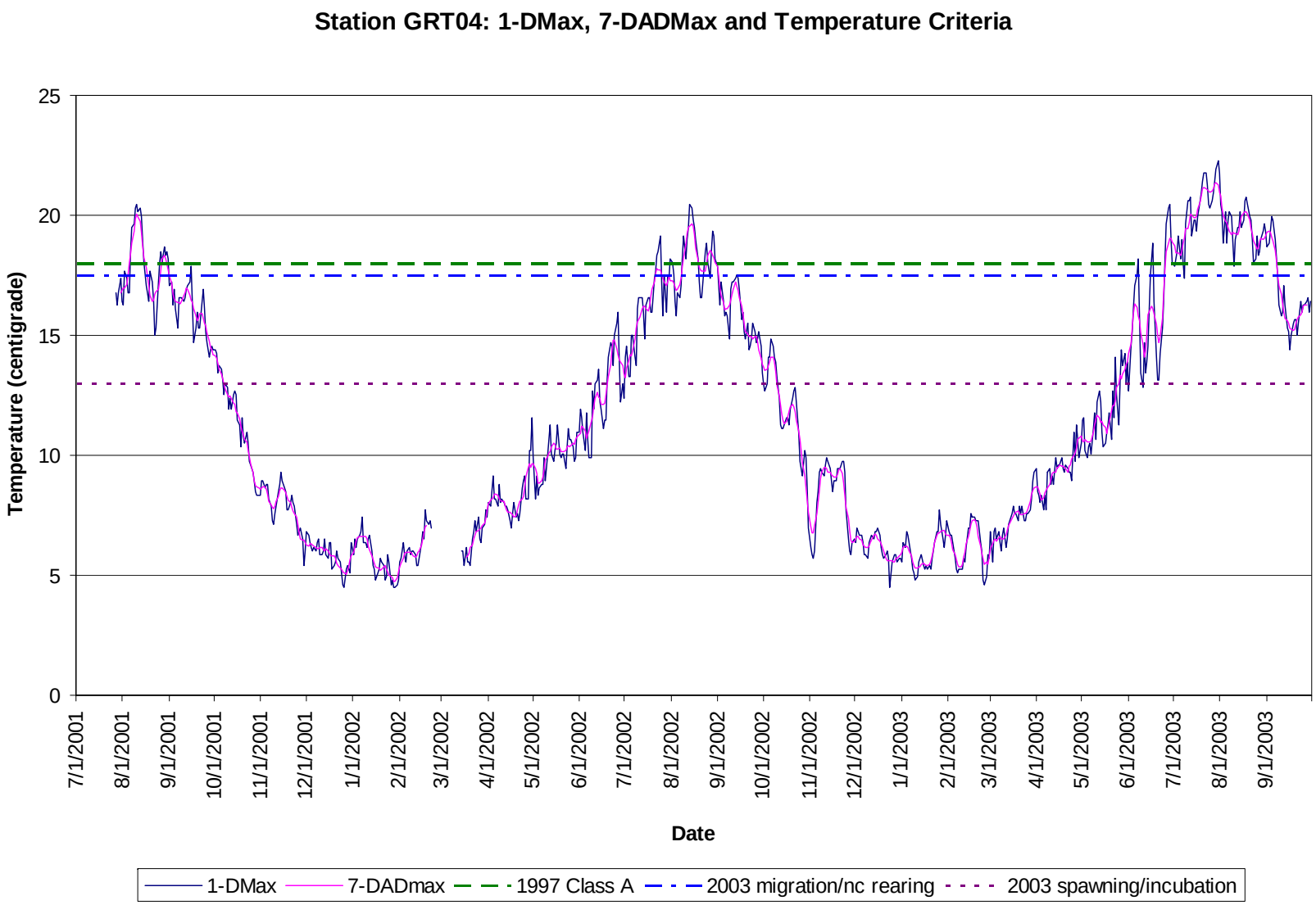
18
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation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Temperature (centigrade)
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15
10
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0
7/1/2001
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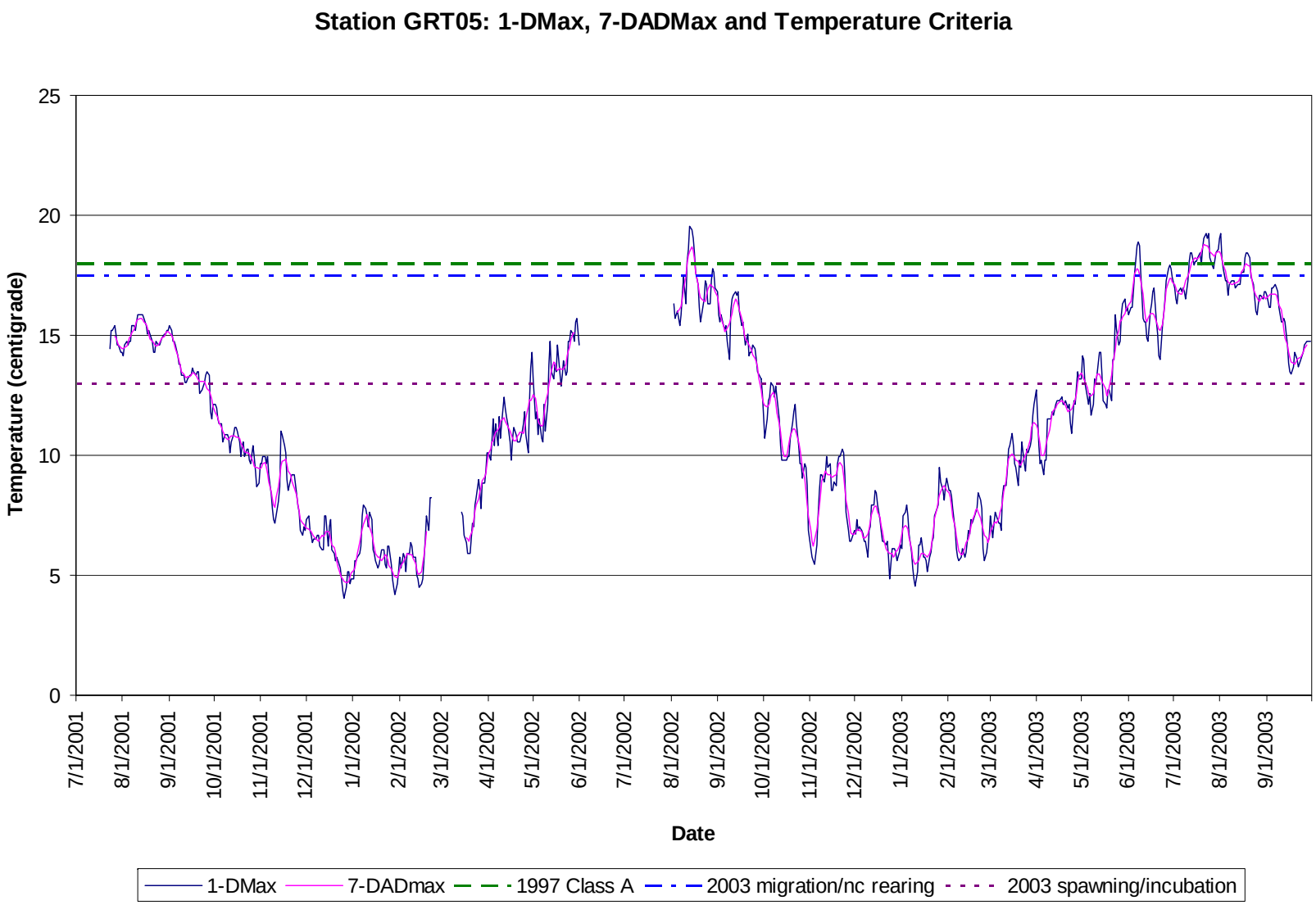
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation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Temperature (centigrade)
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15
10
5
0
7/1/2001
8/1/2001
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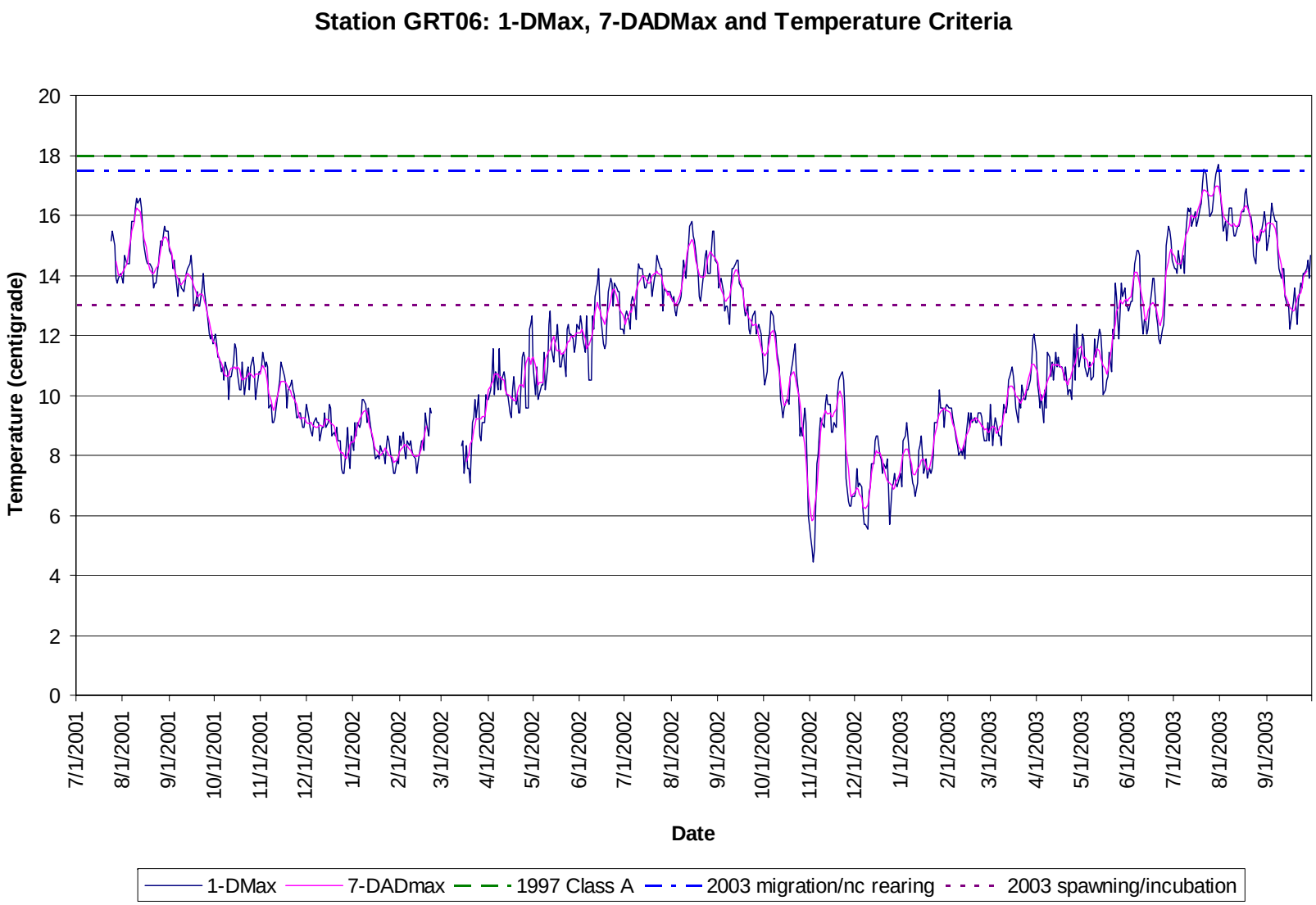
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation


Station GRT06: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
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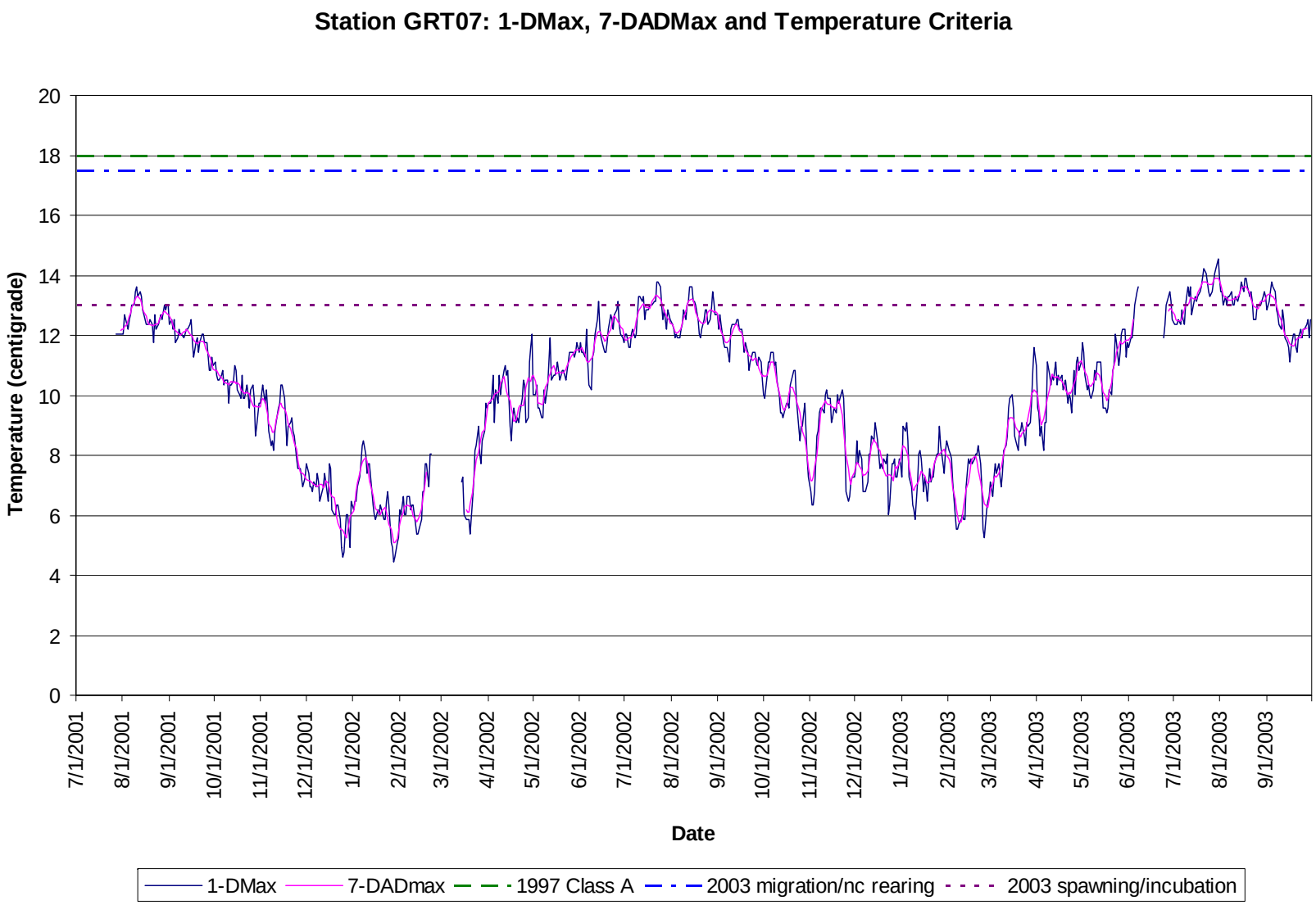
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation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Temperature (centigrade)
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18
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
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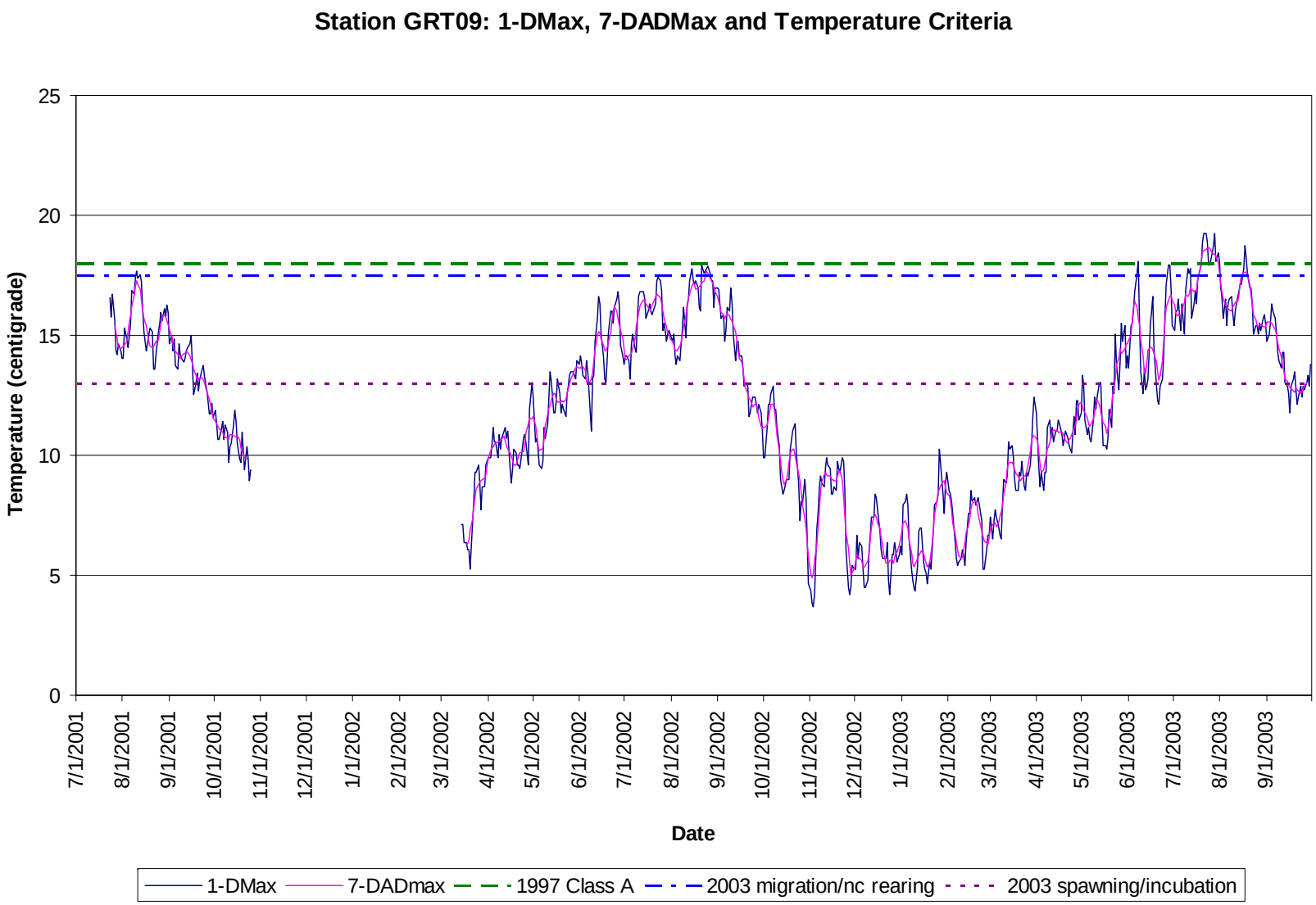
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation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Temperature (centigrade)
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15
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5
0
7/1/2001
8/1/2001
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2/1/2002
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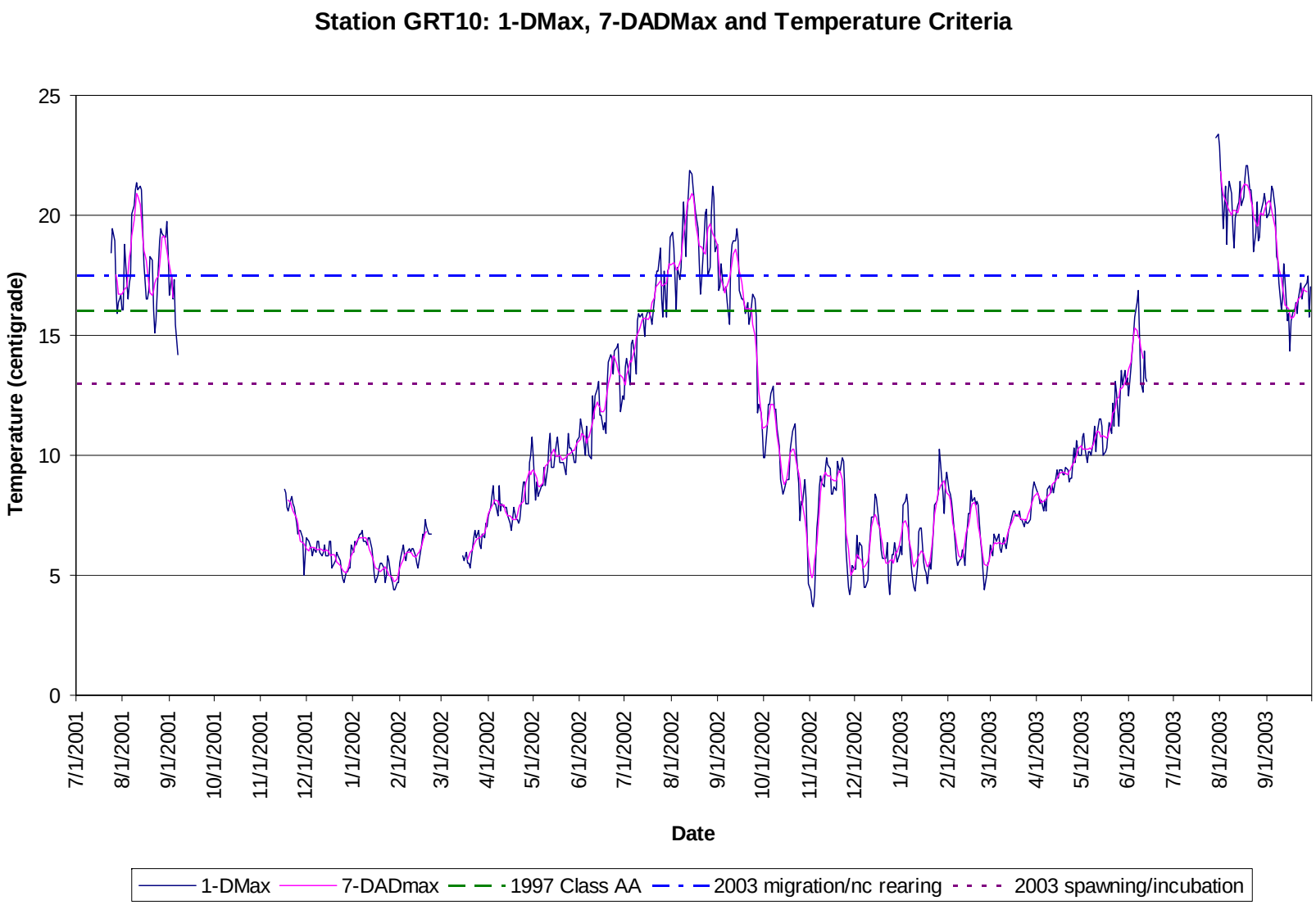
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation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Temperature (centigrade)
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10
5
0
7/1/2001
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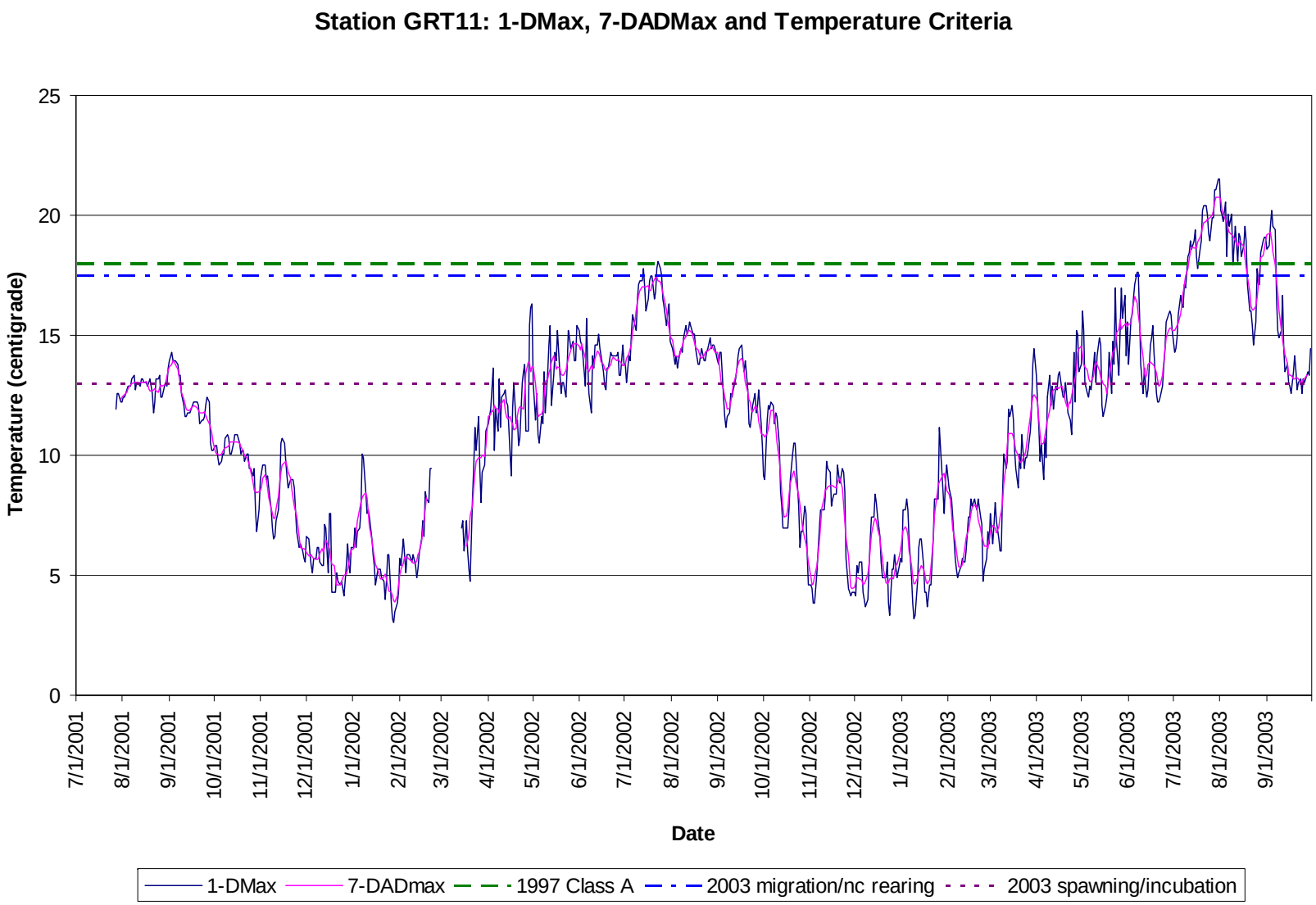
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation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Temperature (centigrade)
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10
5
0
7/1/2001
8/1/2001
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12/1/2002
1/1/2003
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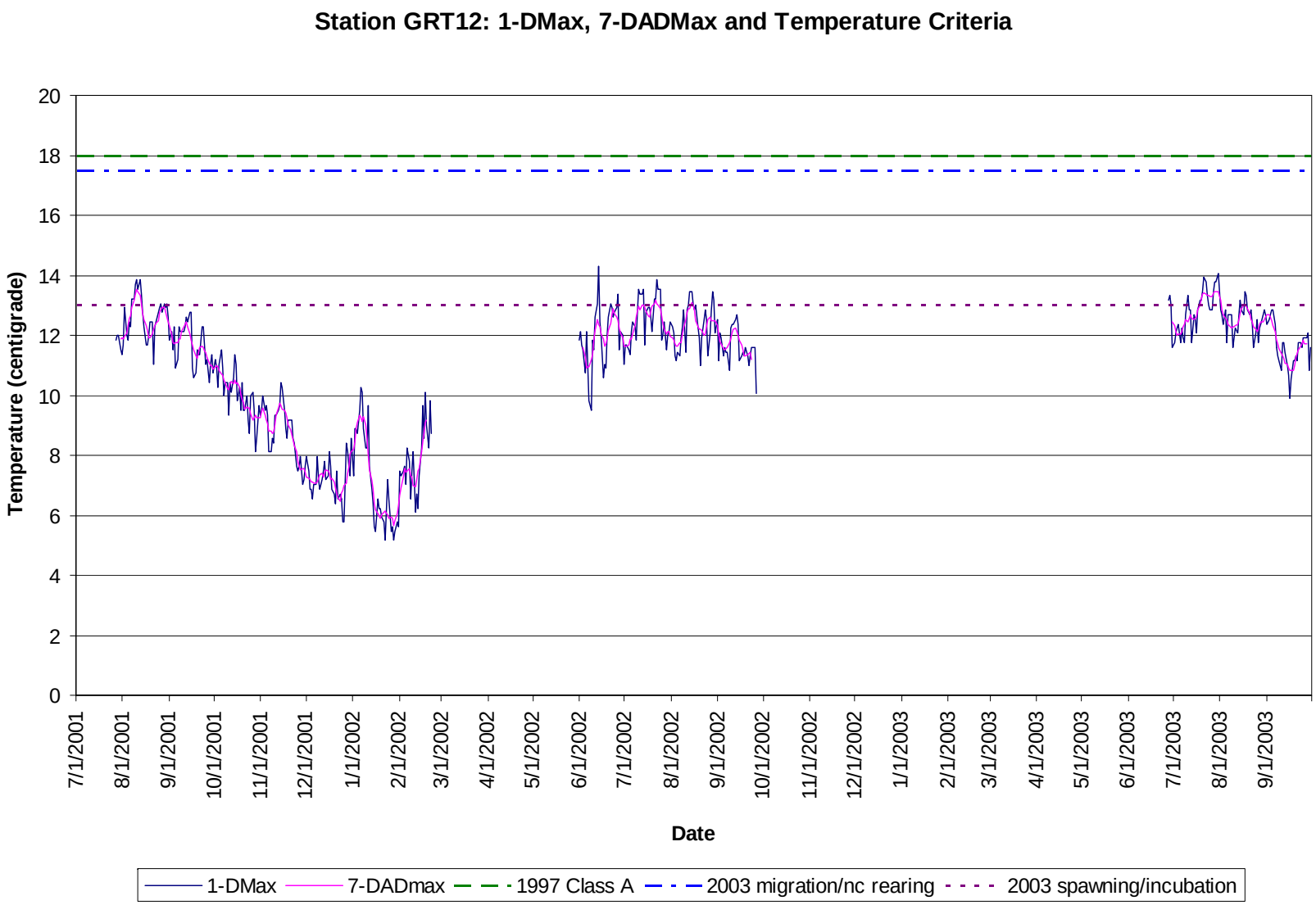
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation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Temperature (centigrade)
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16
14
12
10
8
6
4
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10/1/2001
11/1/2001
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4/1/2002
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9/1/2002
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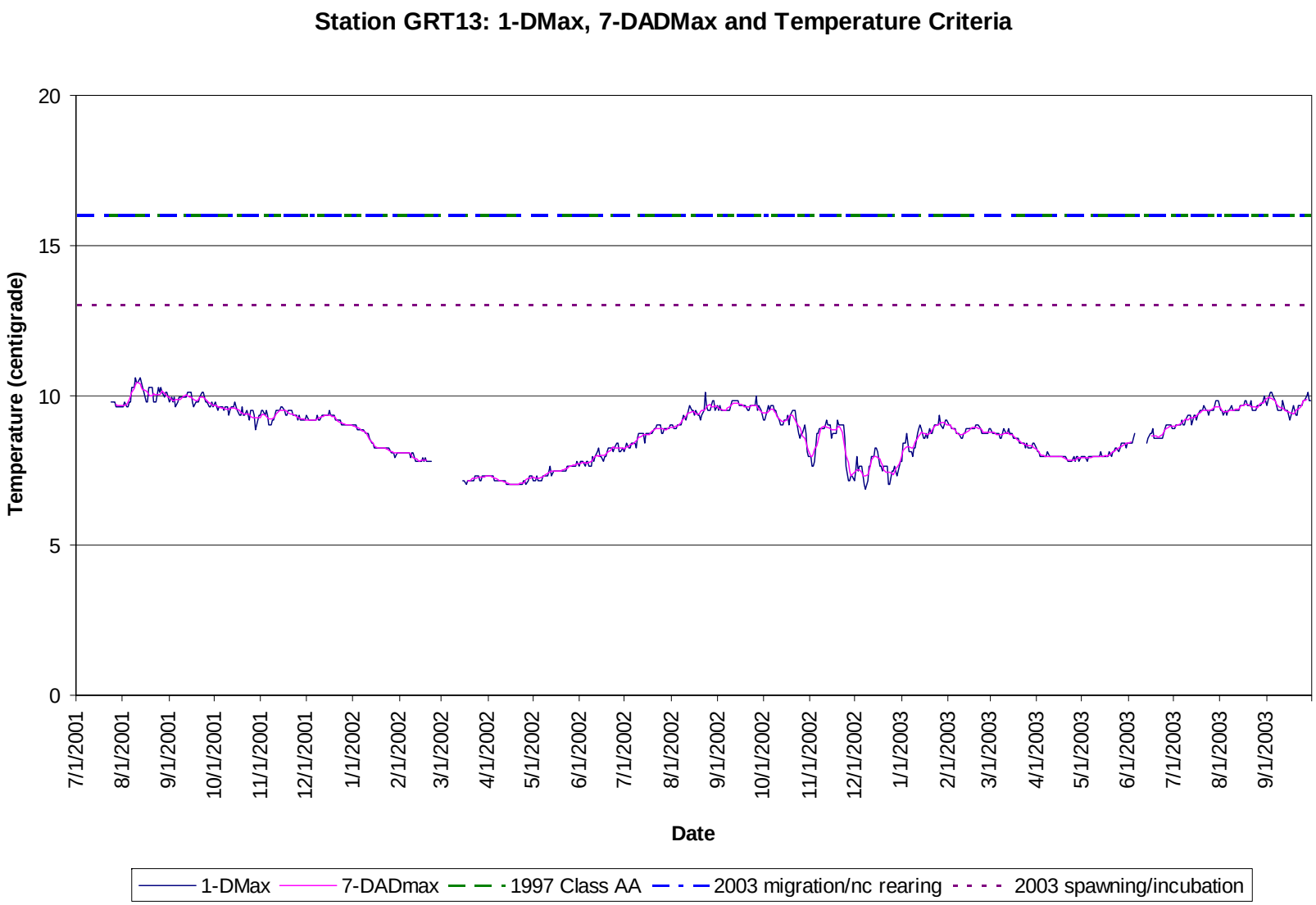
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation


Station GRT13: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
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10
5
0
7/1/2001
8/1/2001
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2/1/2002
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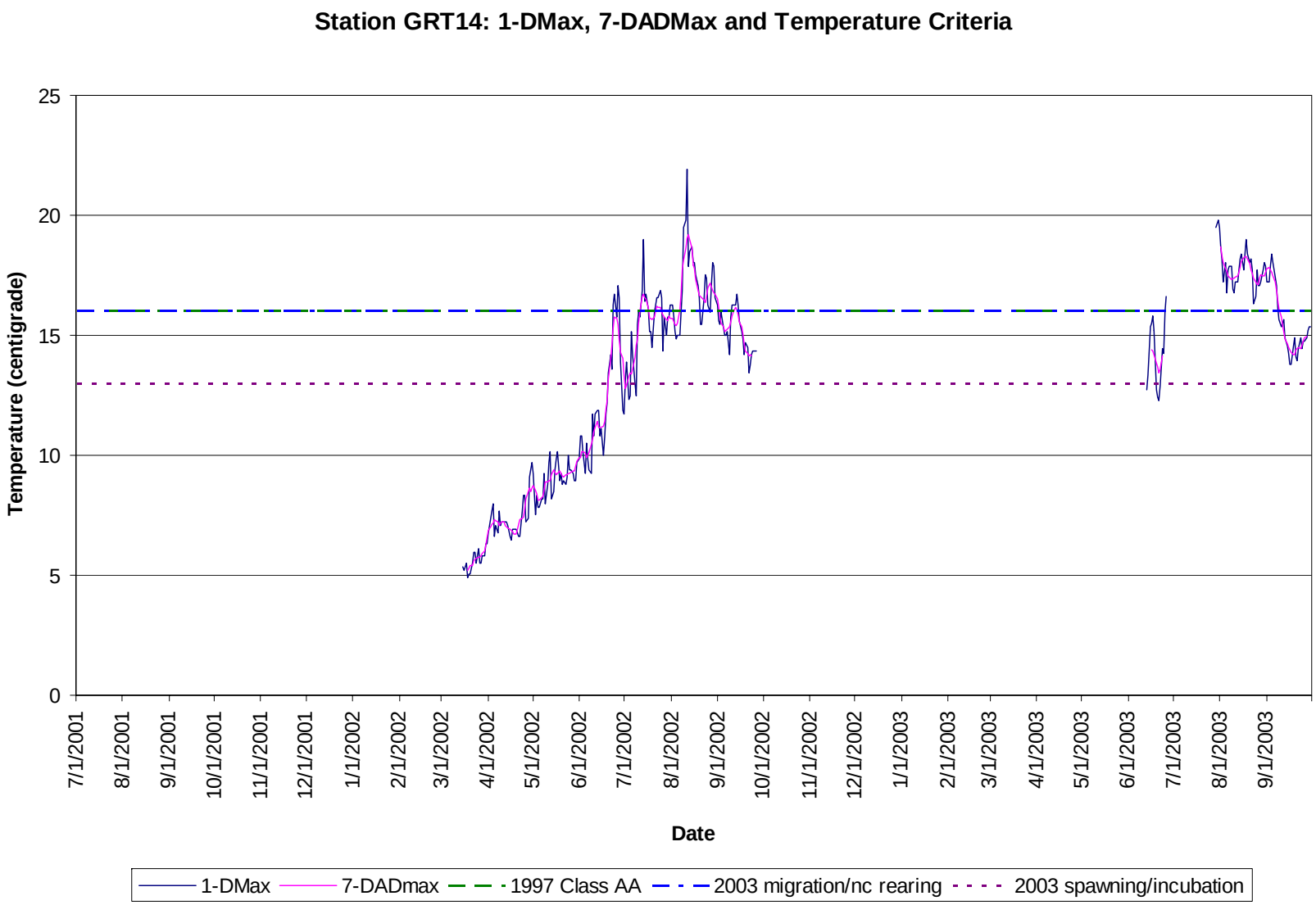
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation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Temperature (centigrade)
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15
10
5
0
7/1/2001
8/1/2001
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10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
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9/1/2002
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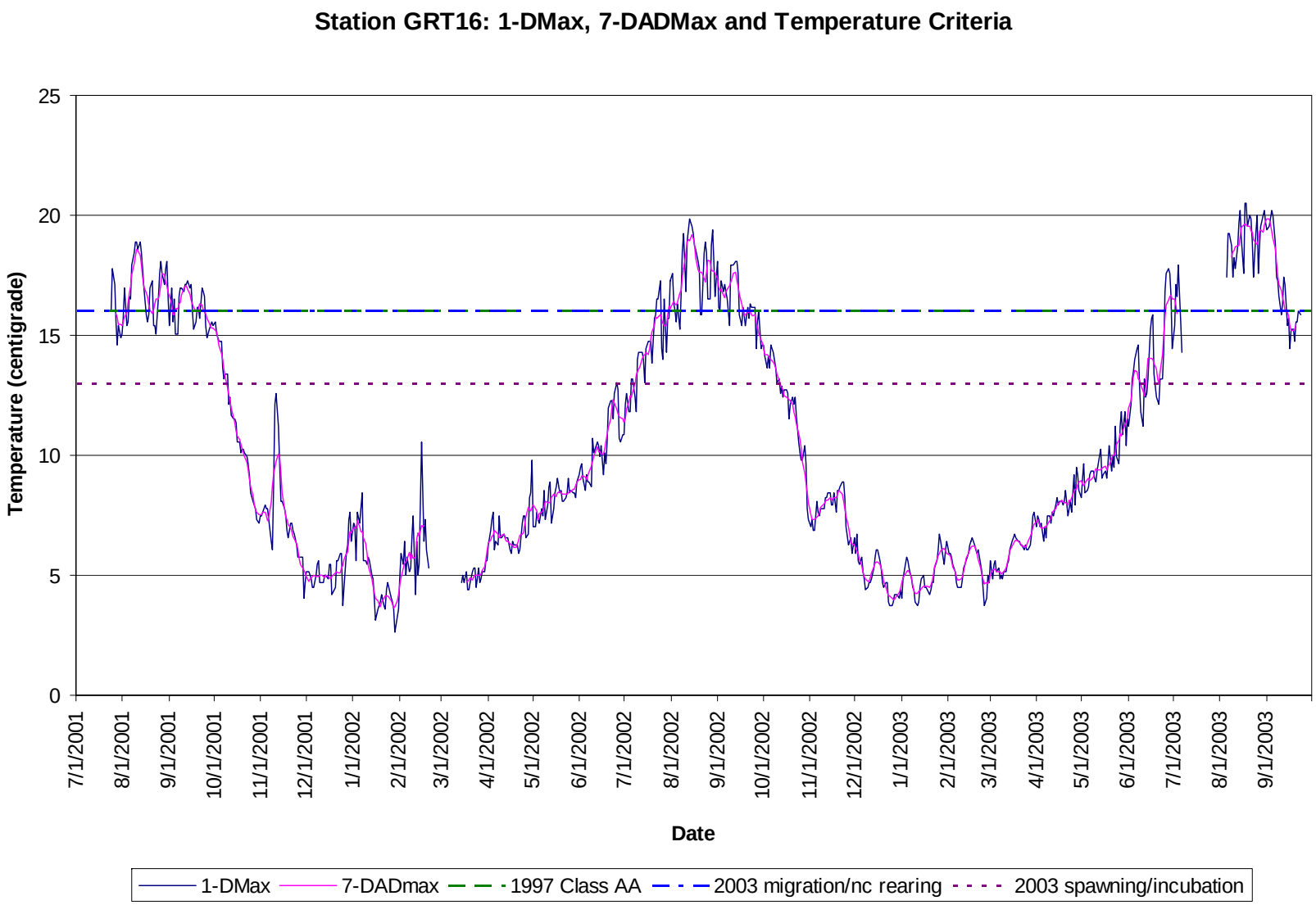
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation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Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
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10/1/2001
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9/1/2002
10/1/2002
11/1/2002
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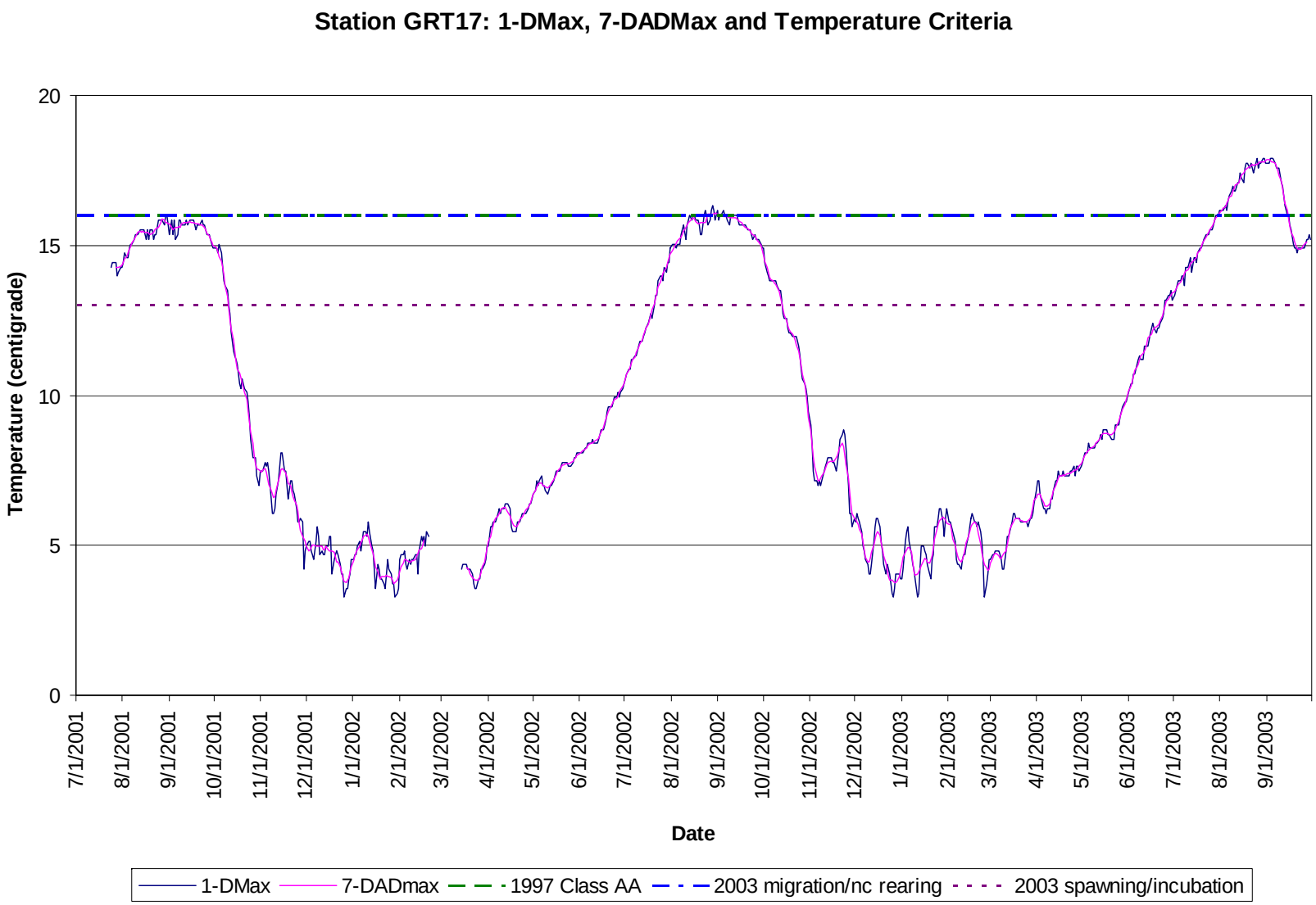
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation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Temperature (centigrade)
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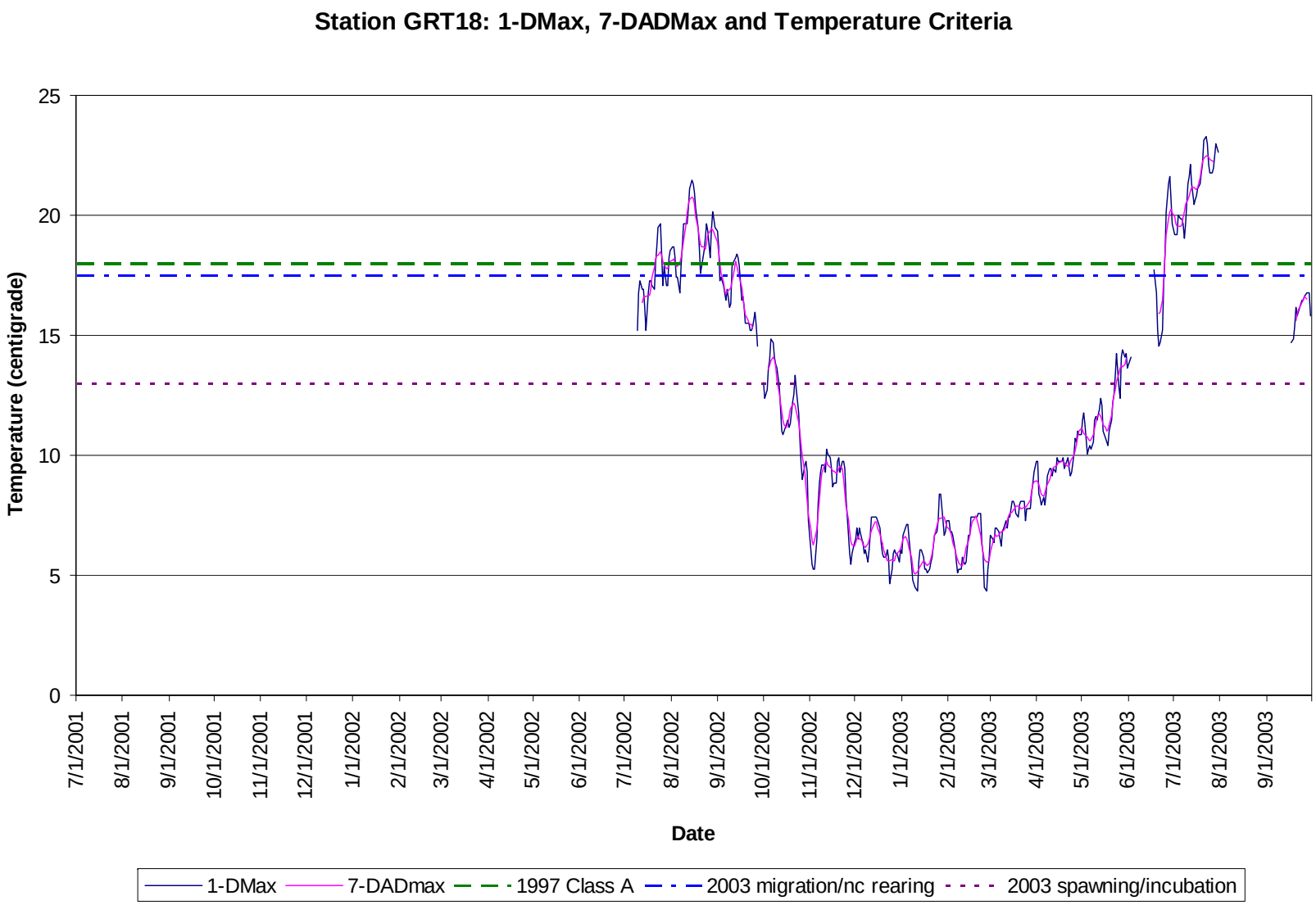
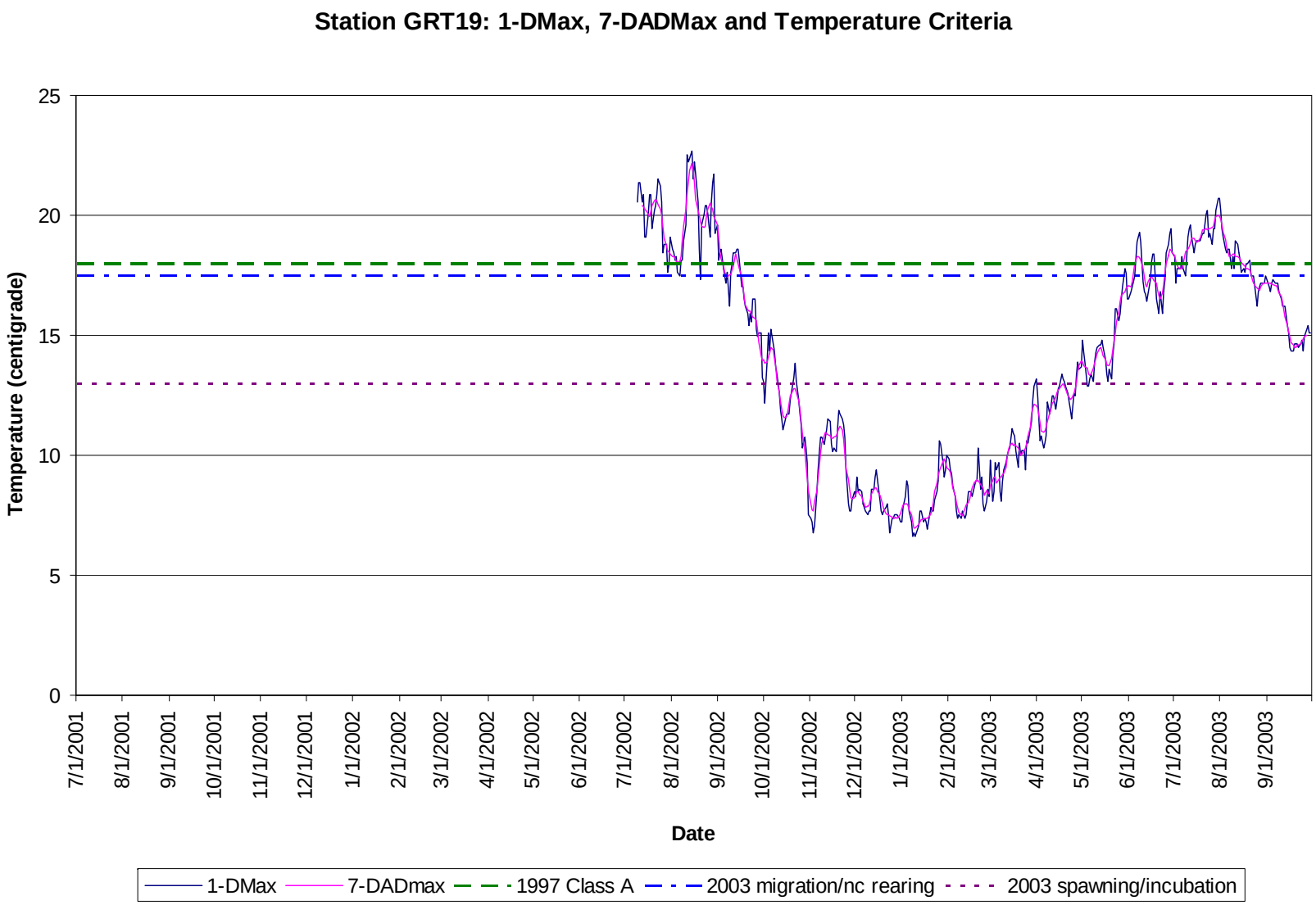
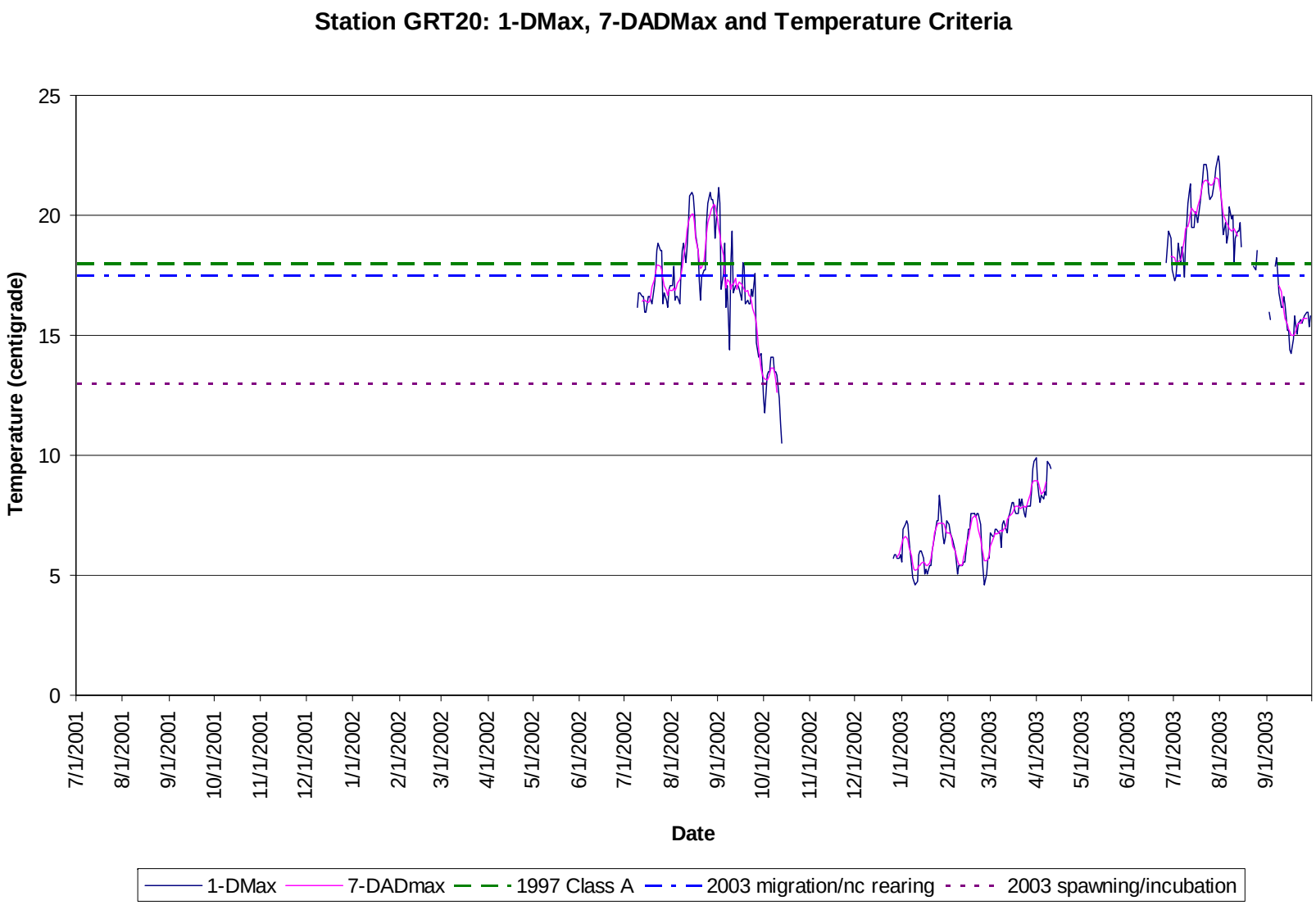
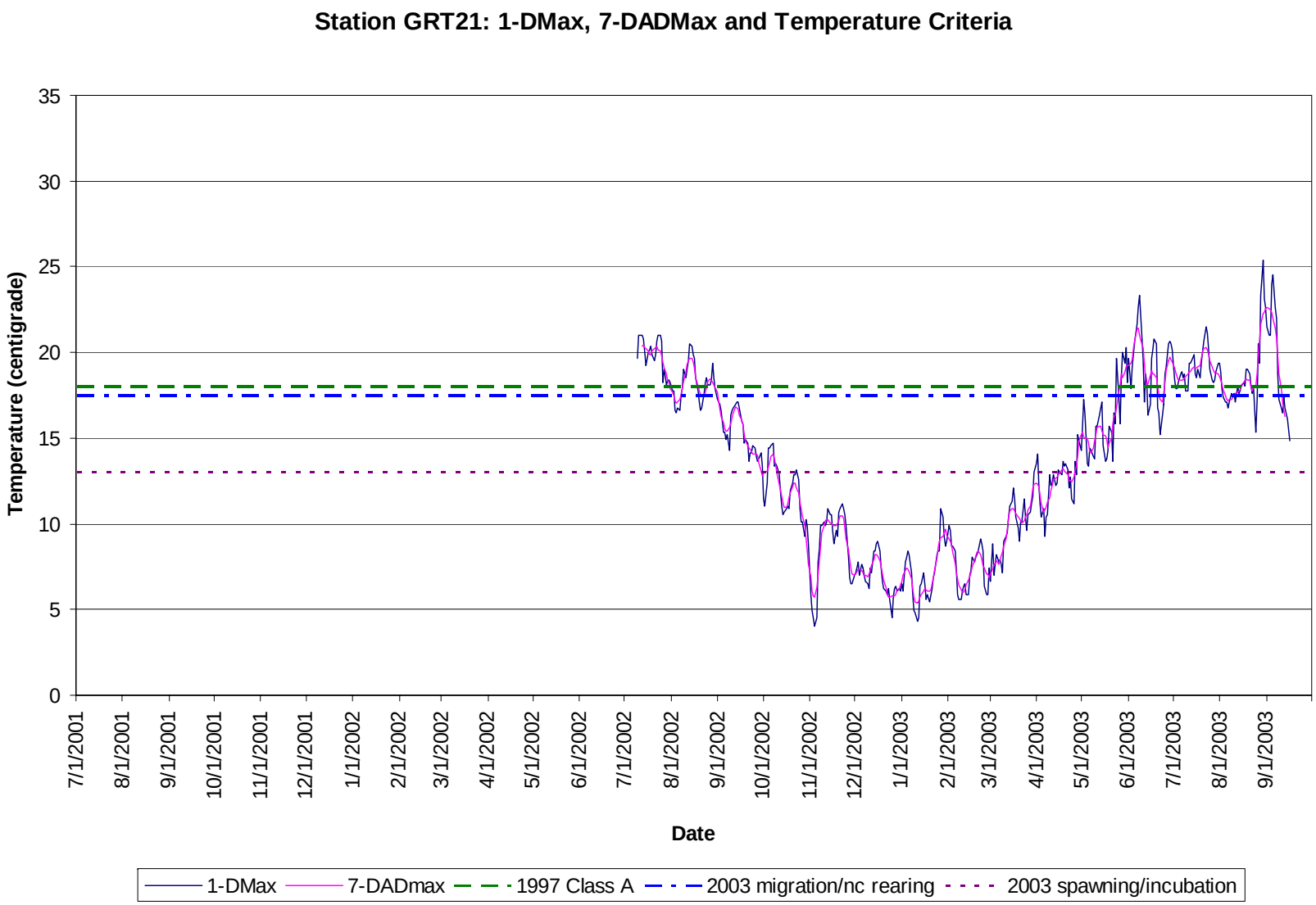
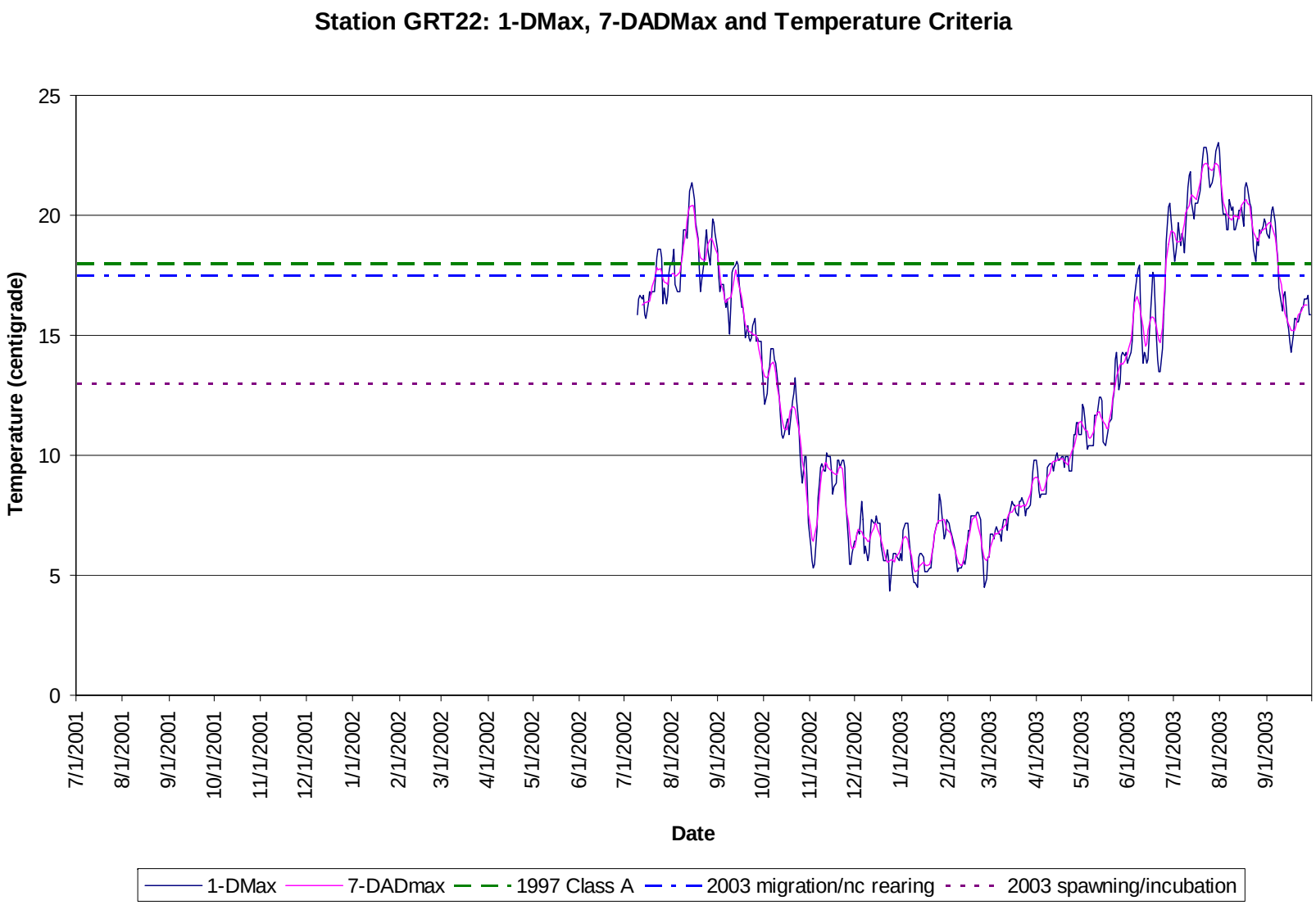
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation

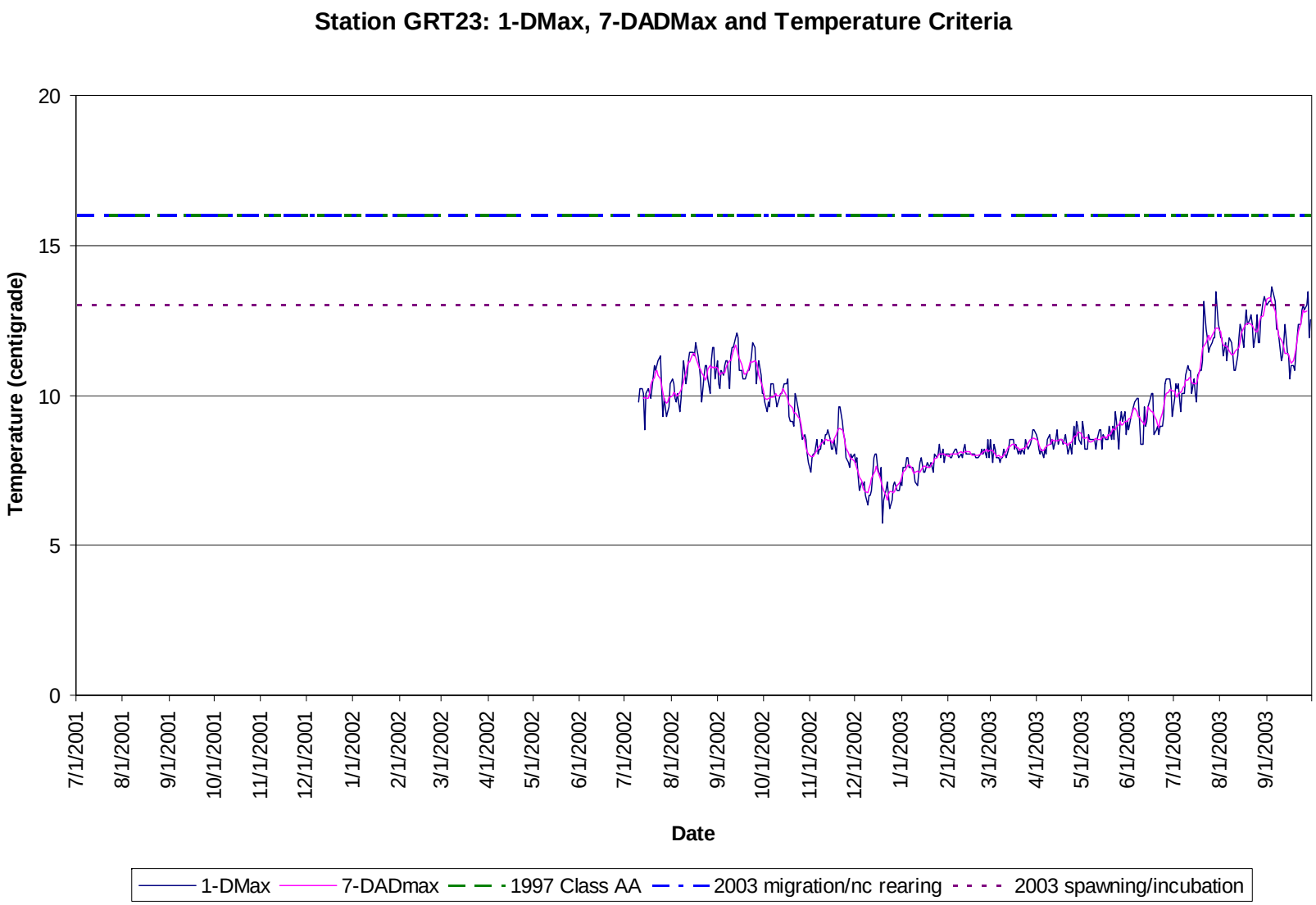

Station GRT18: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

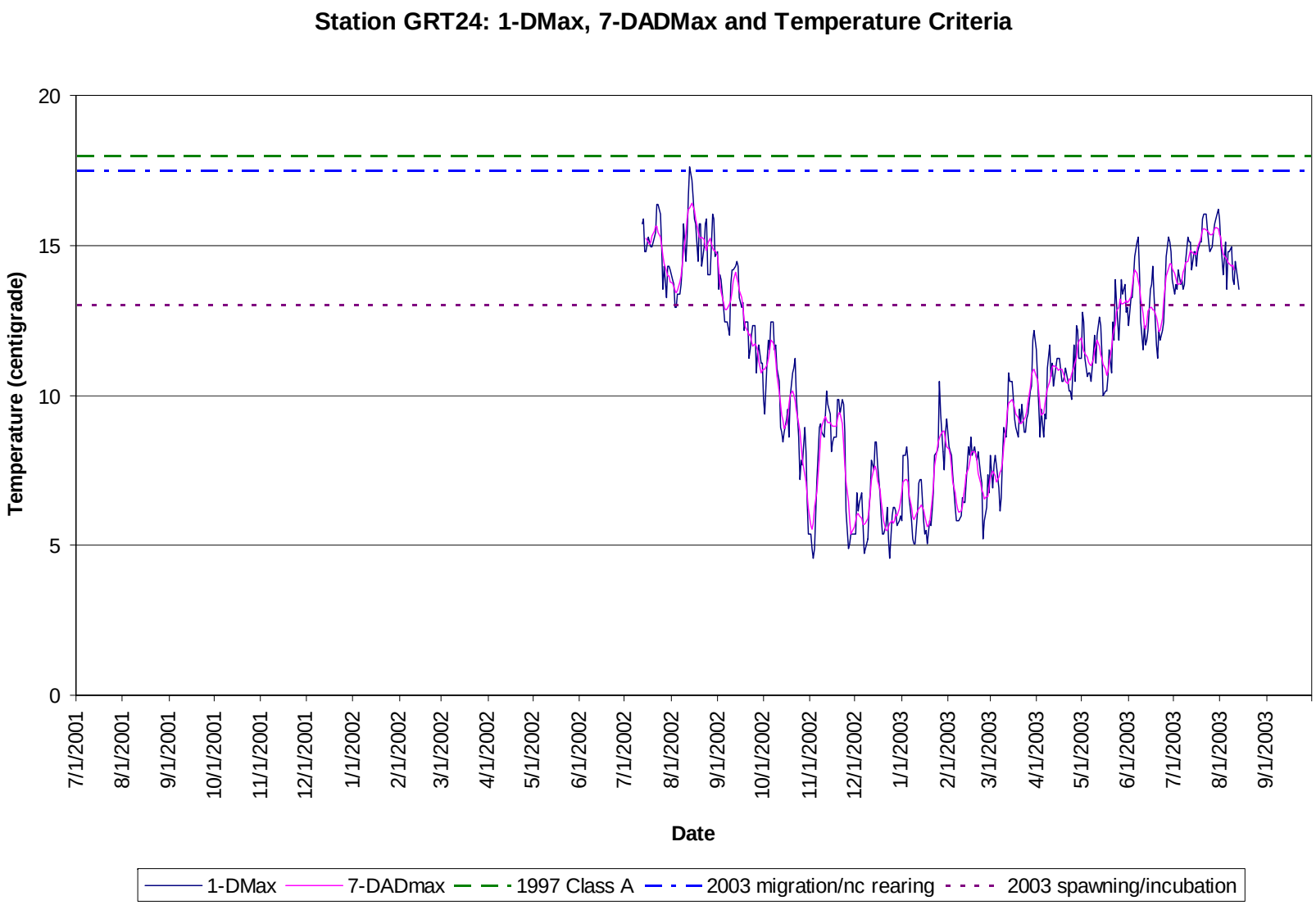

Station GRT19: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

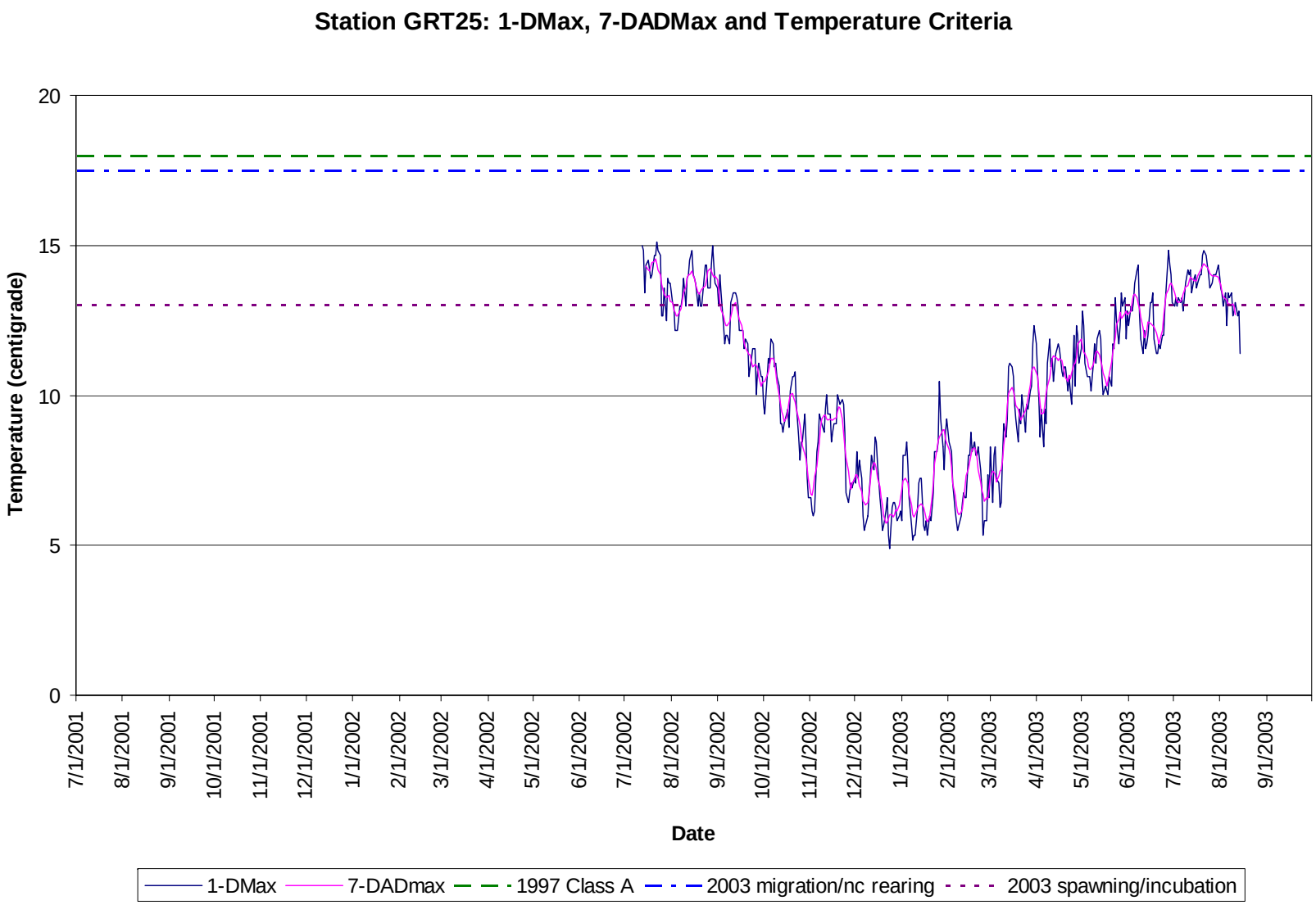

Station GRT20: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

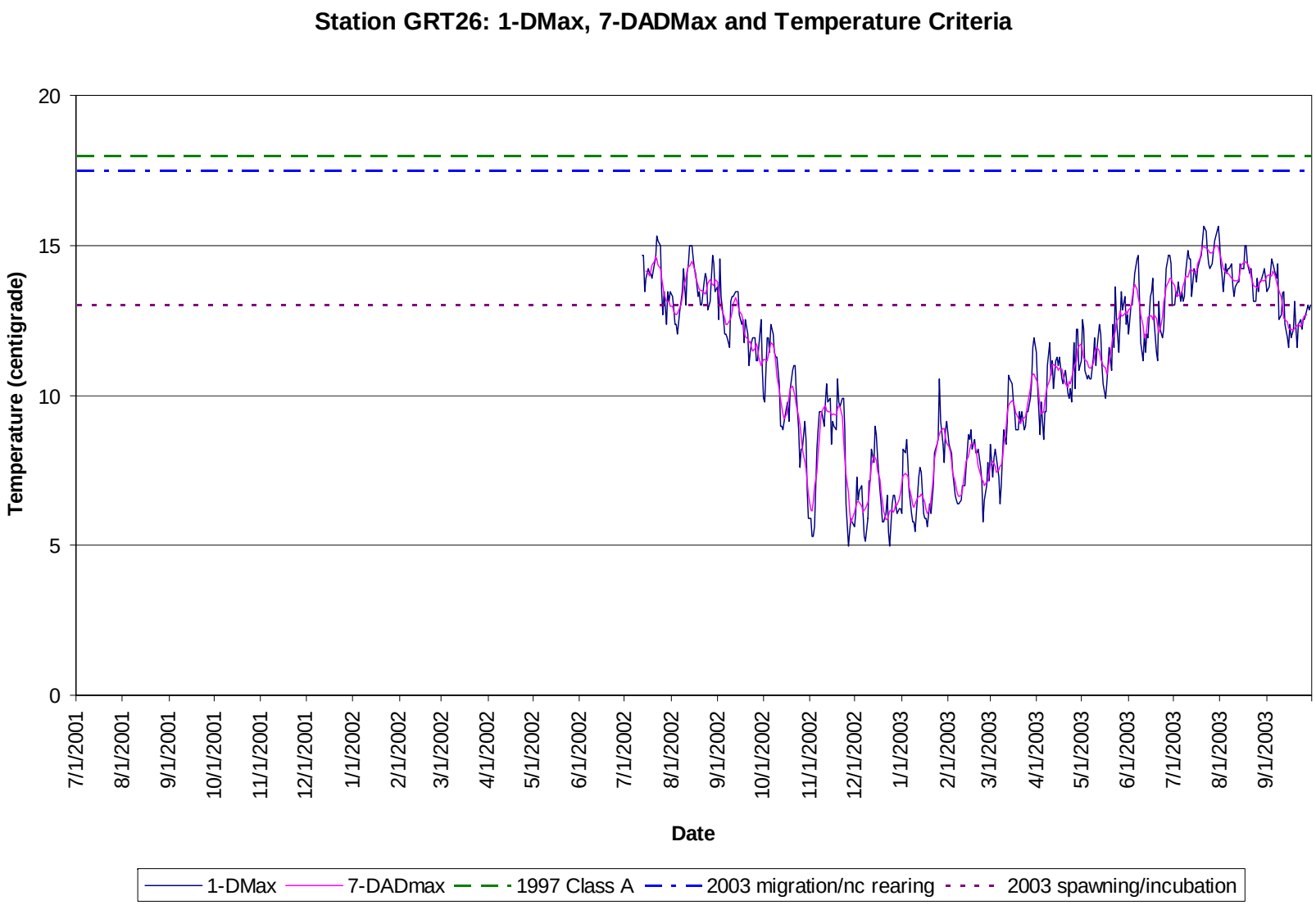

Station GRT21: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
35
30
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

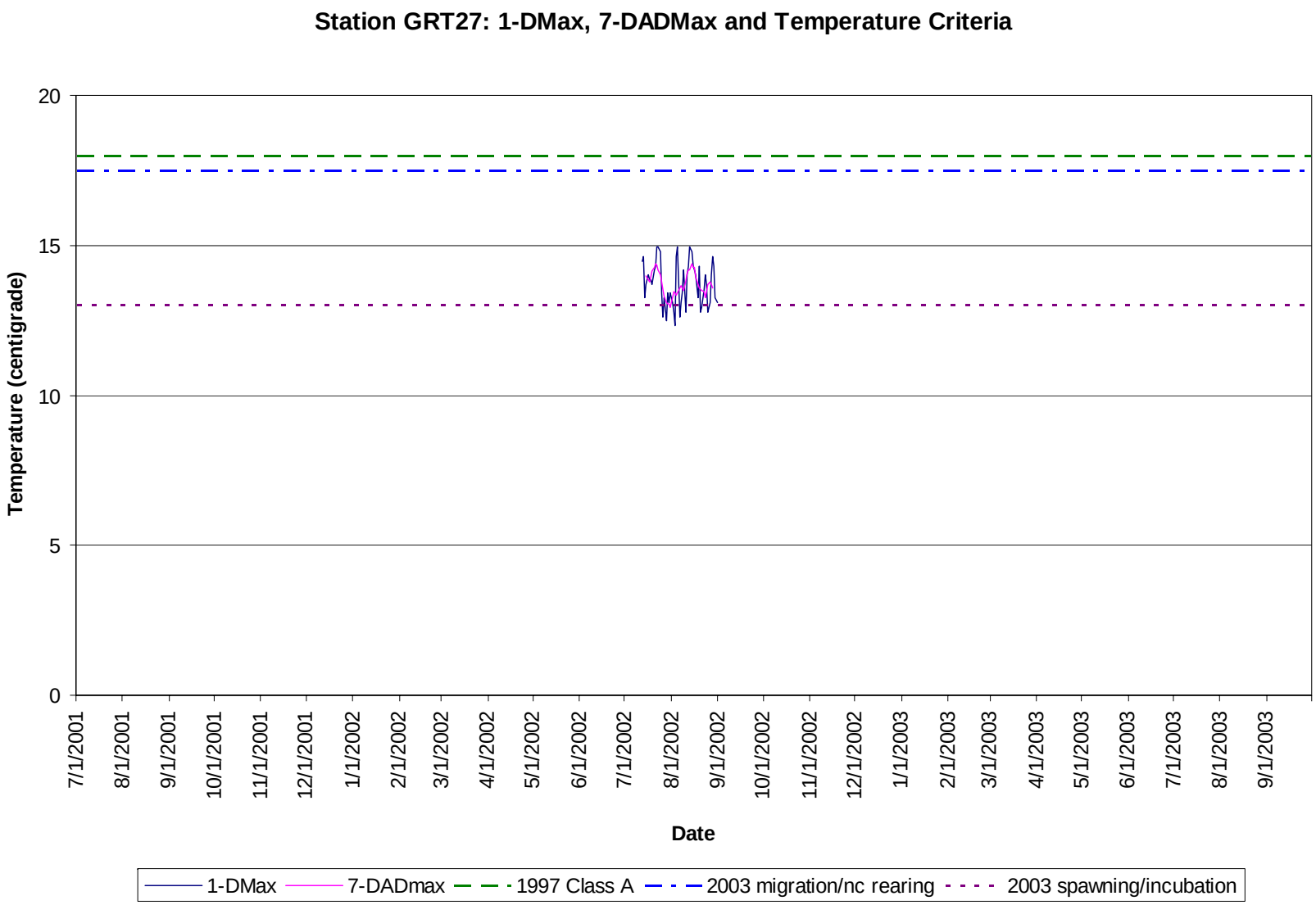

Station GRT22: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

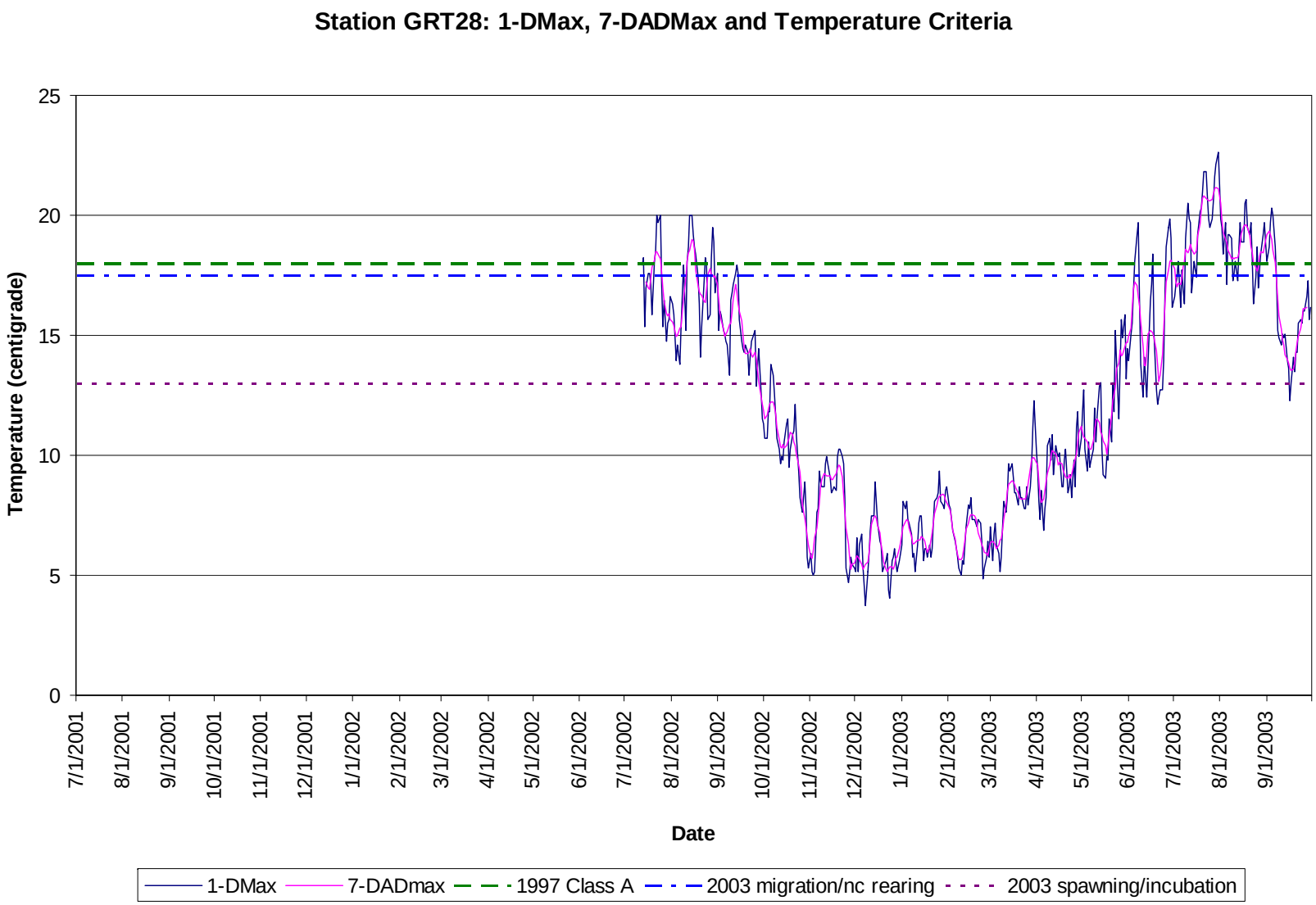

Station GRT23: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation

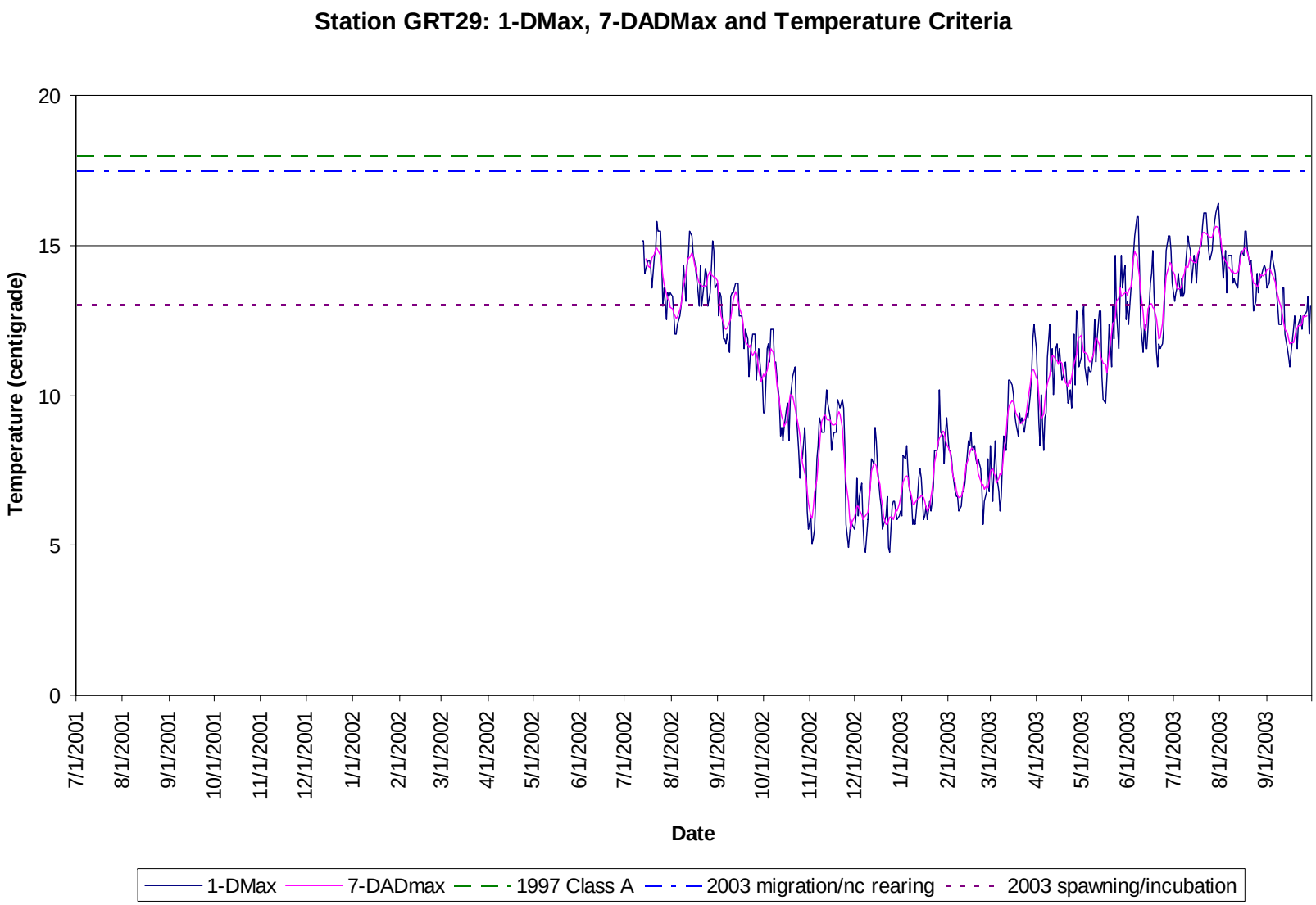

Station GRT24: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

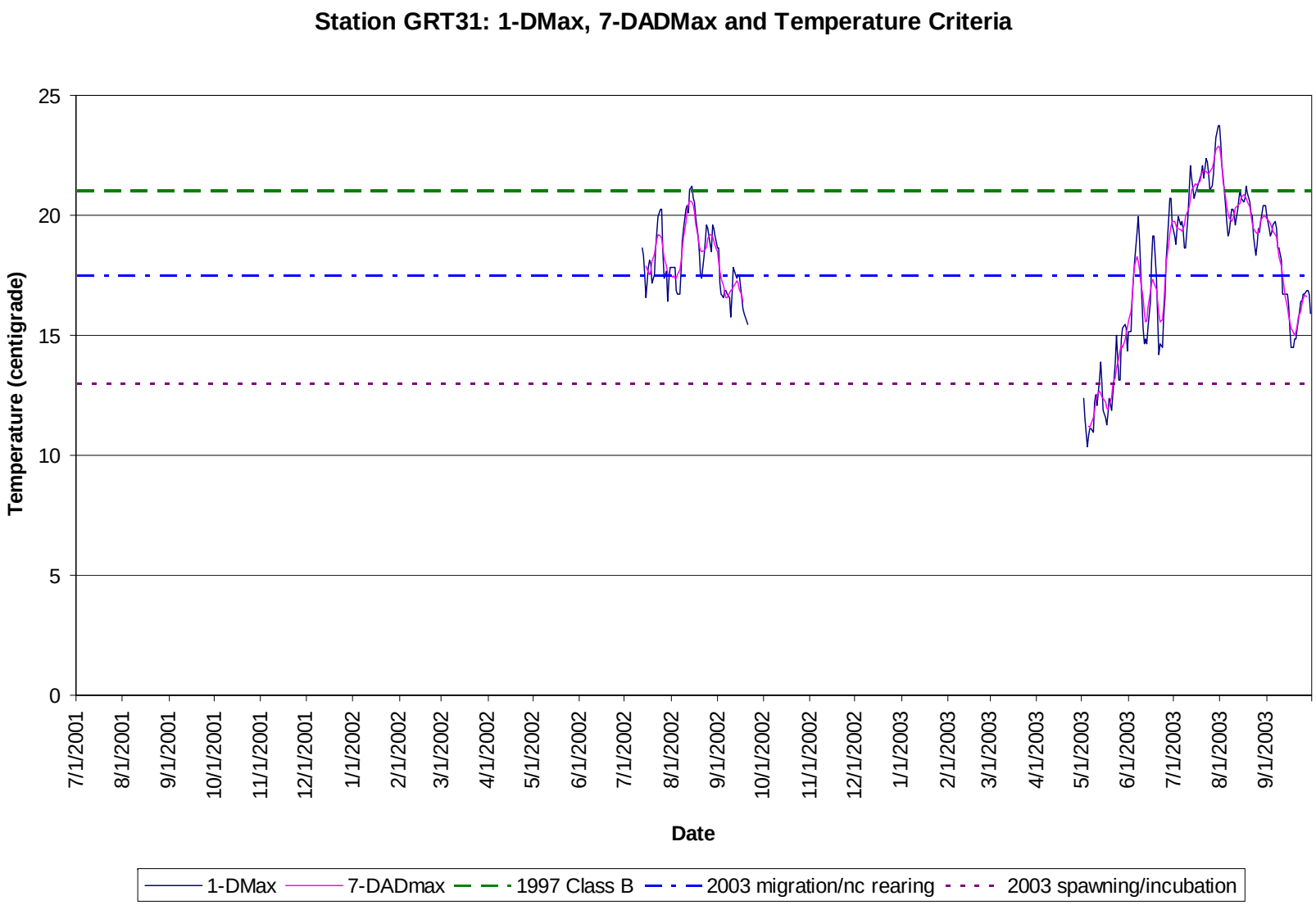

Station GRT25: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

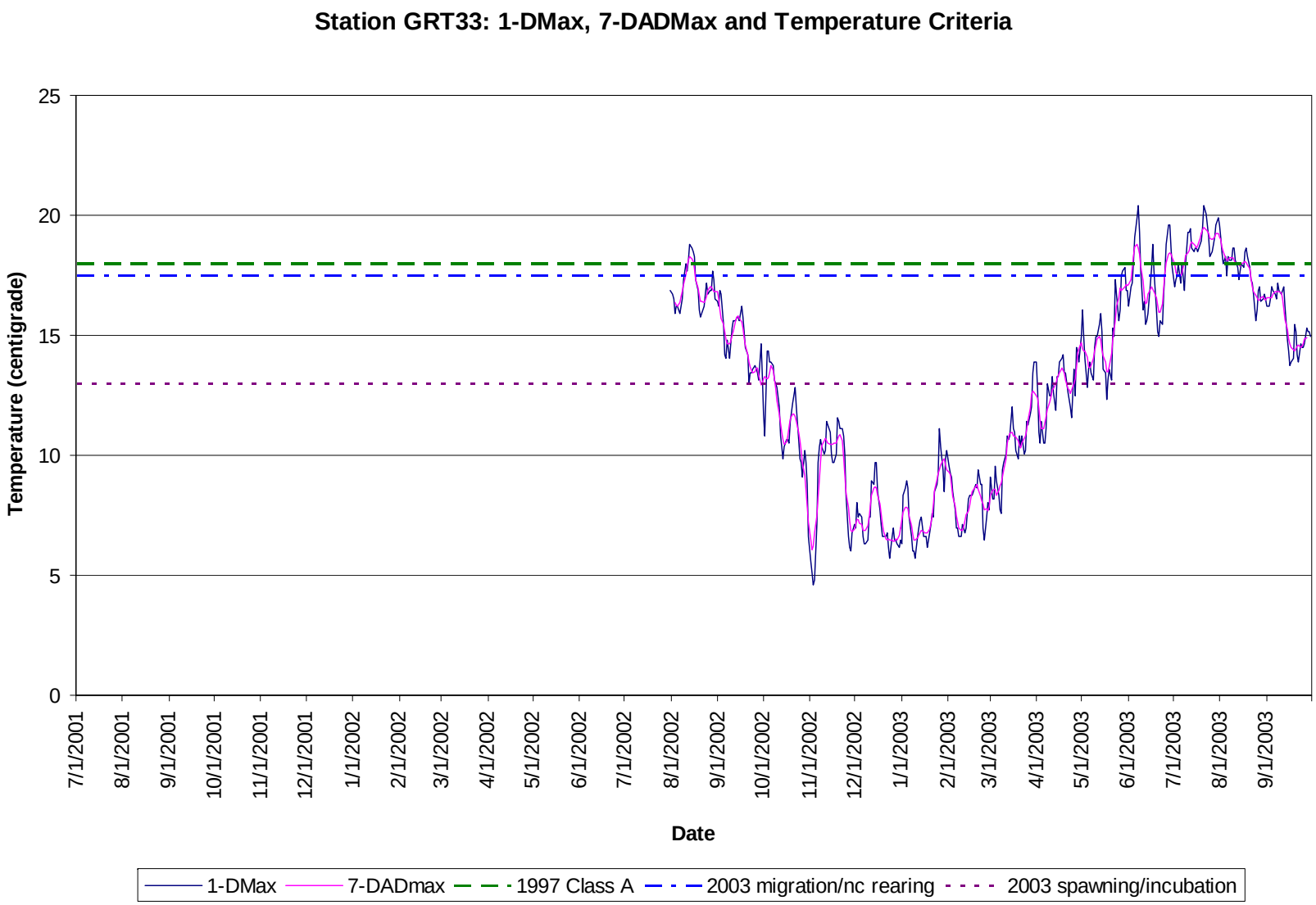

Station GRT26: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

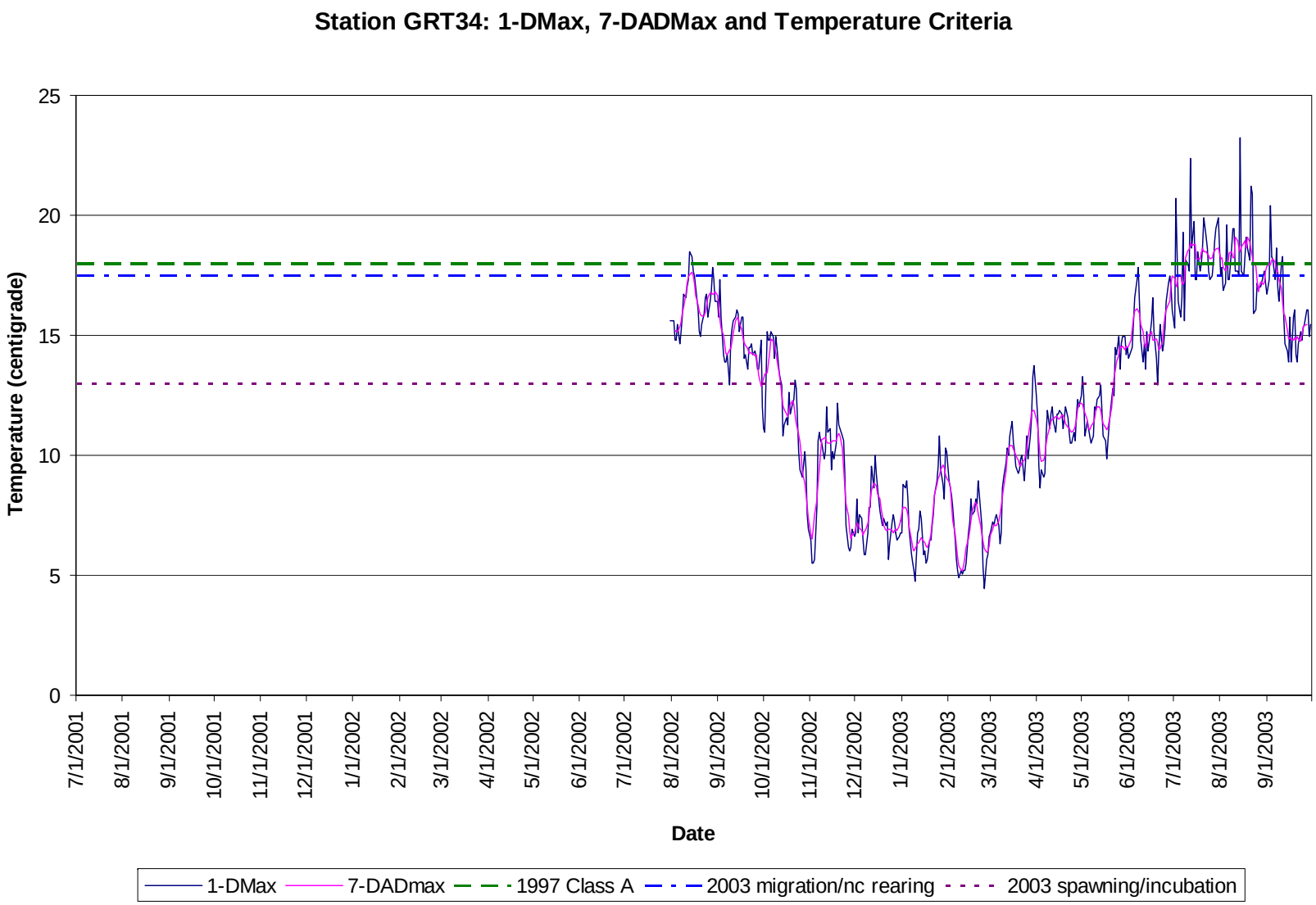

Station GRT27: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

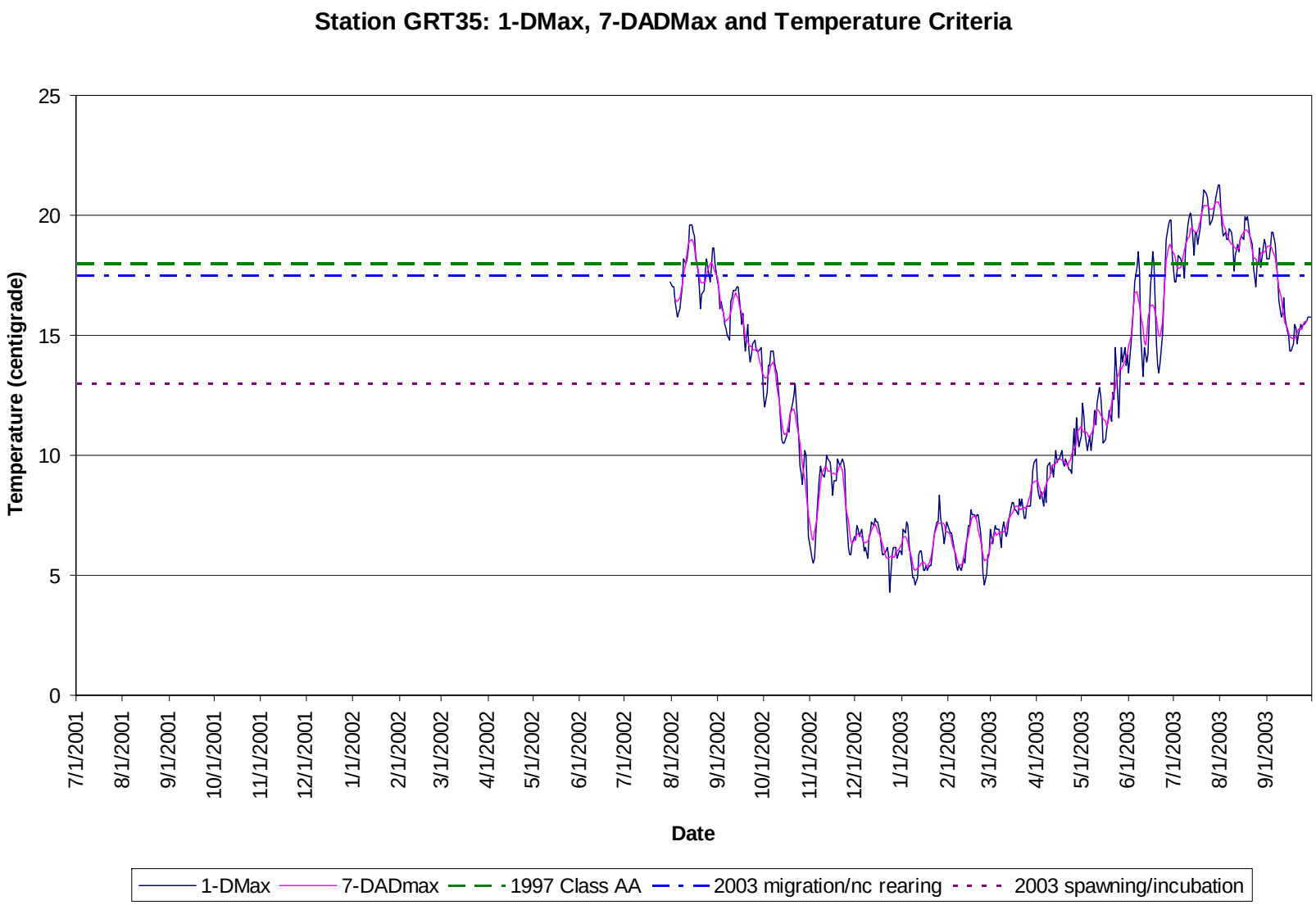

Station GRT28: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

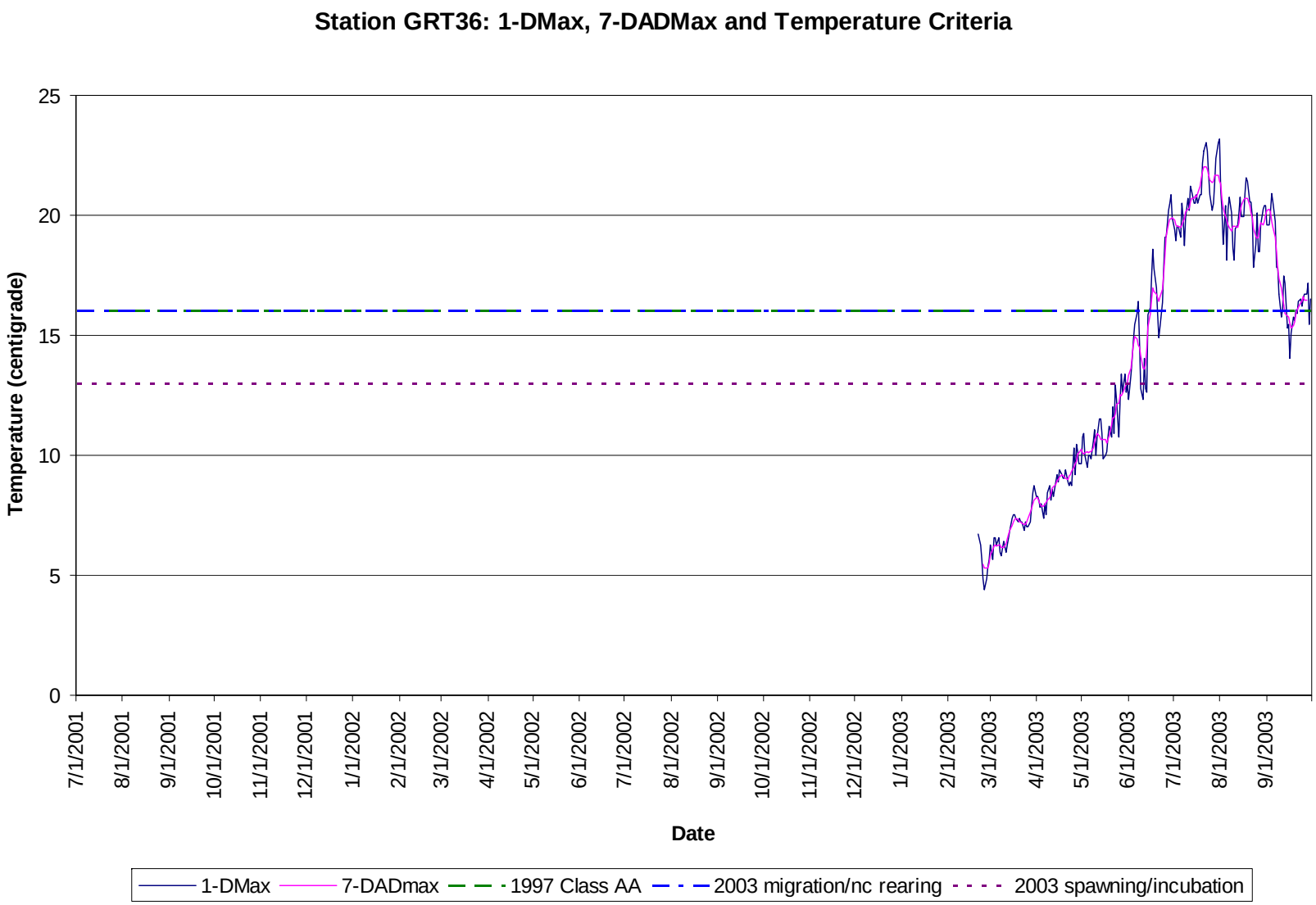

Station GRT29: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

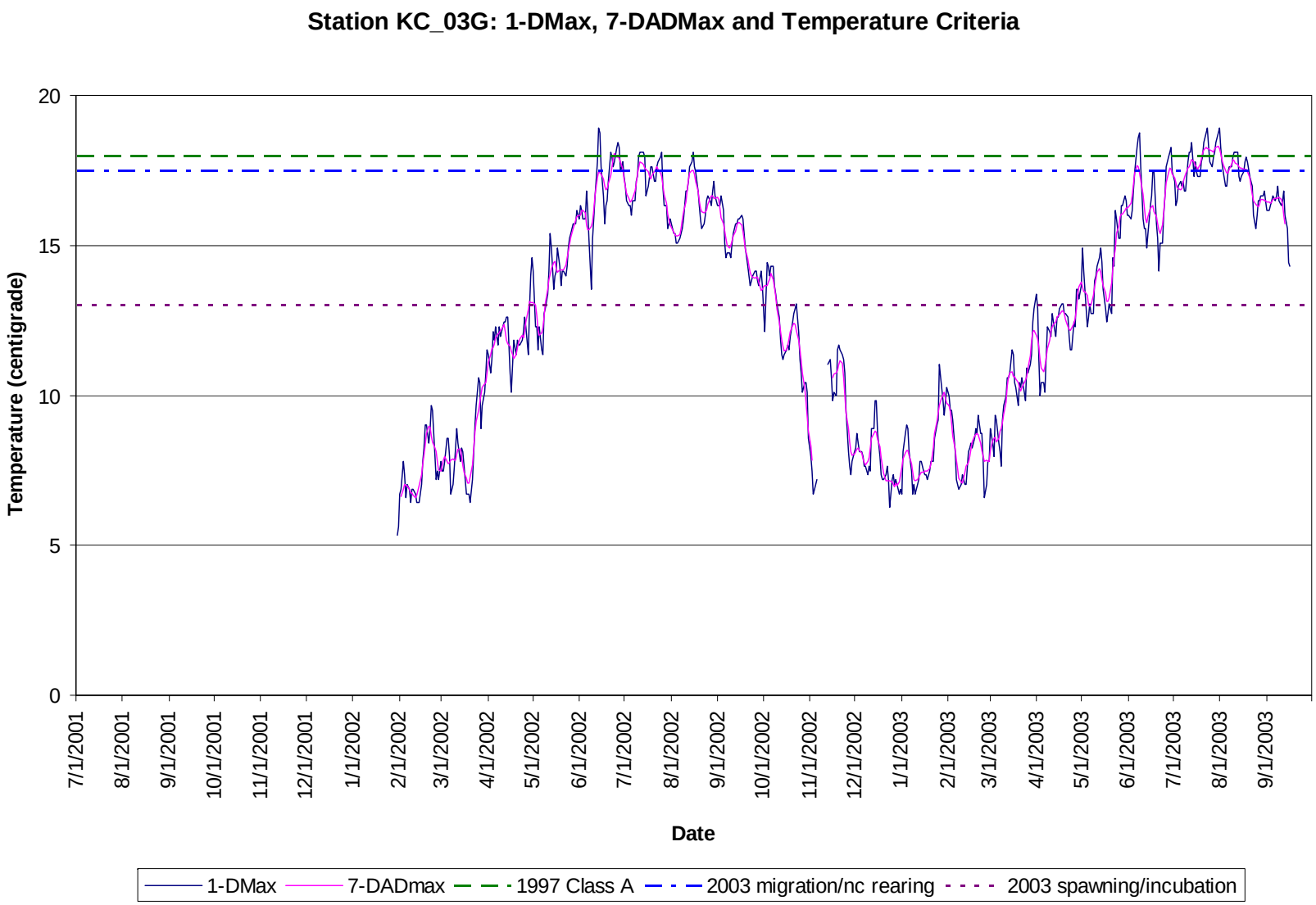

Station GRT31: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class B
2003 migration/nc rearing
2003 spawning/incubation

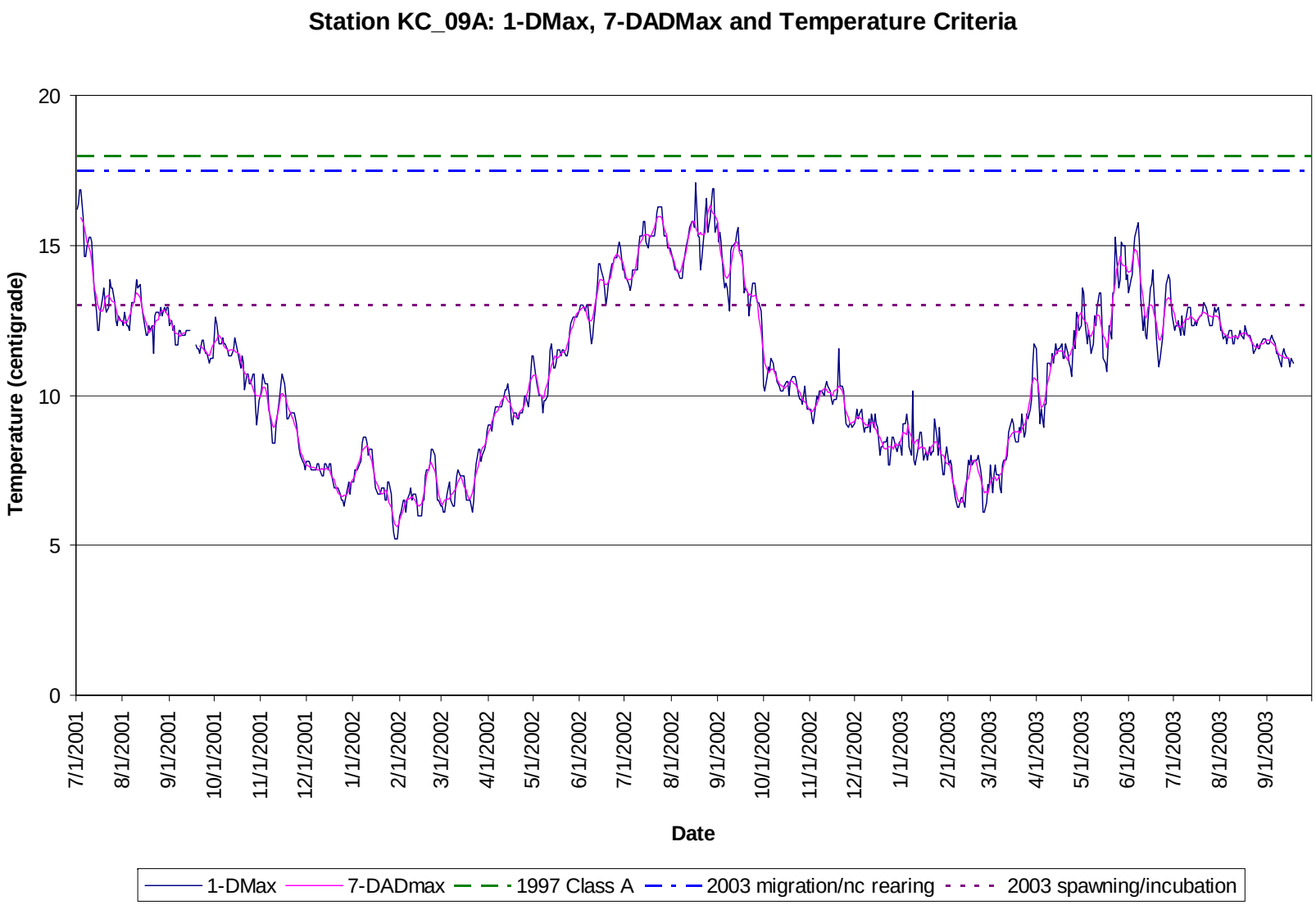

Station GRT33: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

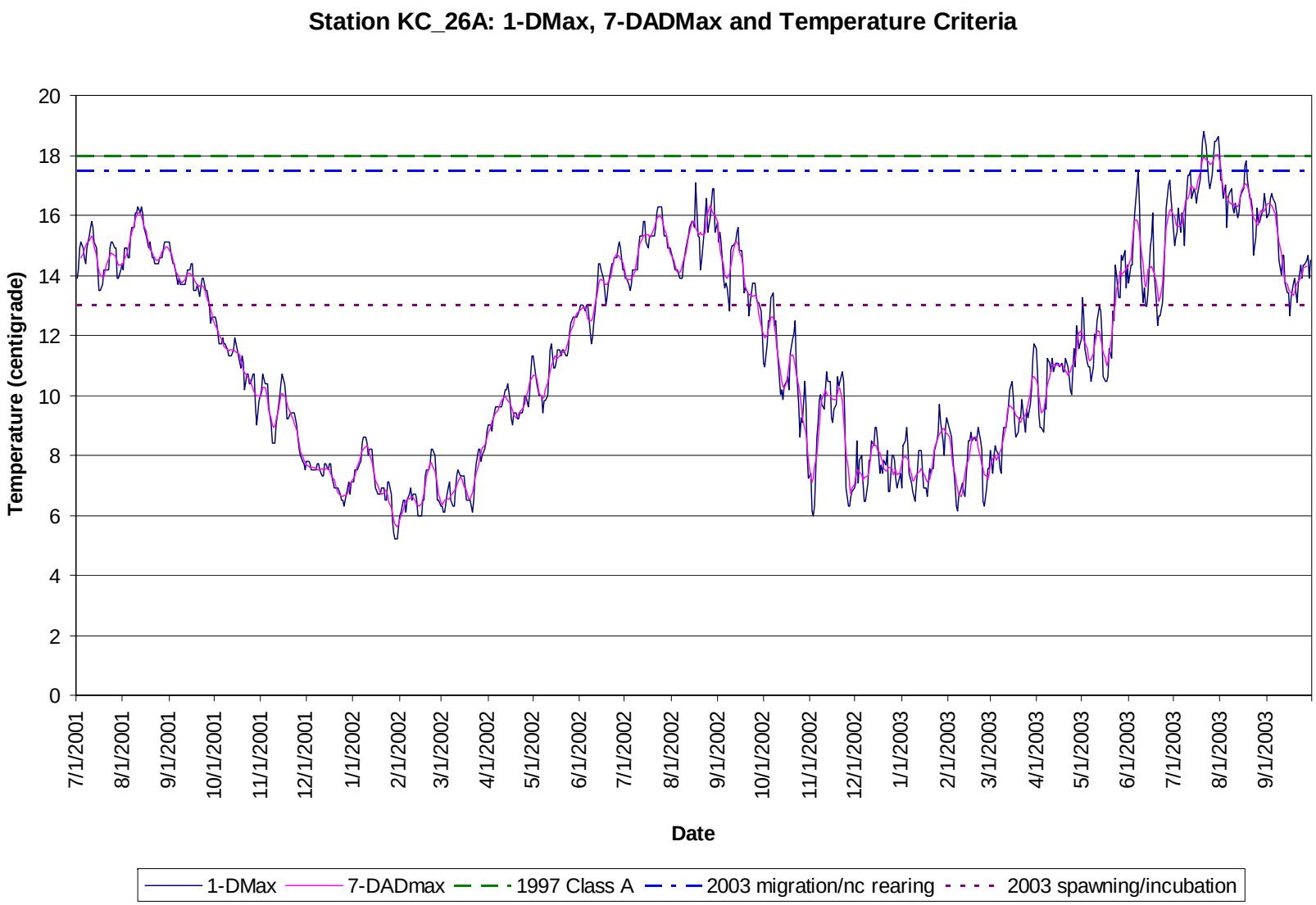

Station GRT34: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

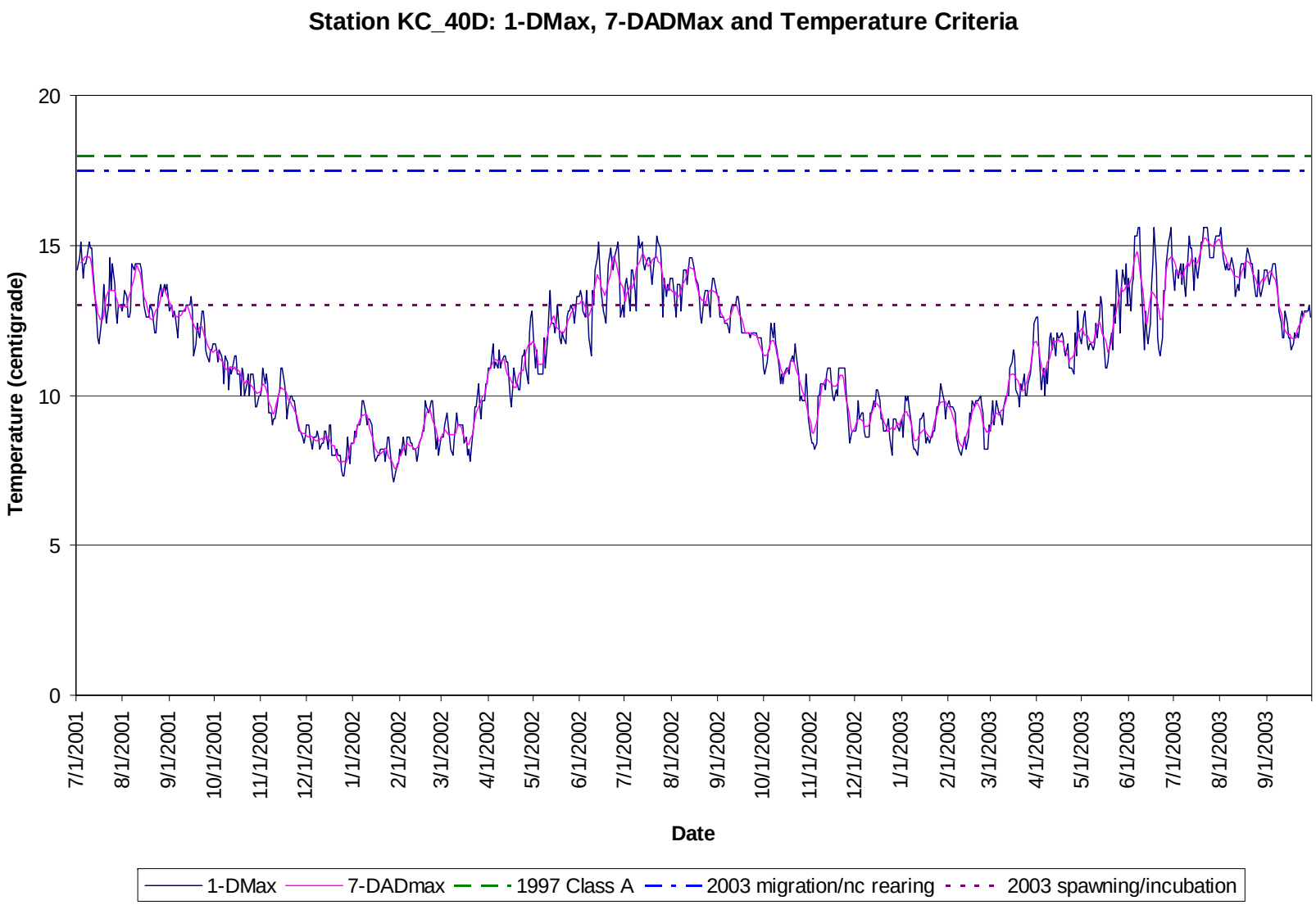

Station GRT35: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation

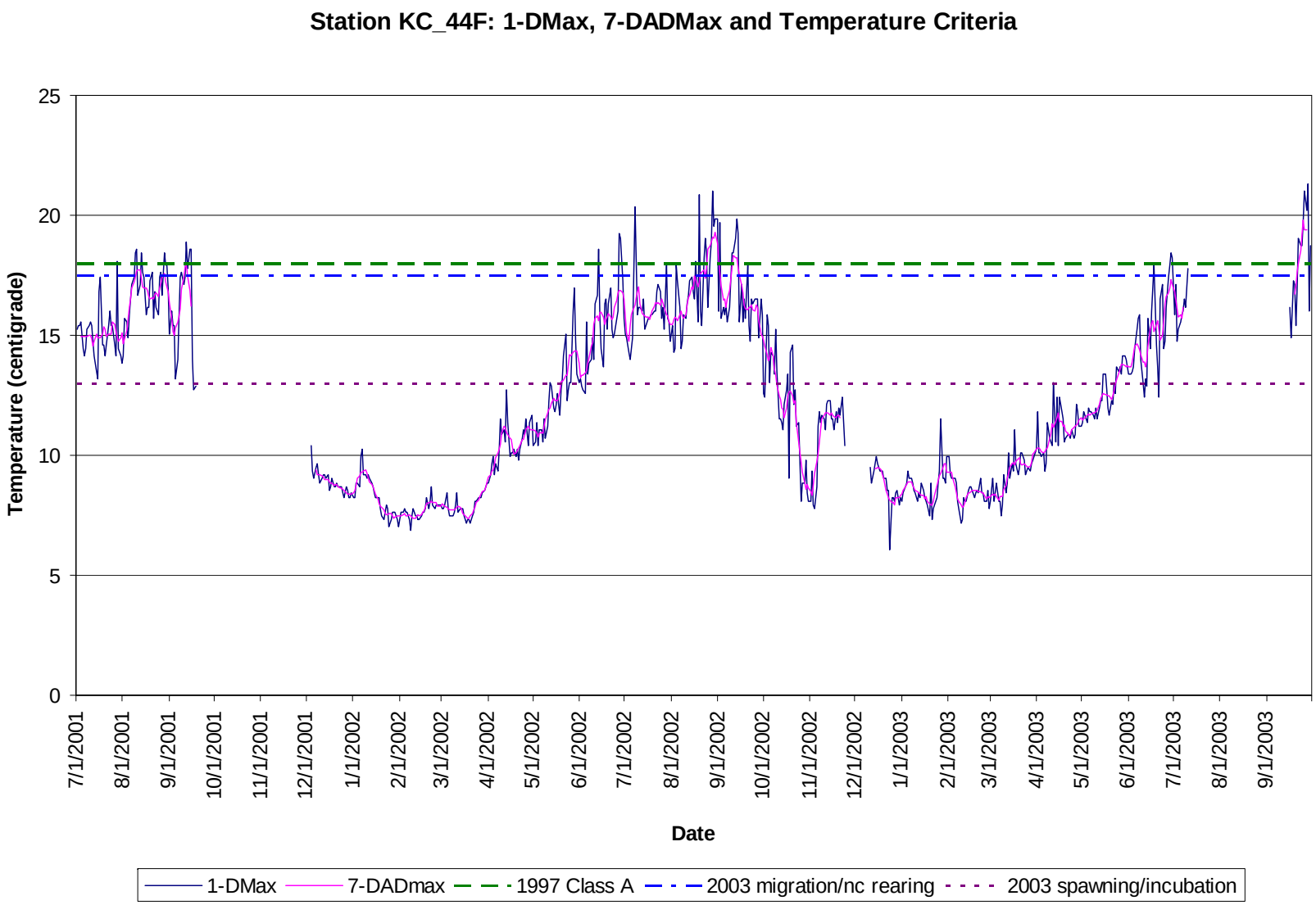

Station GRT36: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation

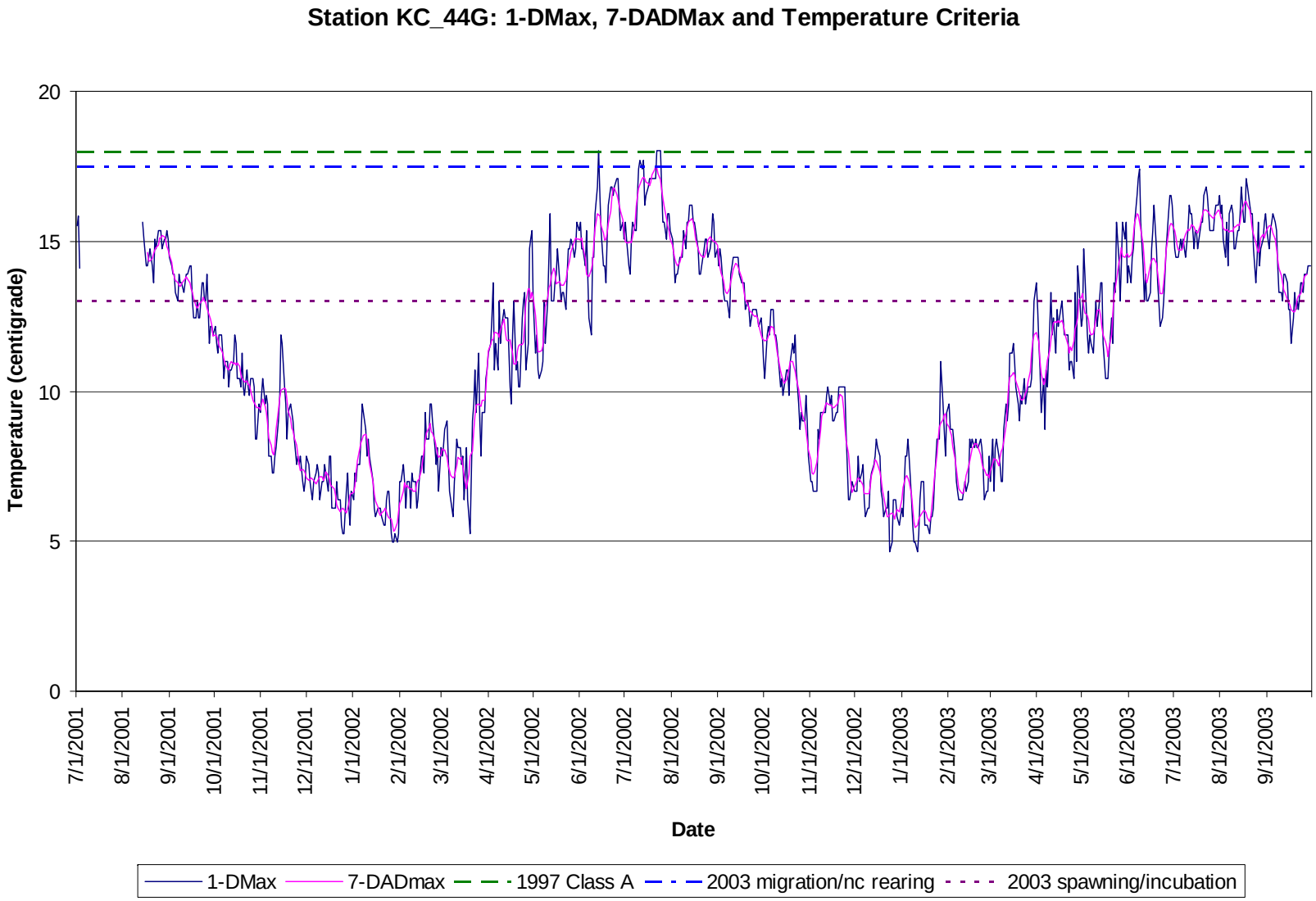

Station KC_03G: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

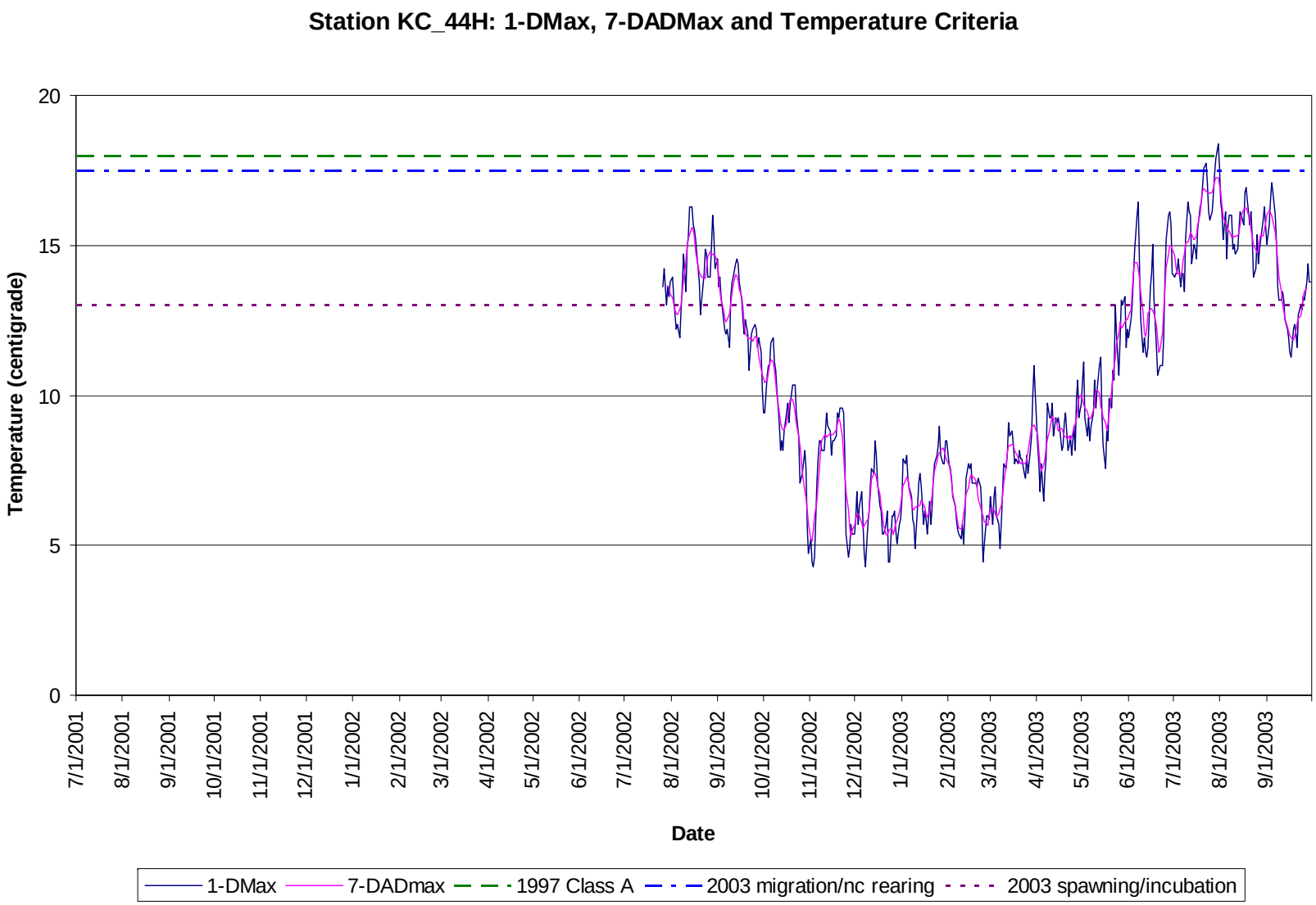

Station KC_09A: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

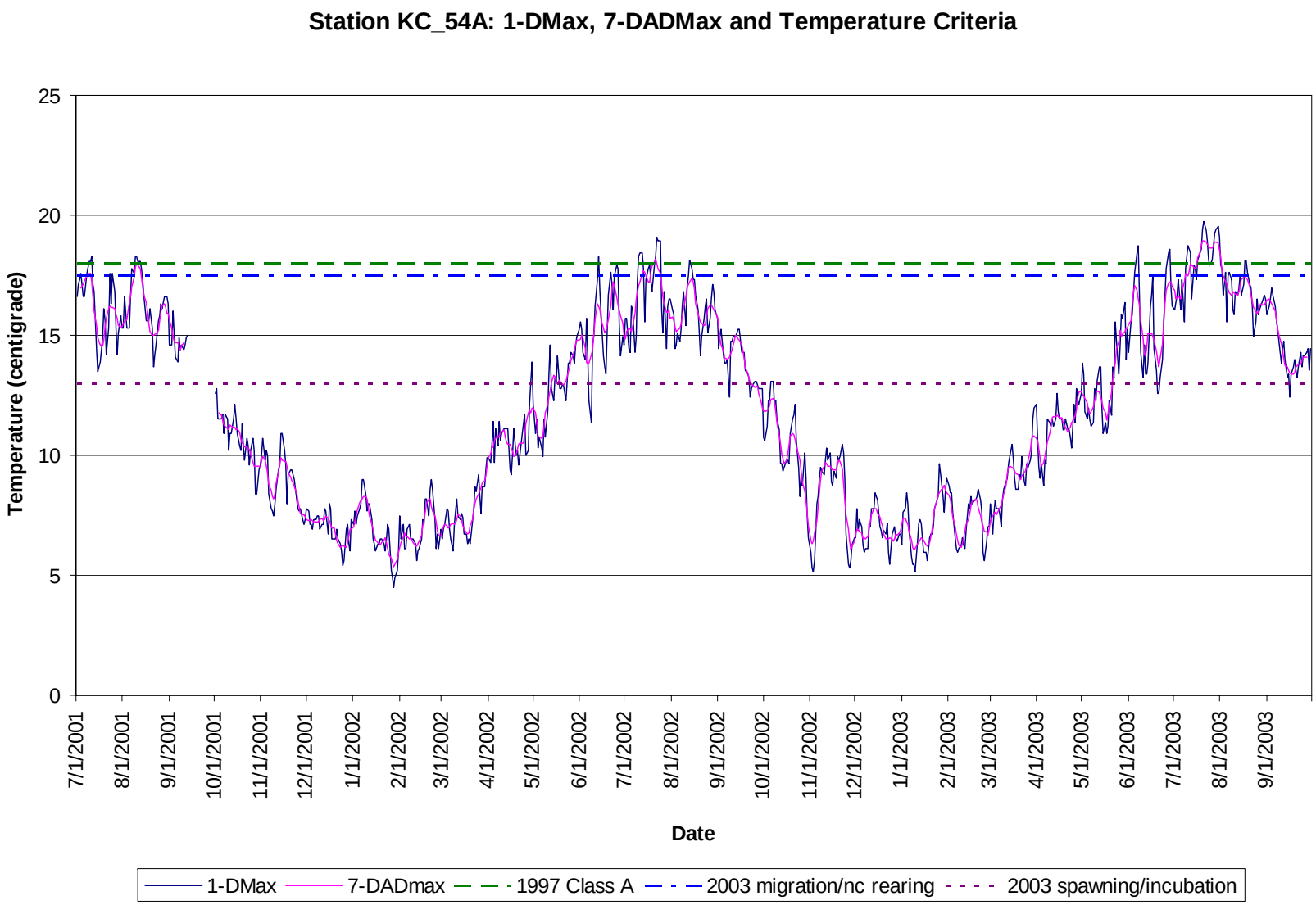

Station KC_26A: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
18
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

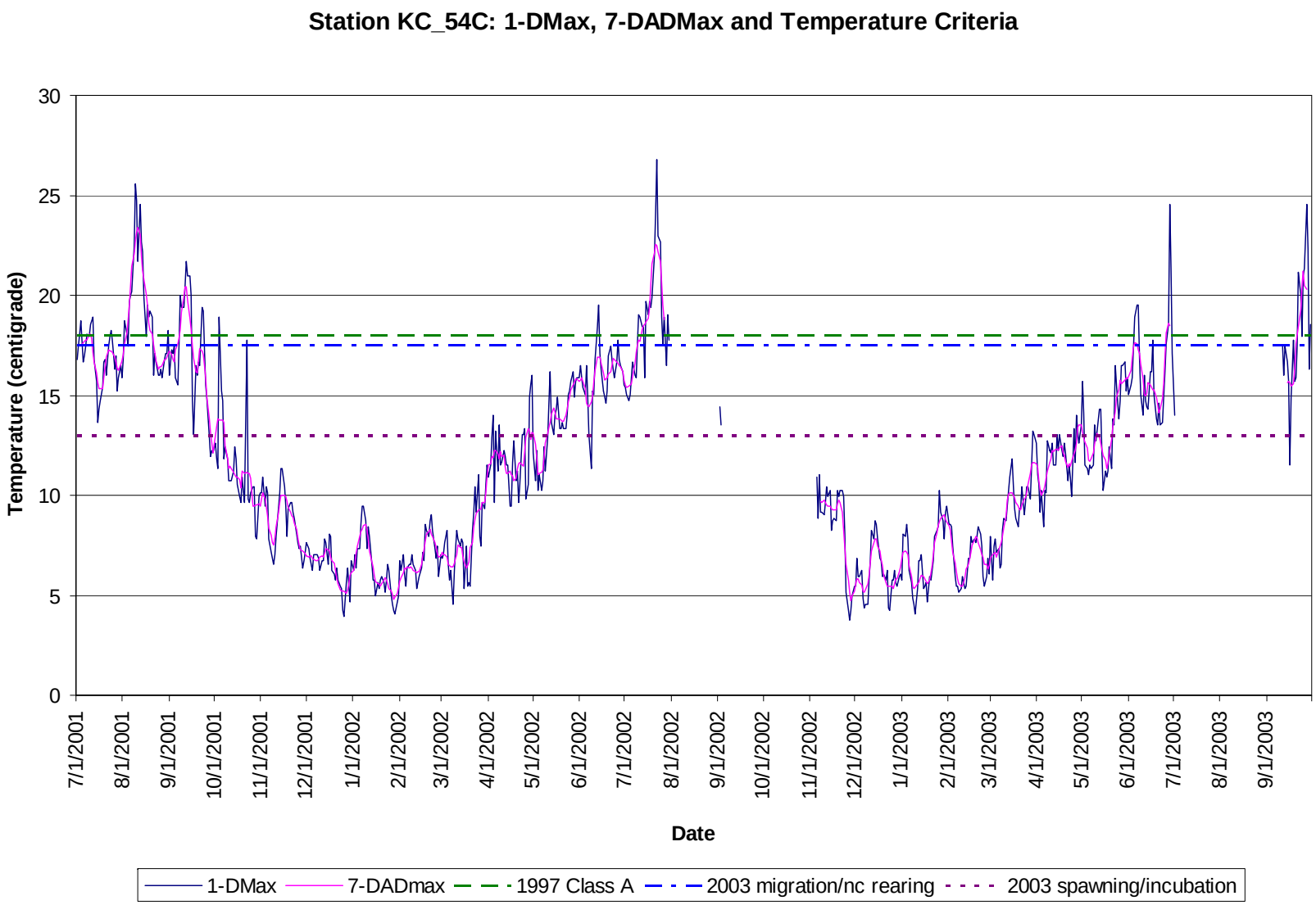

Station KC_40D: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

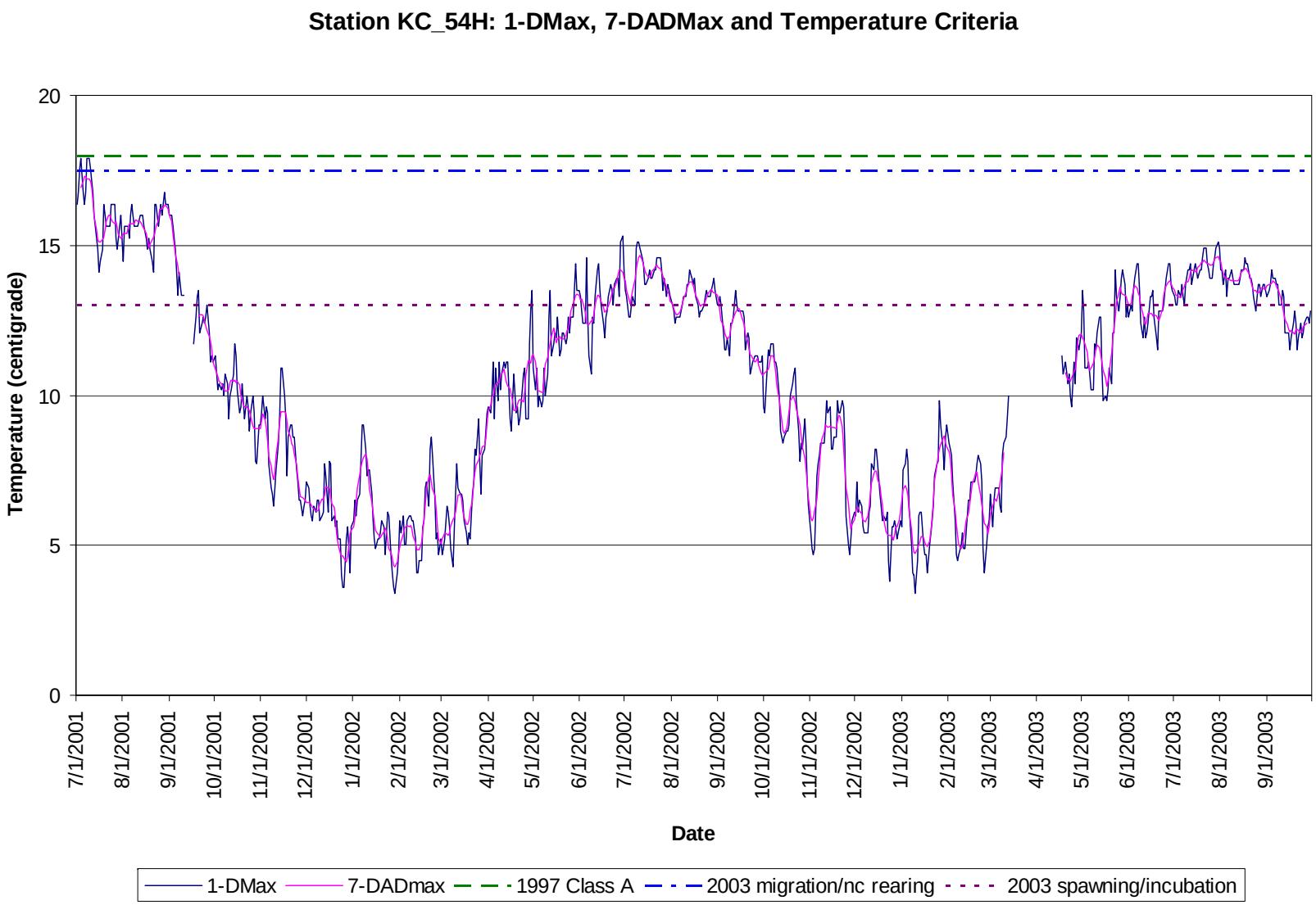

Station KC_44F: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

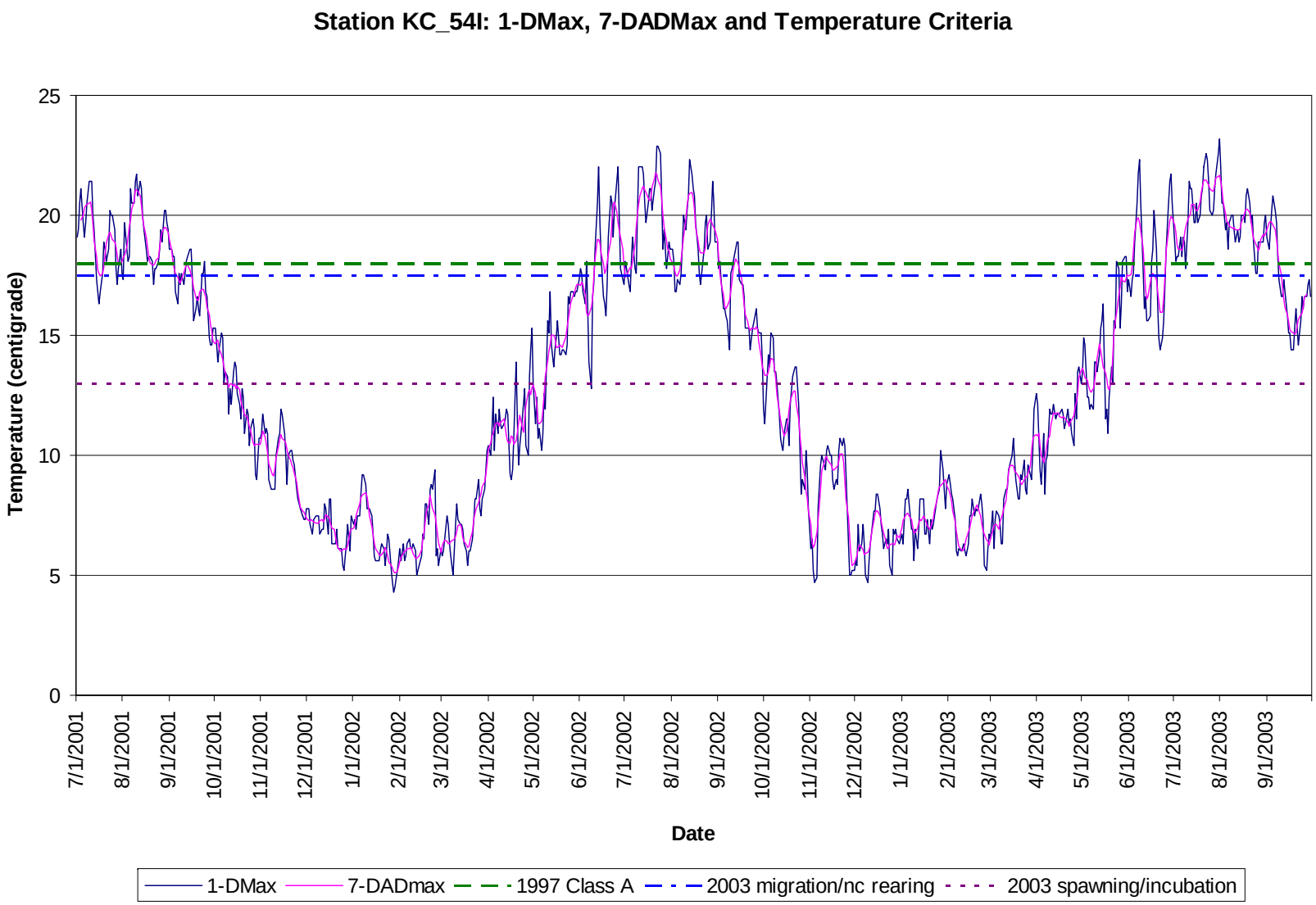

Station KC_44G: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

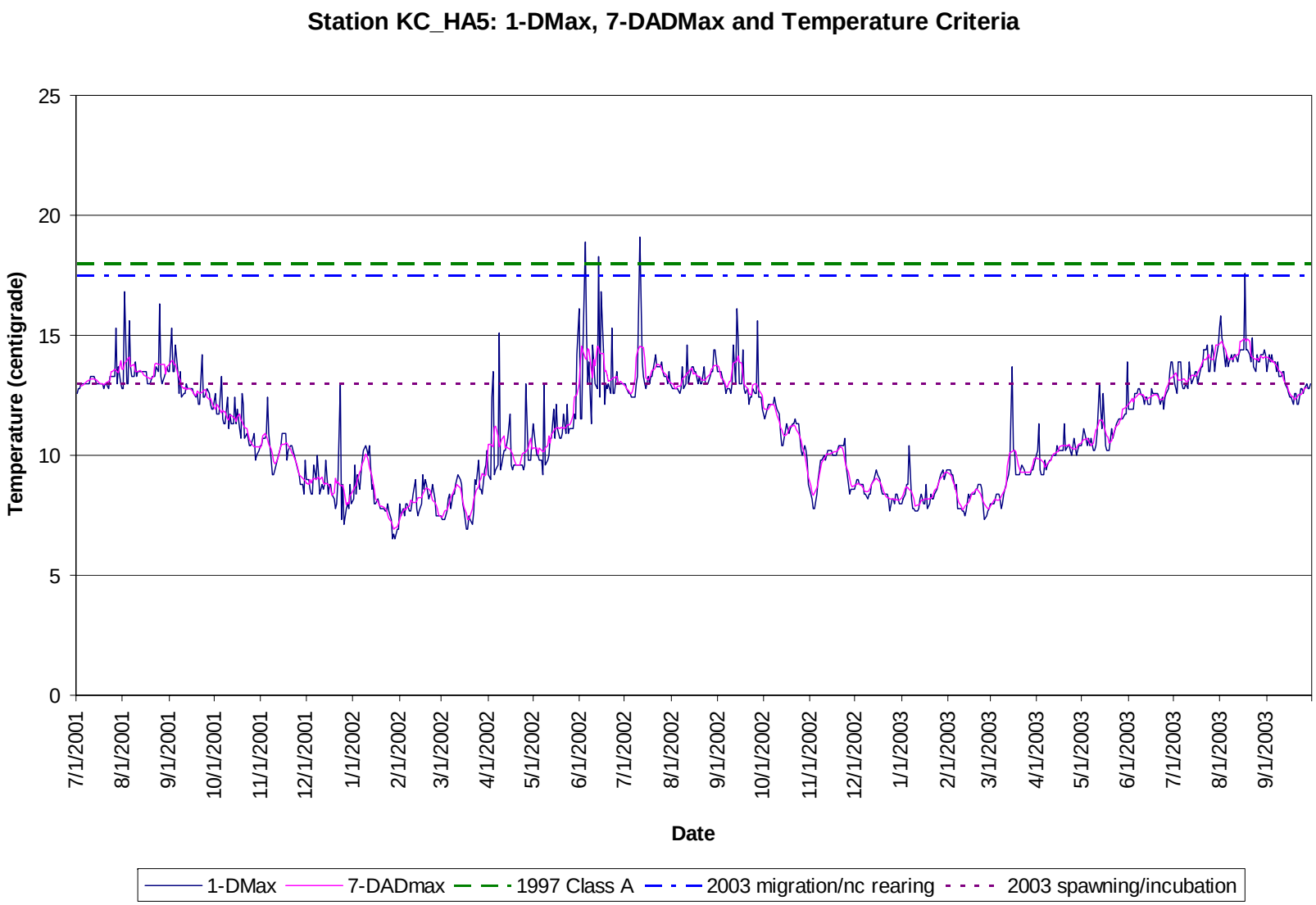

Station KC_44H: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

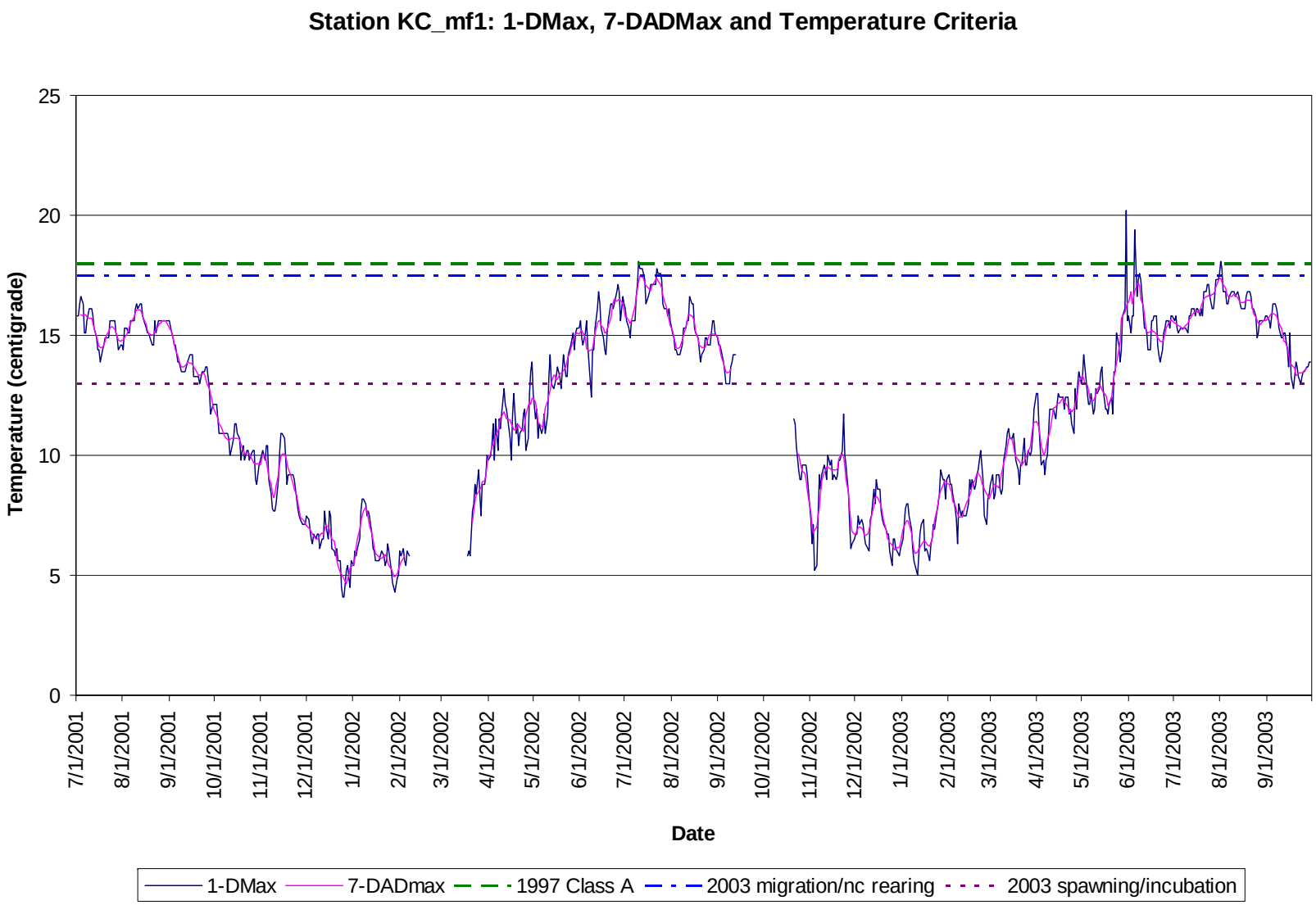

Station KC_54A: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

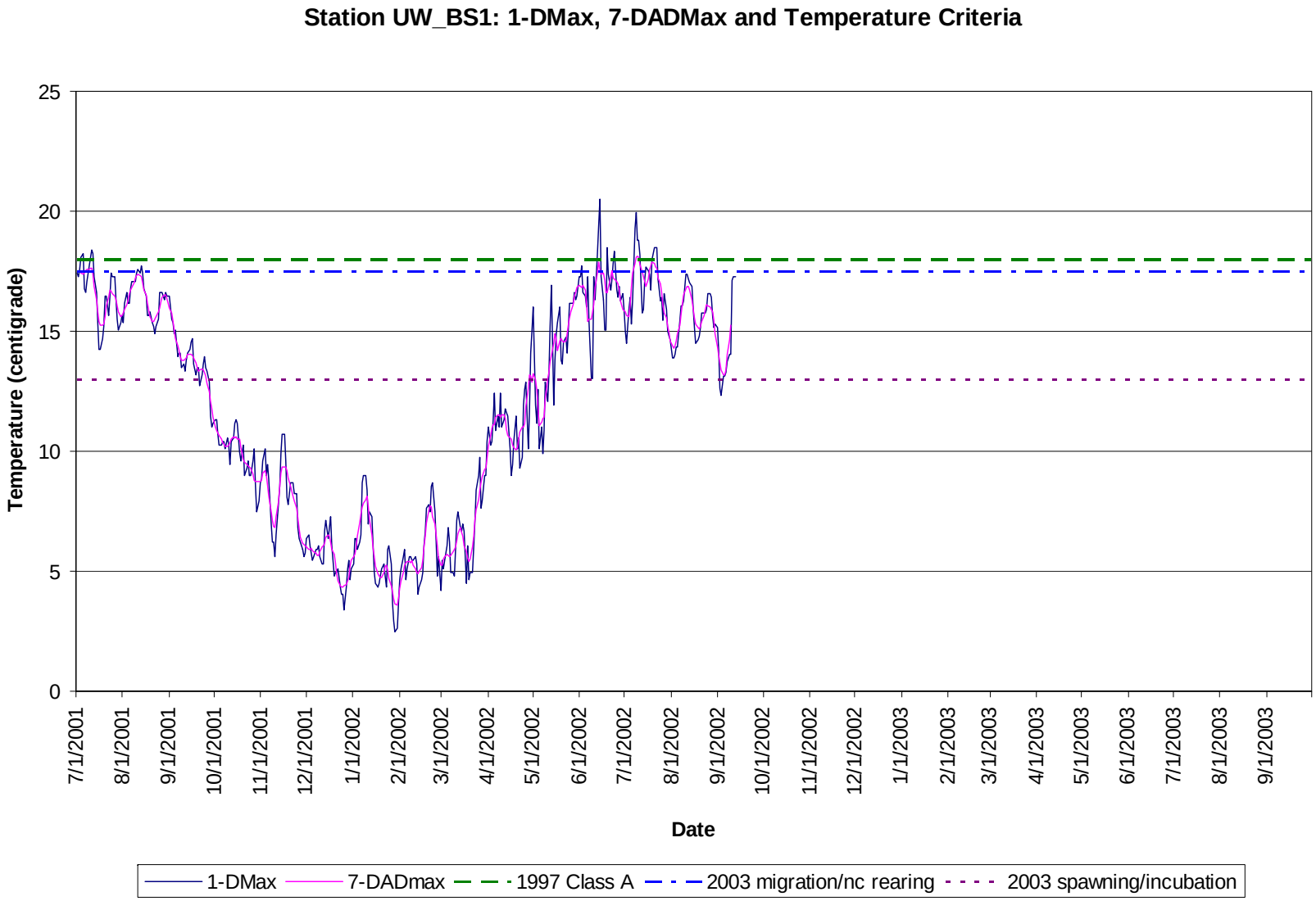

Station KC_54C: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
30
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

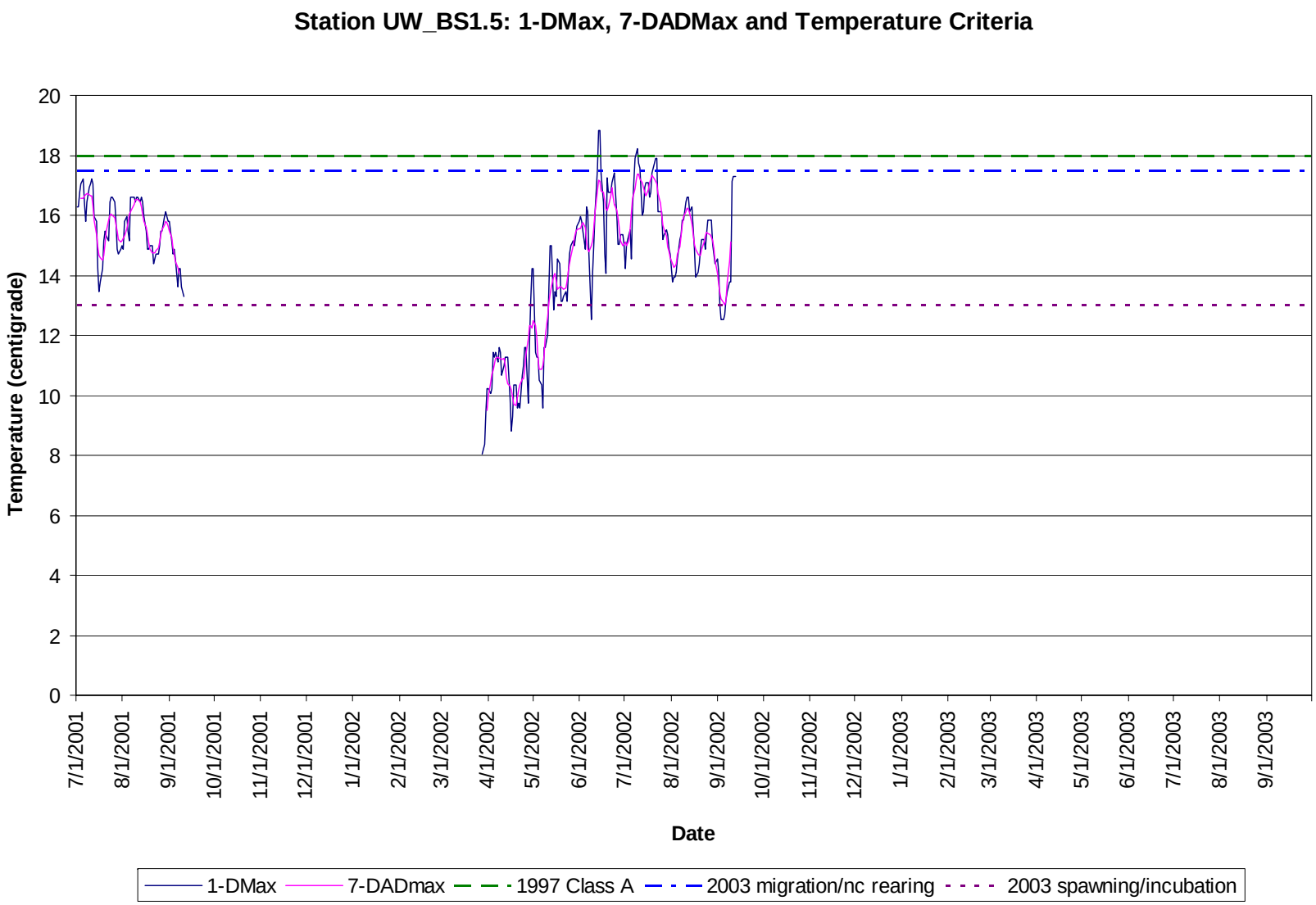

Station KC_54H: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

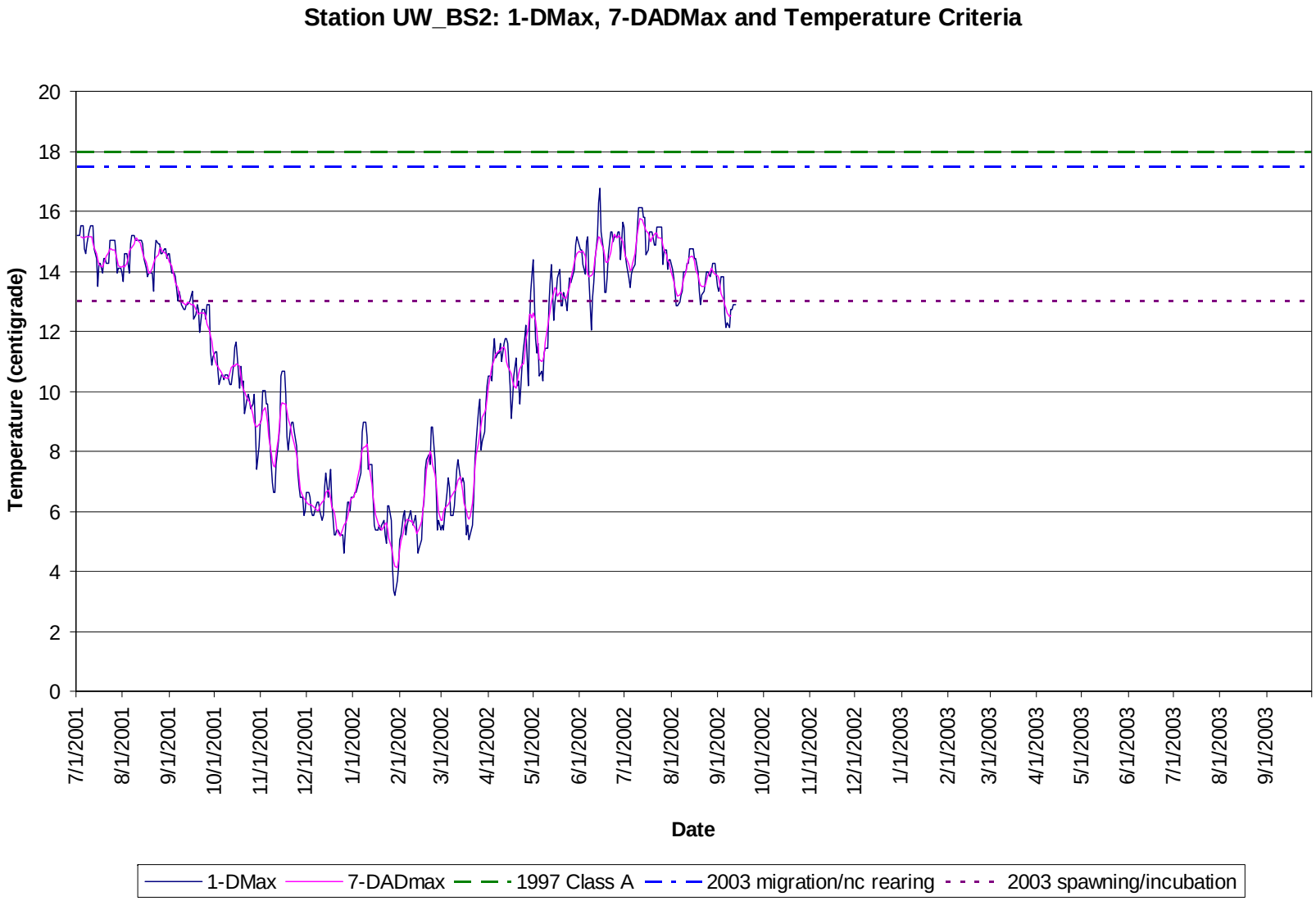

Station KC_54I: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

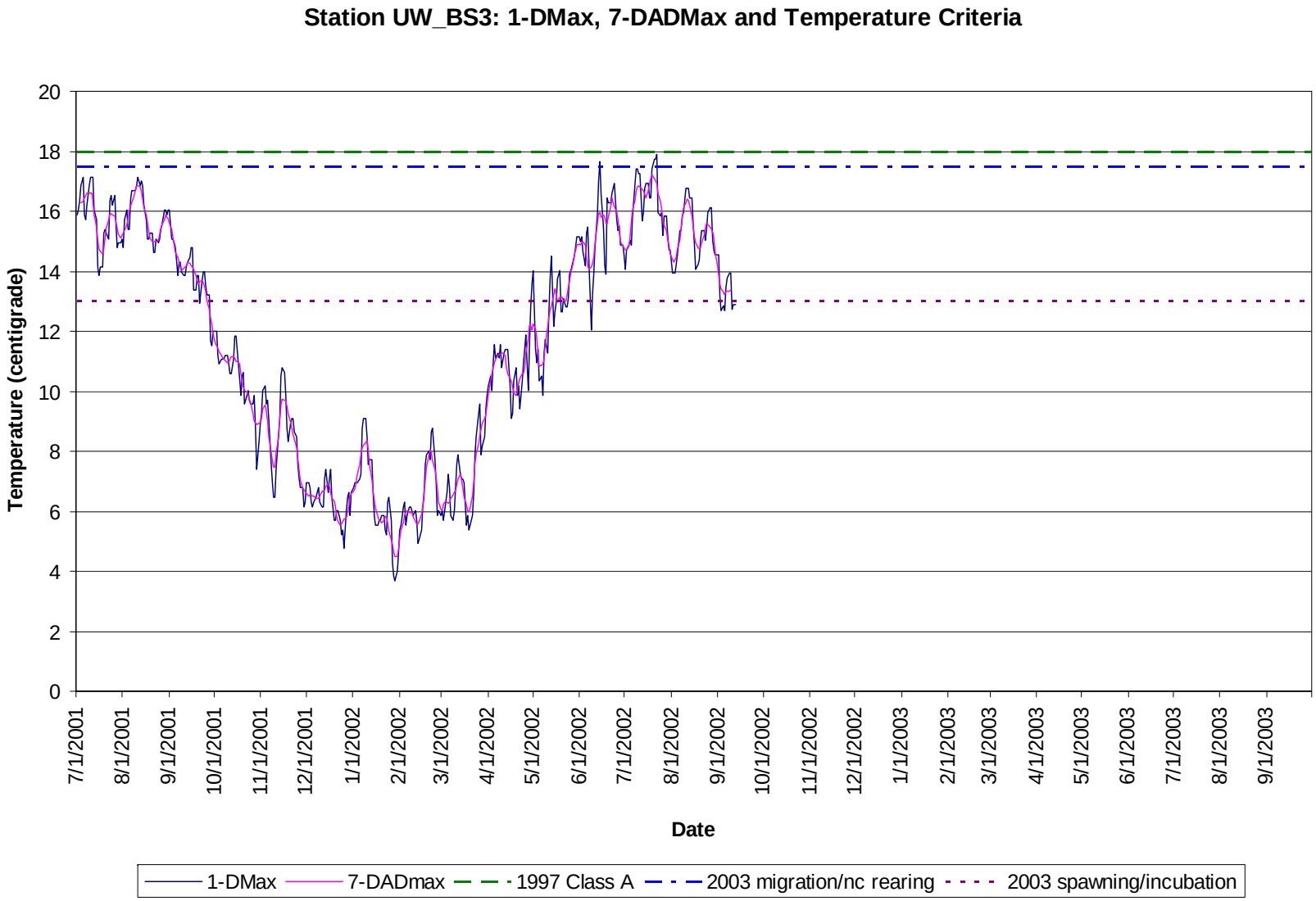

Station KC_HA5: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

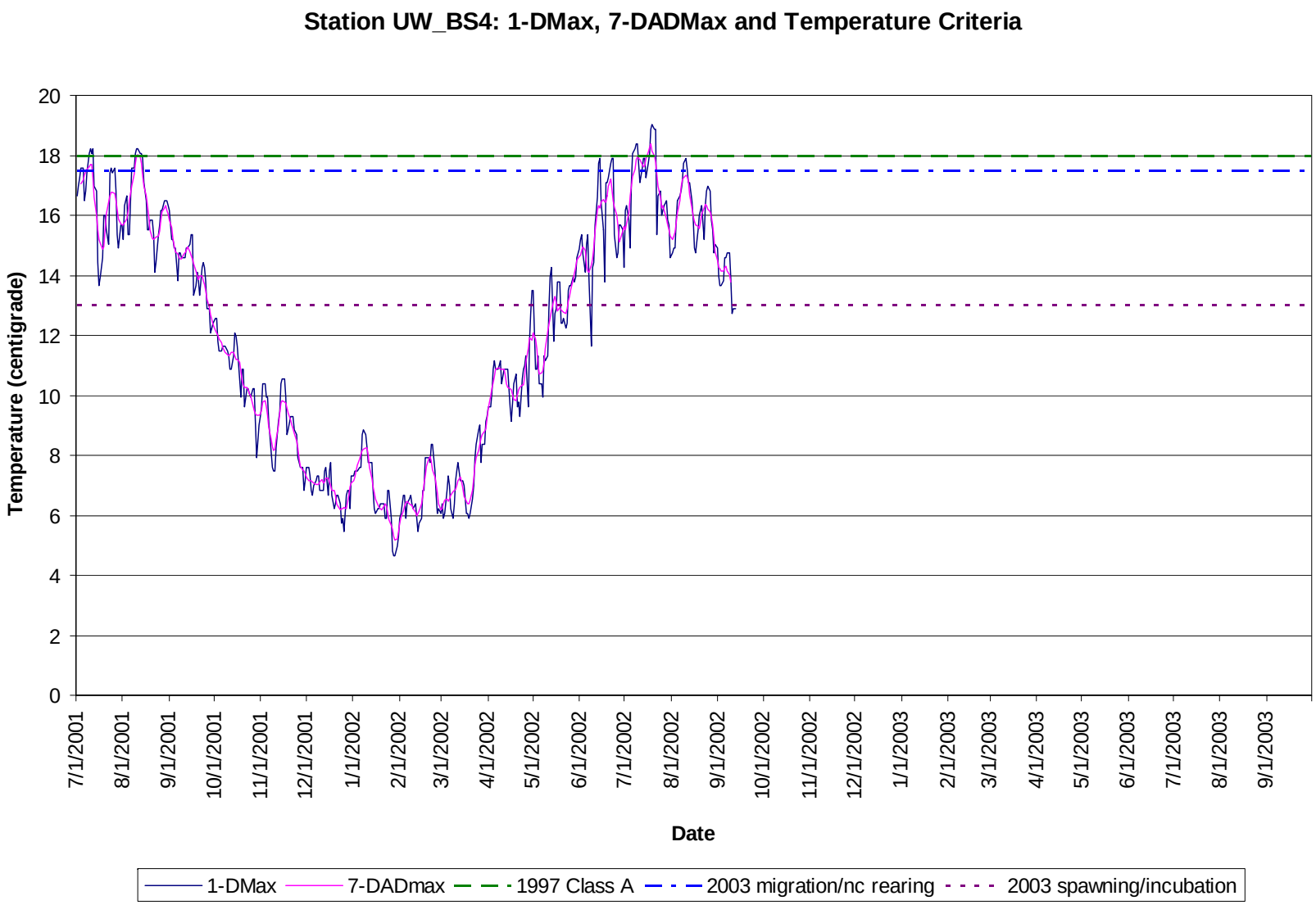

Station KC_mf1: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation


Station UW_BS1: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation


Station UW_BS1.5: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
18
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation


Station UW_BS2: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
18
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation


Station UW_BS3: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
18
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation


Station UW_BS4: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
18
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
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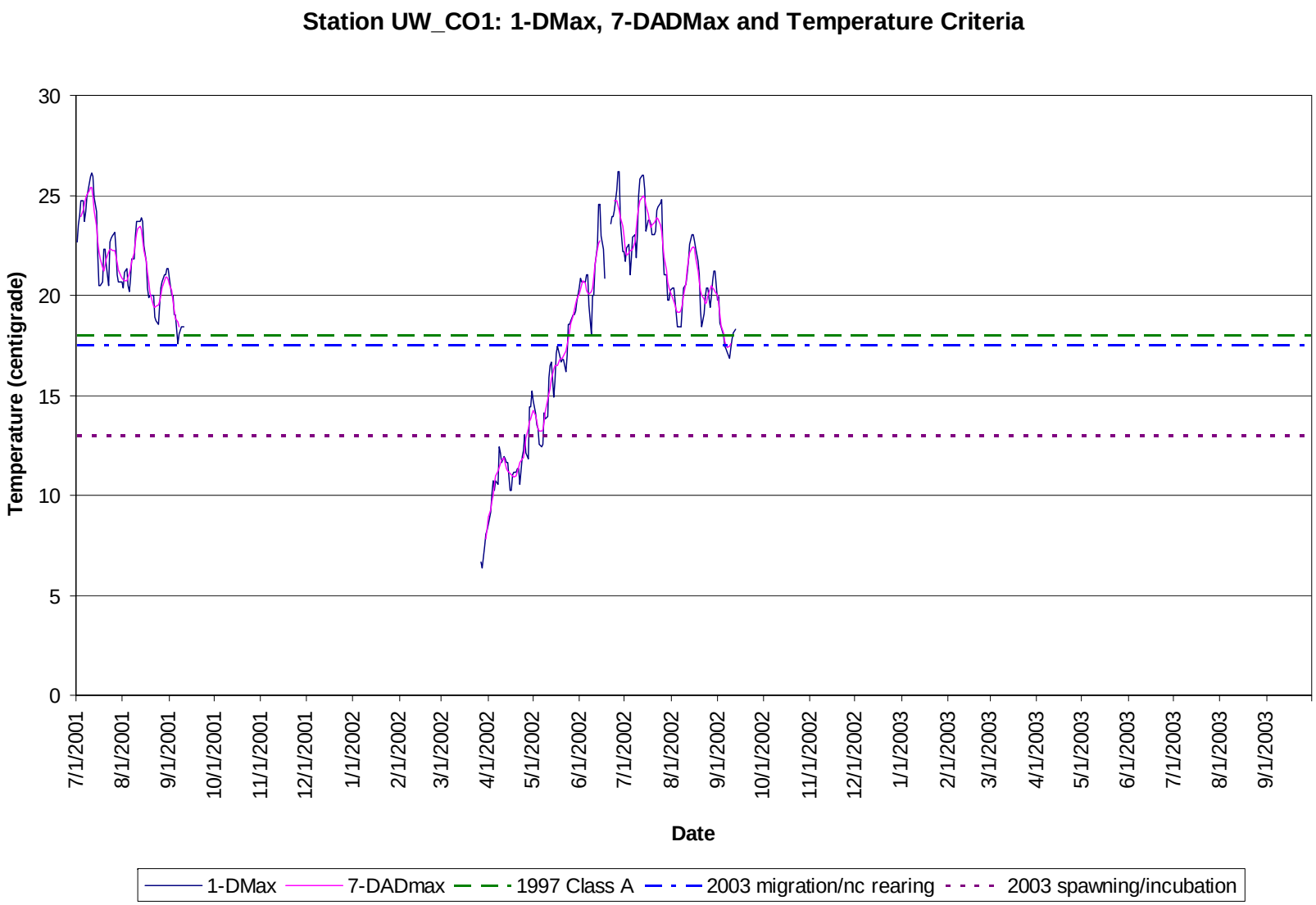
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation


Station UW_CO1: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
30
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
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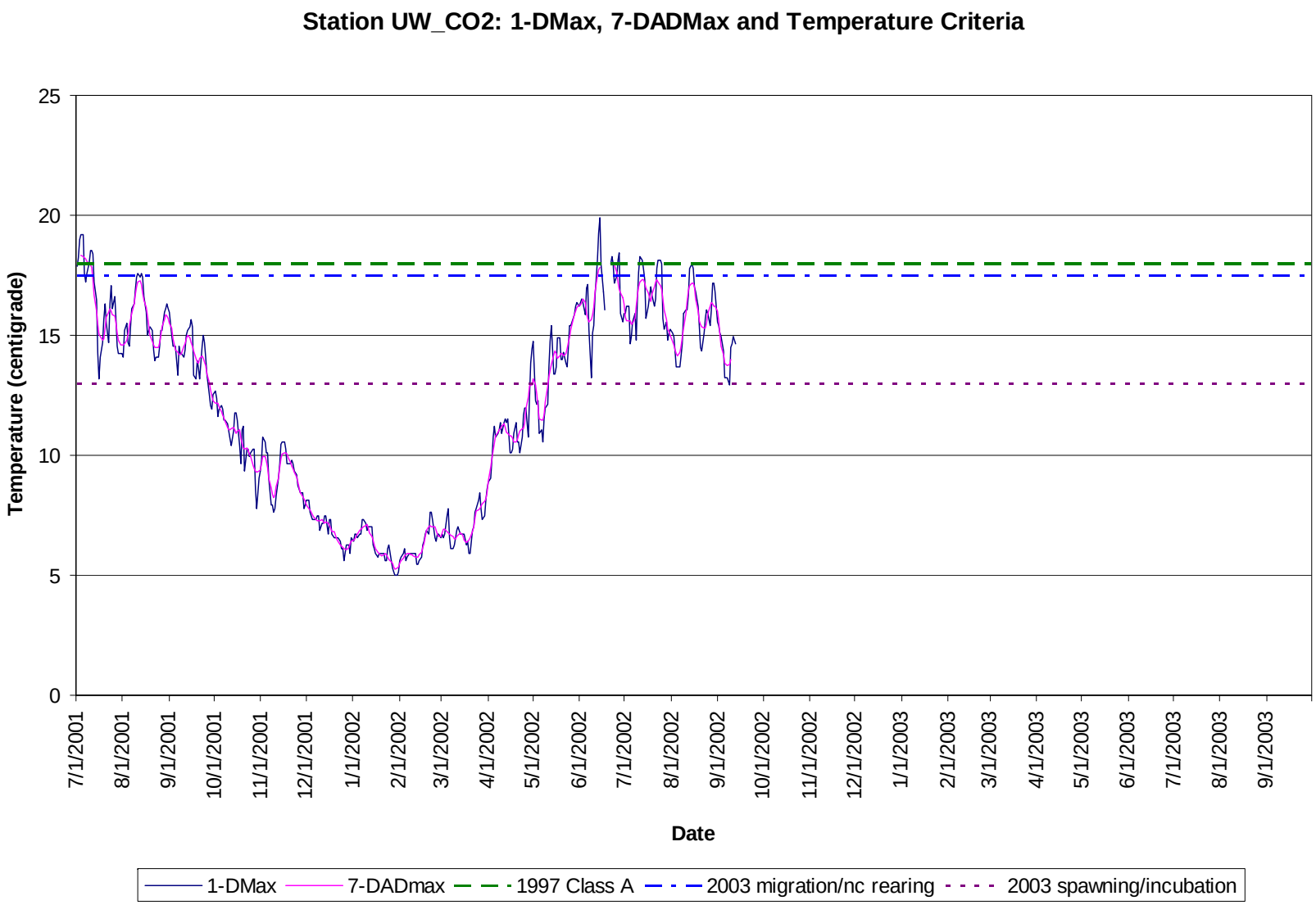
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation


Station UW_CO2: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
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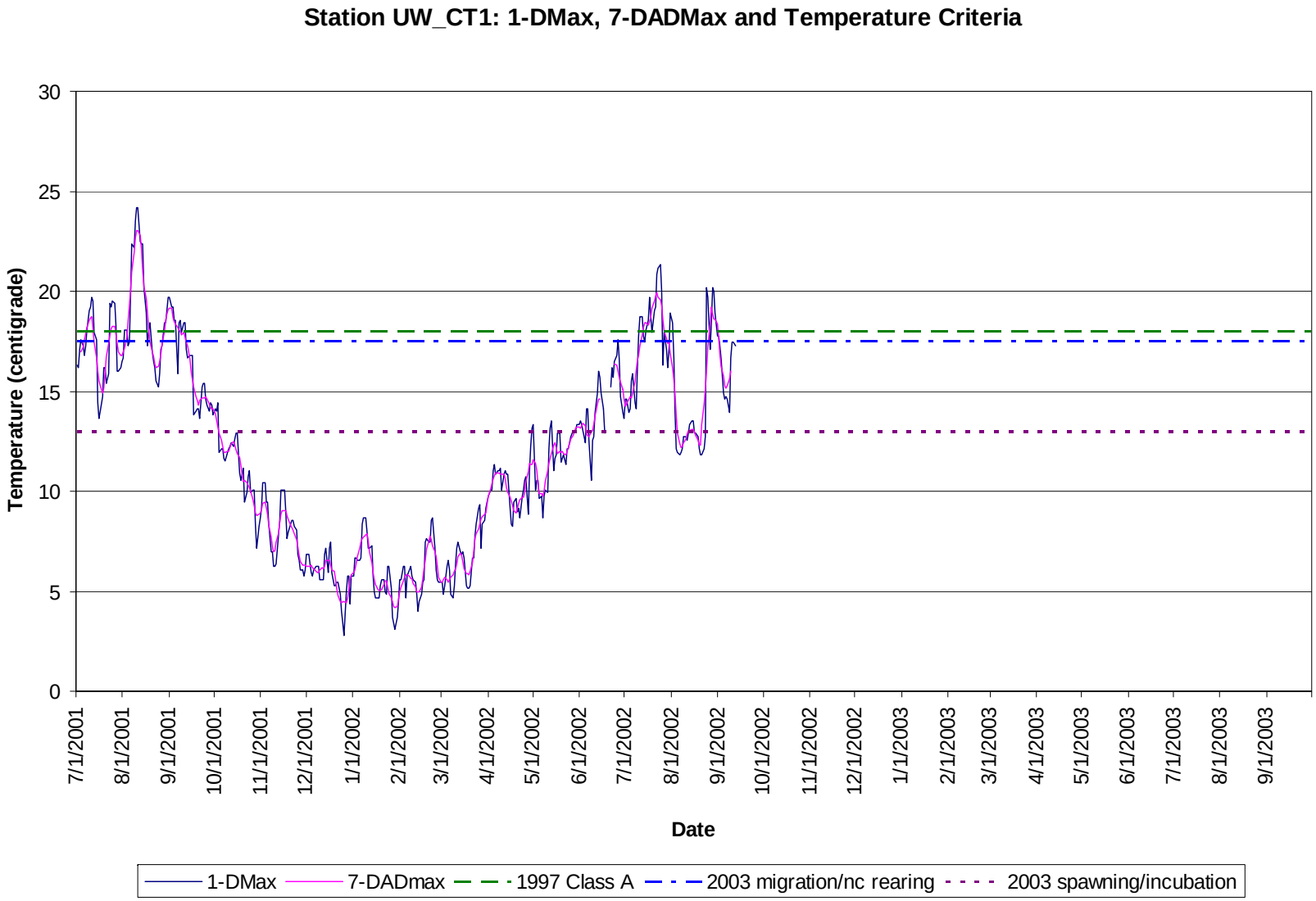
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation


Station UW_CT1: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
30
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
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3/1/2002
4/1/2002
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7/1/2002
8/1/2002
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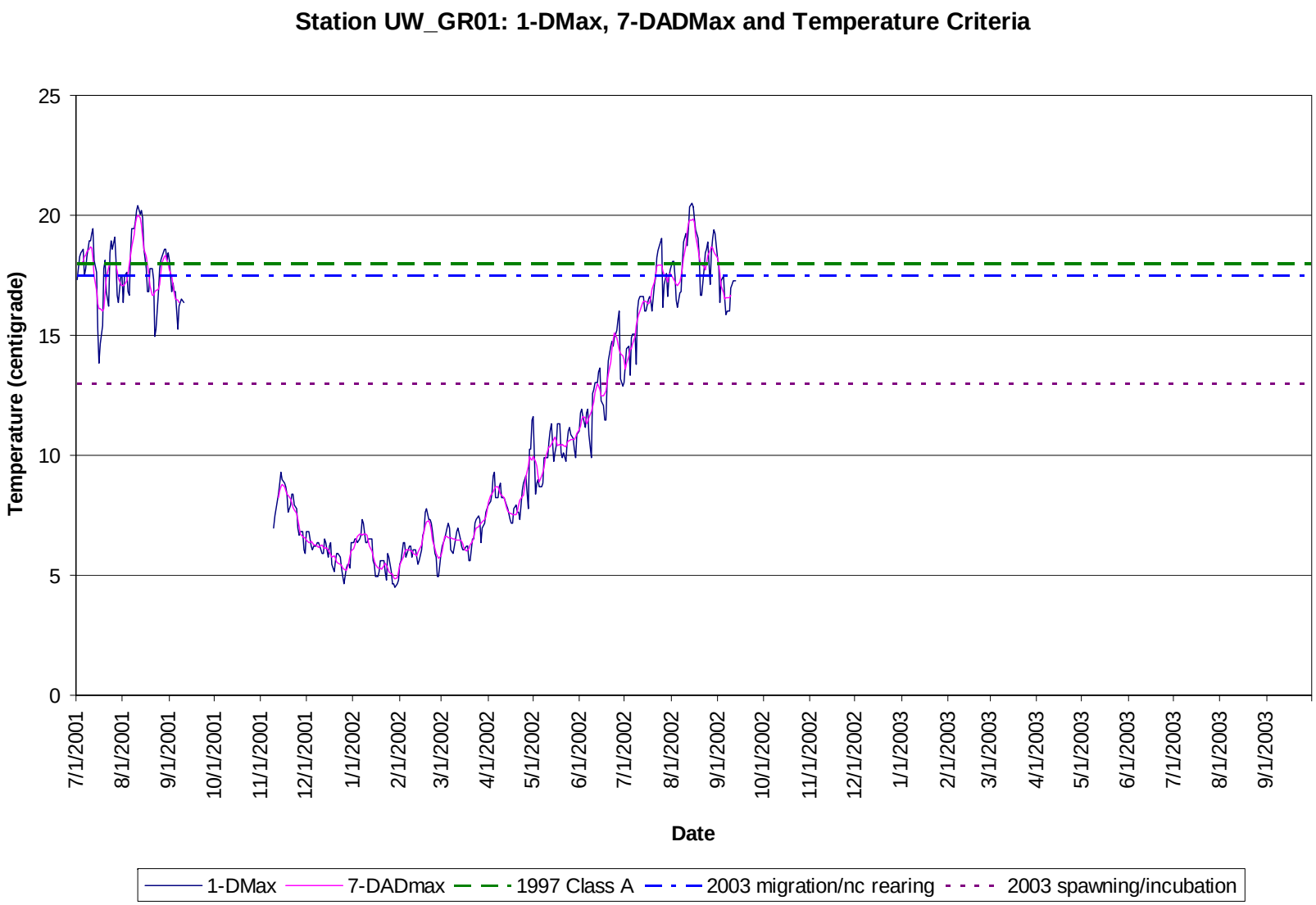
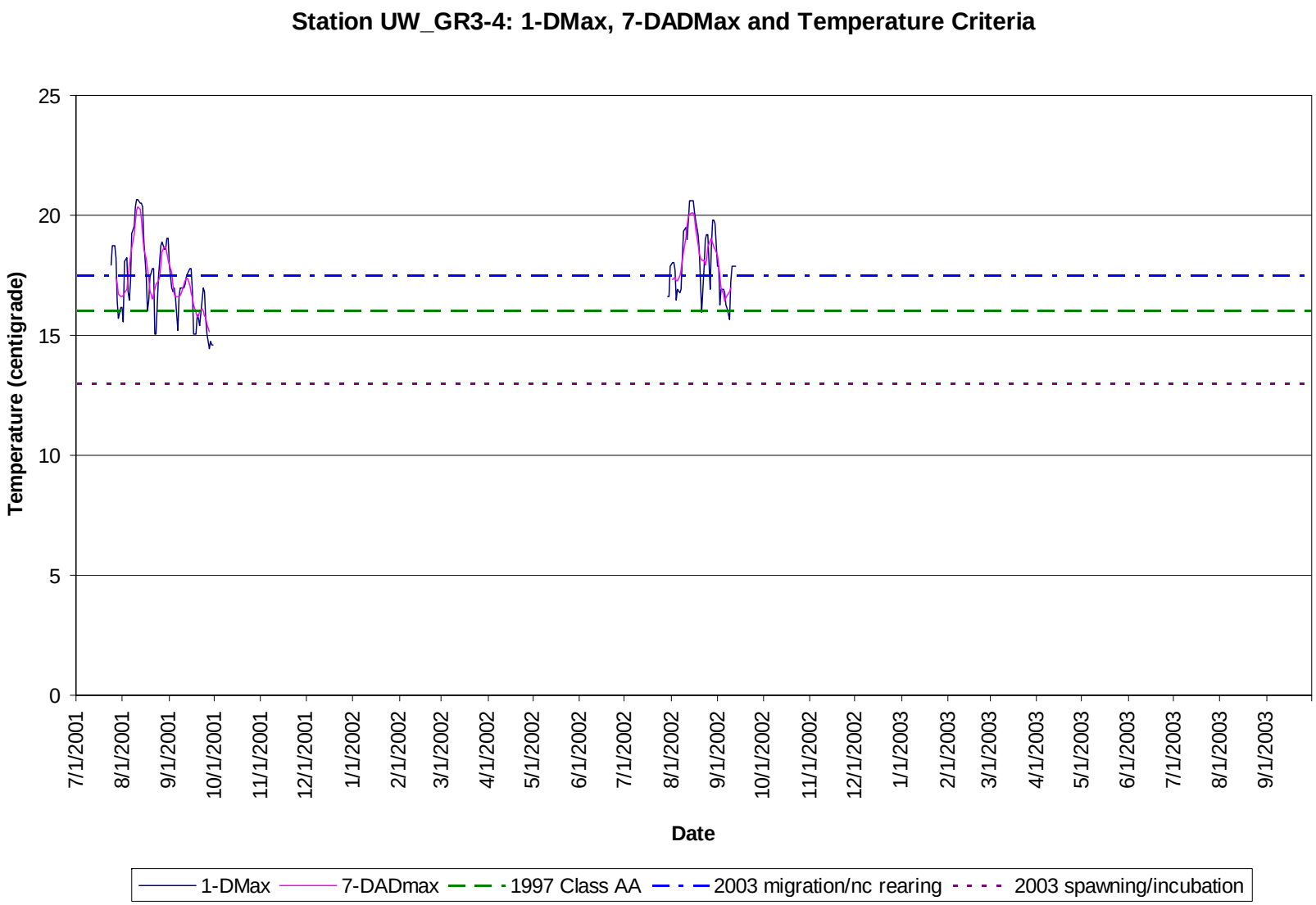
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation


Station UW_GR01: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation


Station UW_GR3-4: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
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6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
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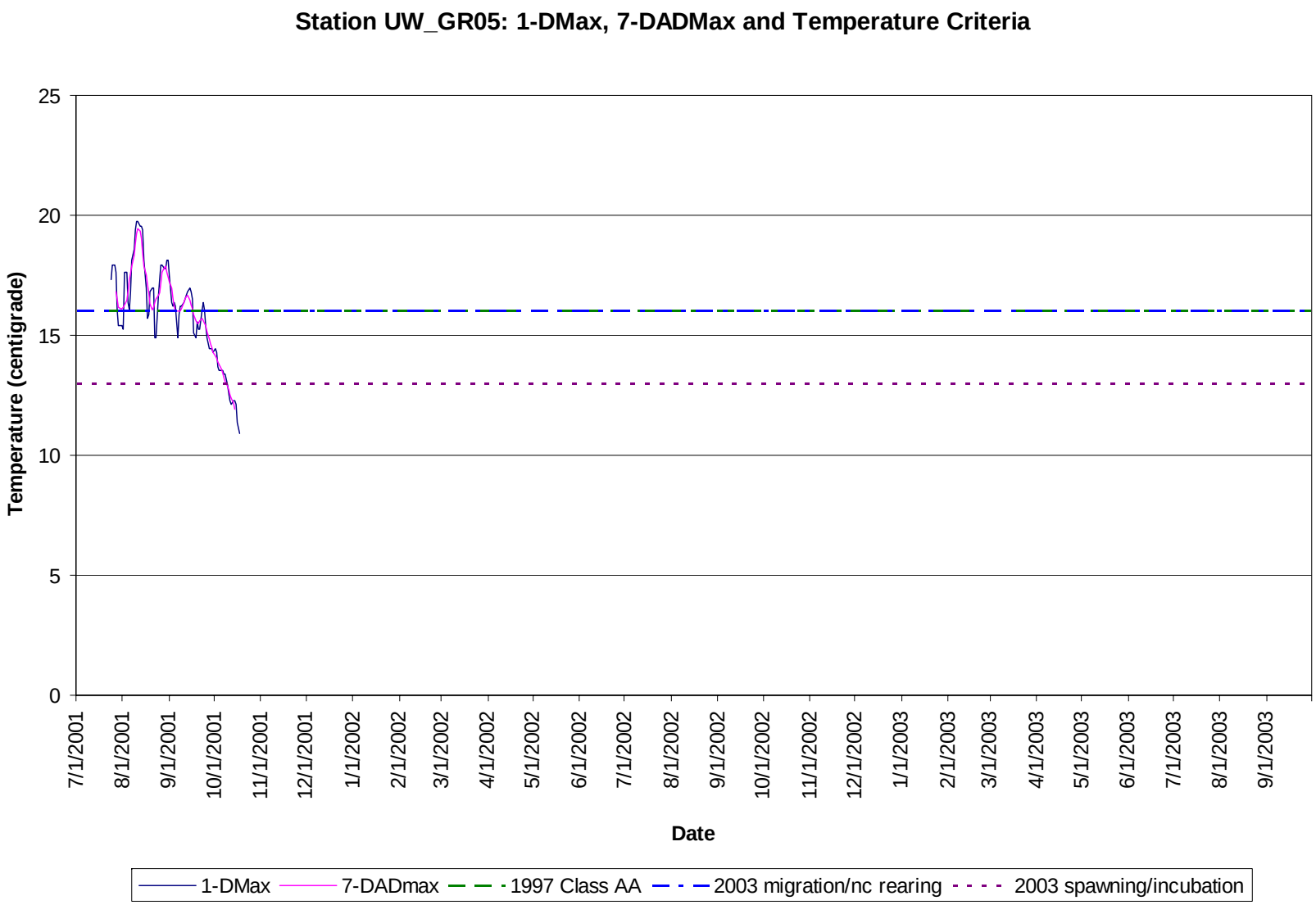
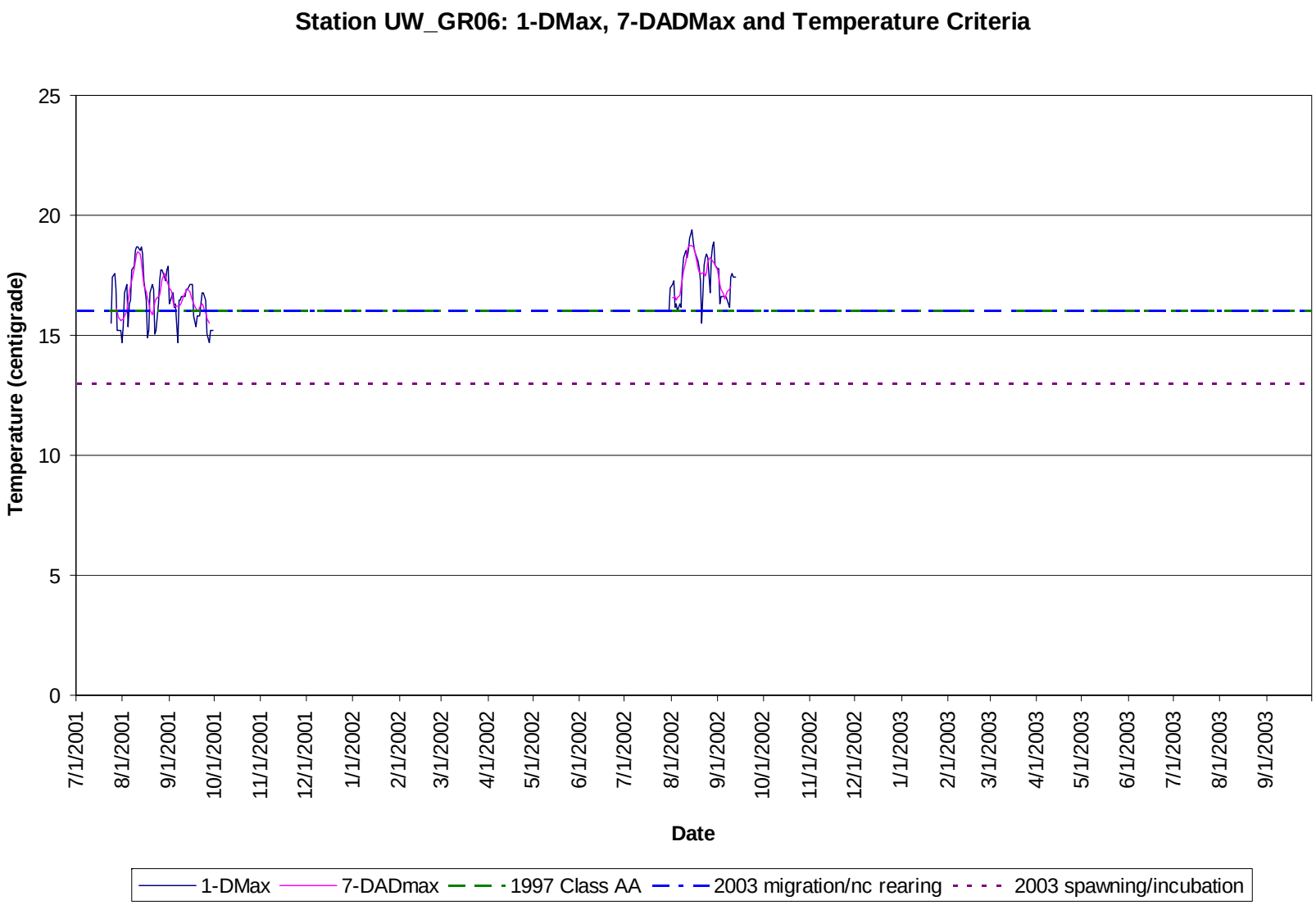
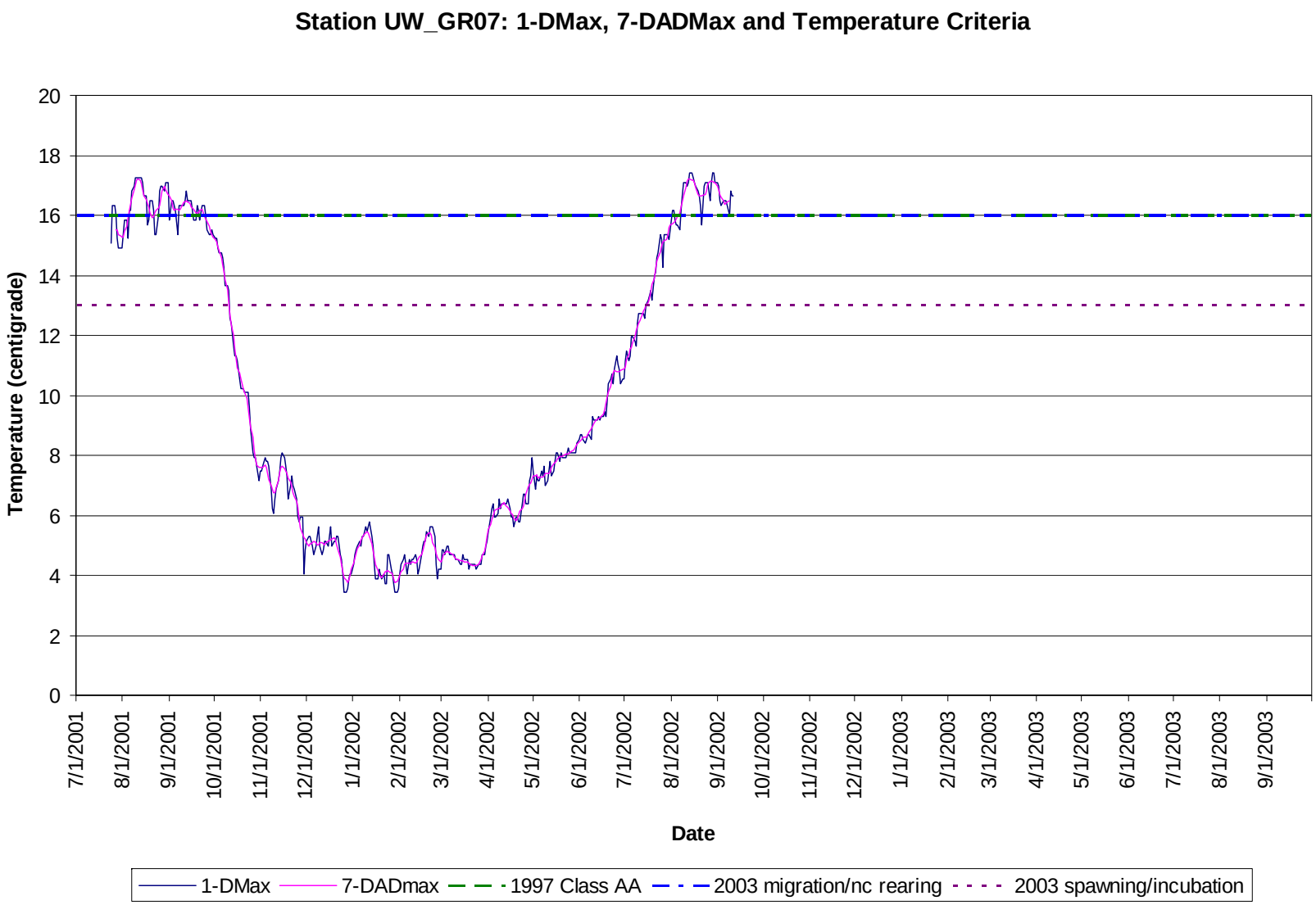
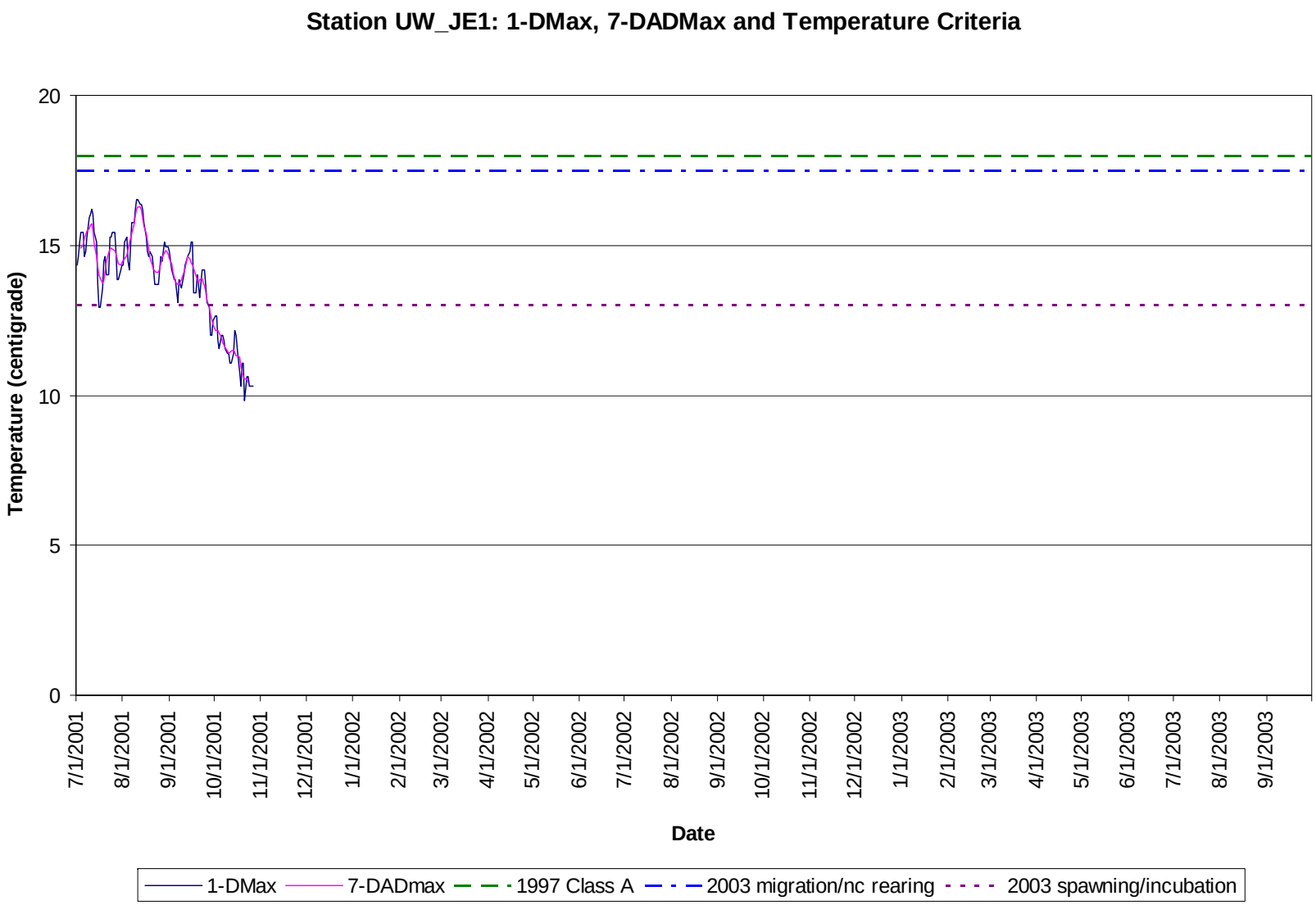
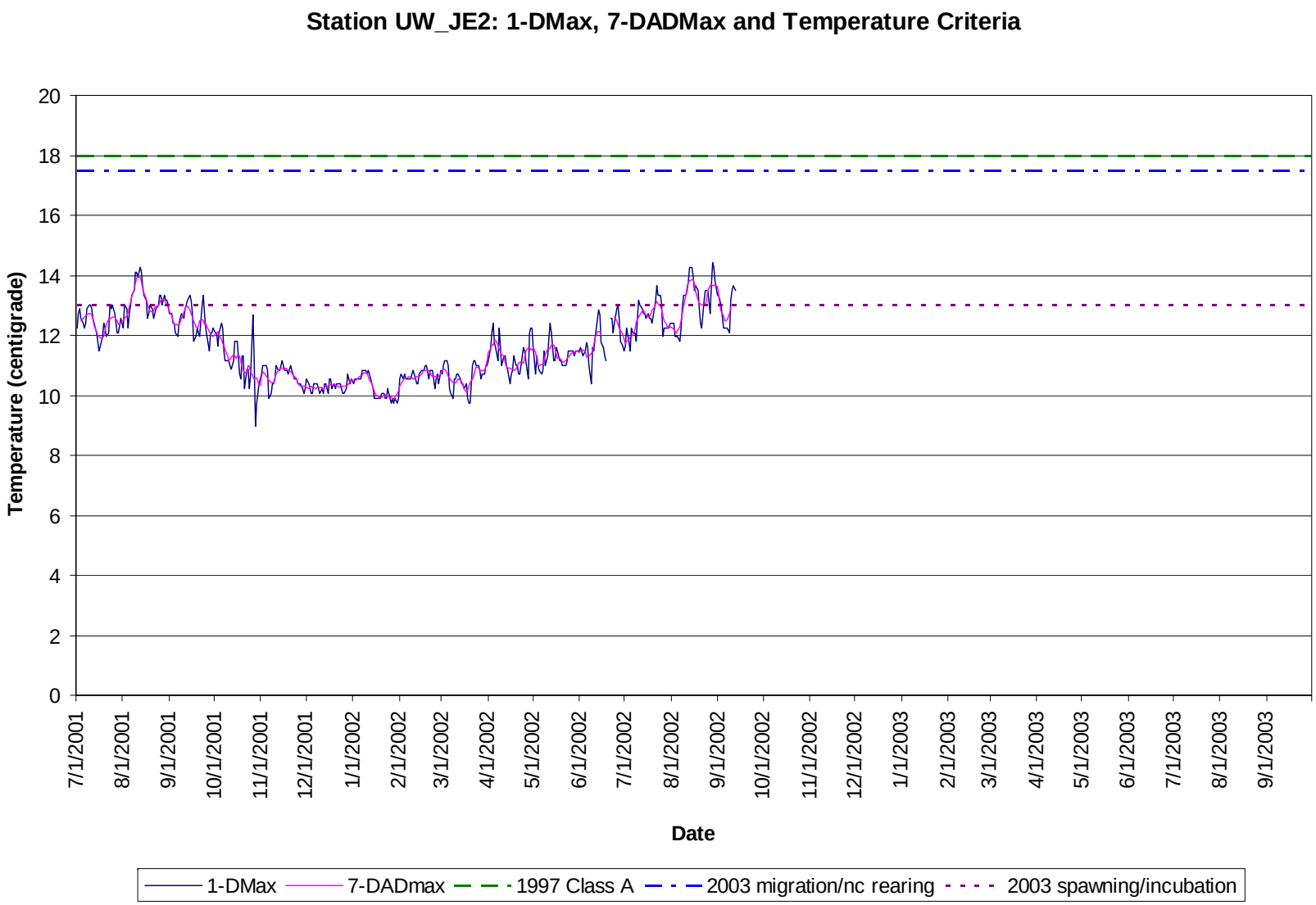
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation

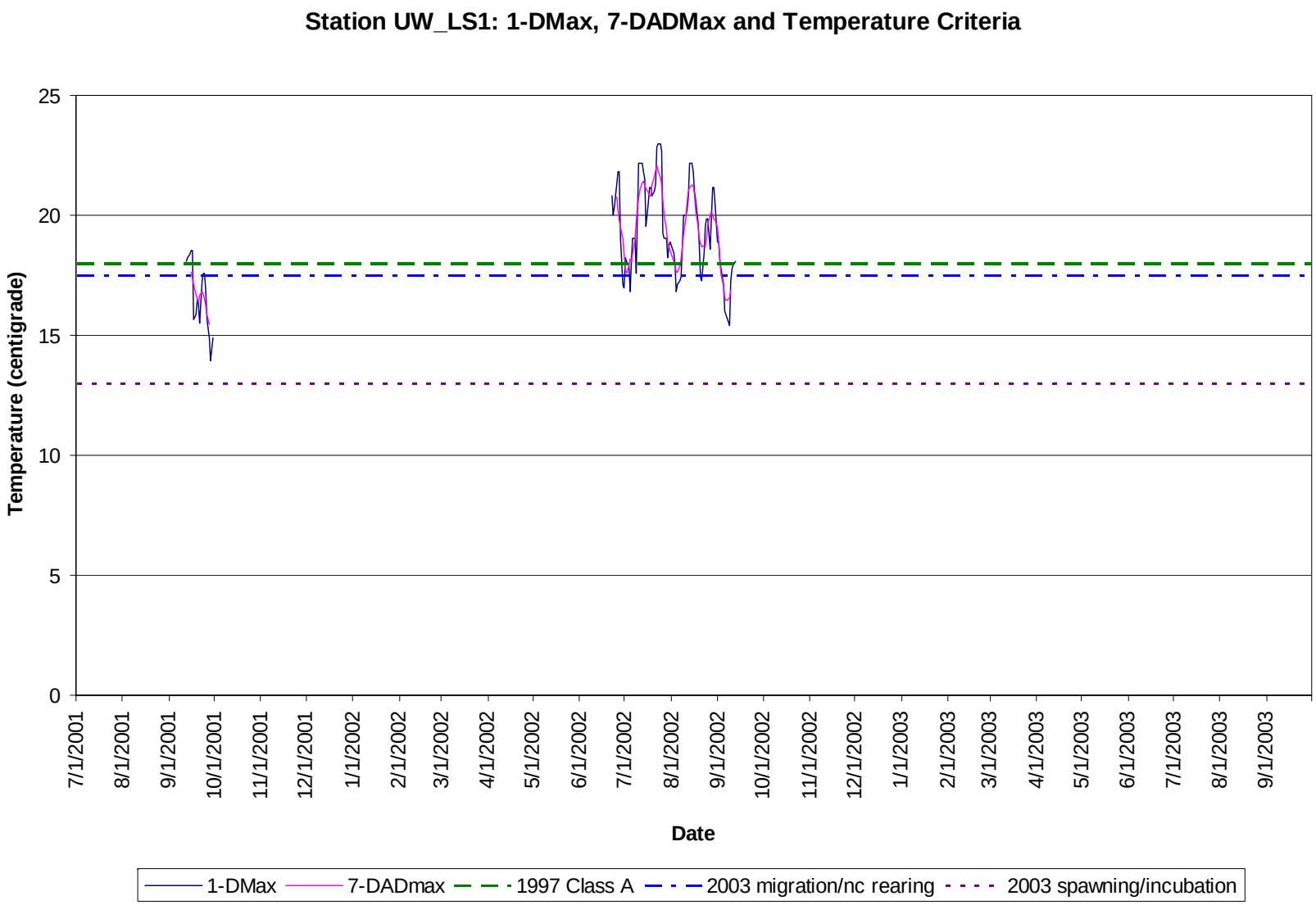

Station UW_GR05: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation

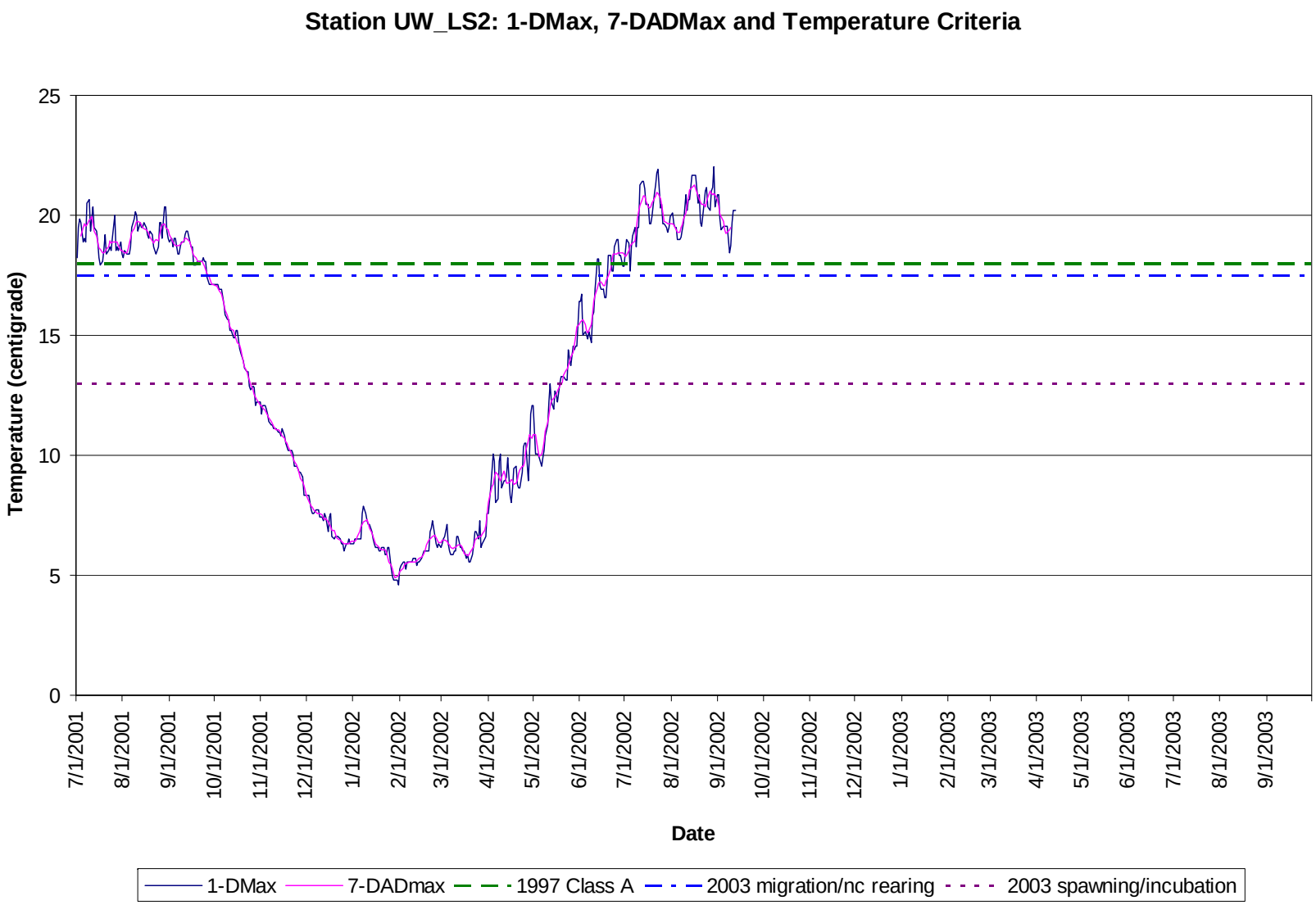

Station UW_GR06: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation

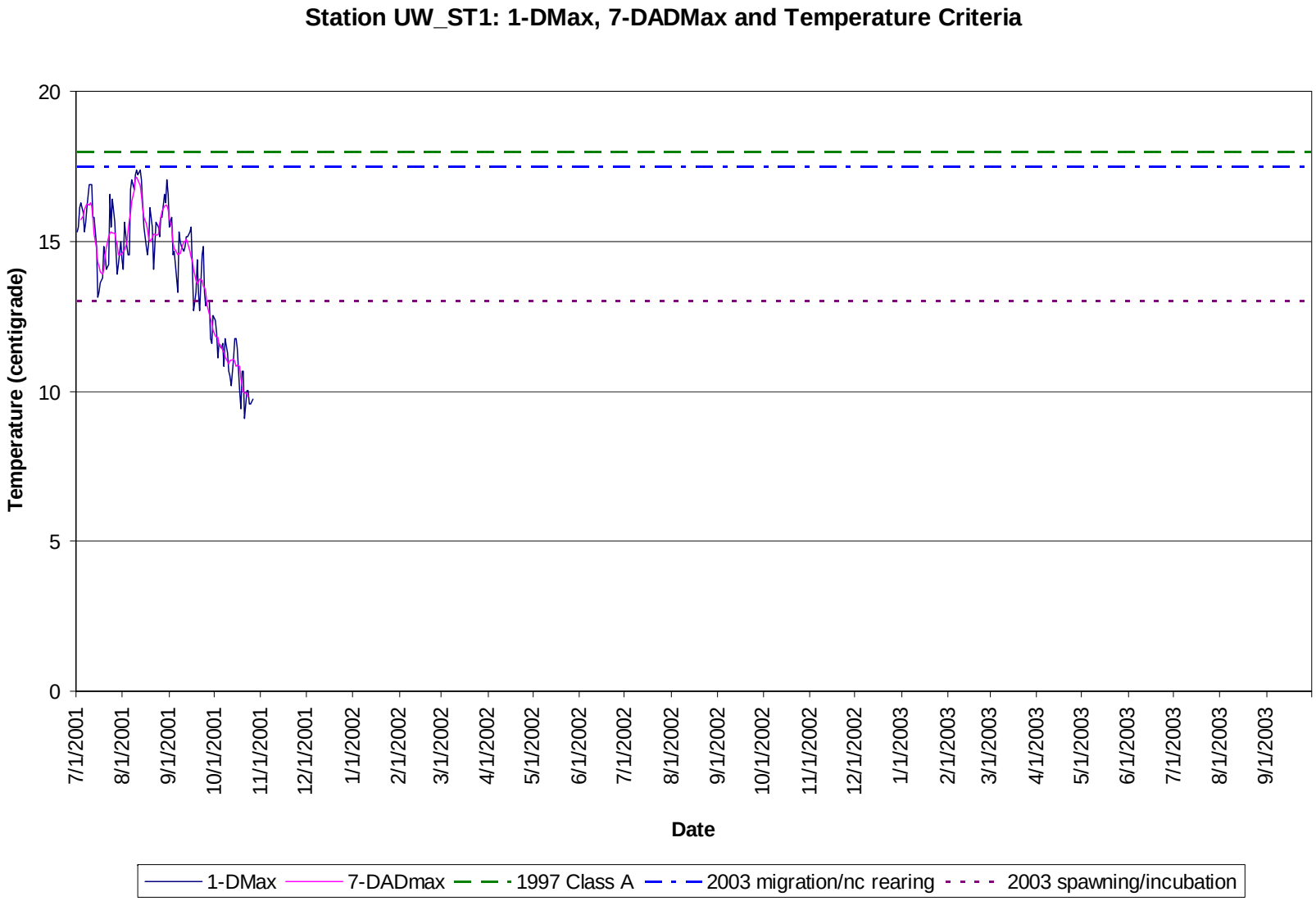

Station UW_GR07: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
18
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation

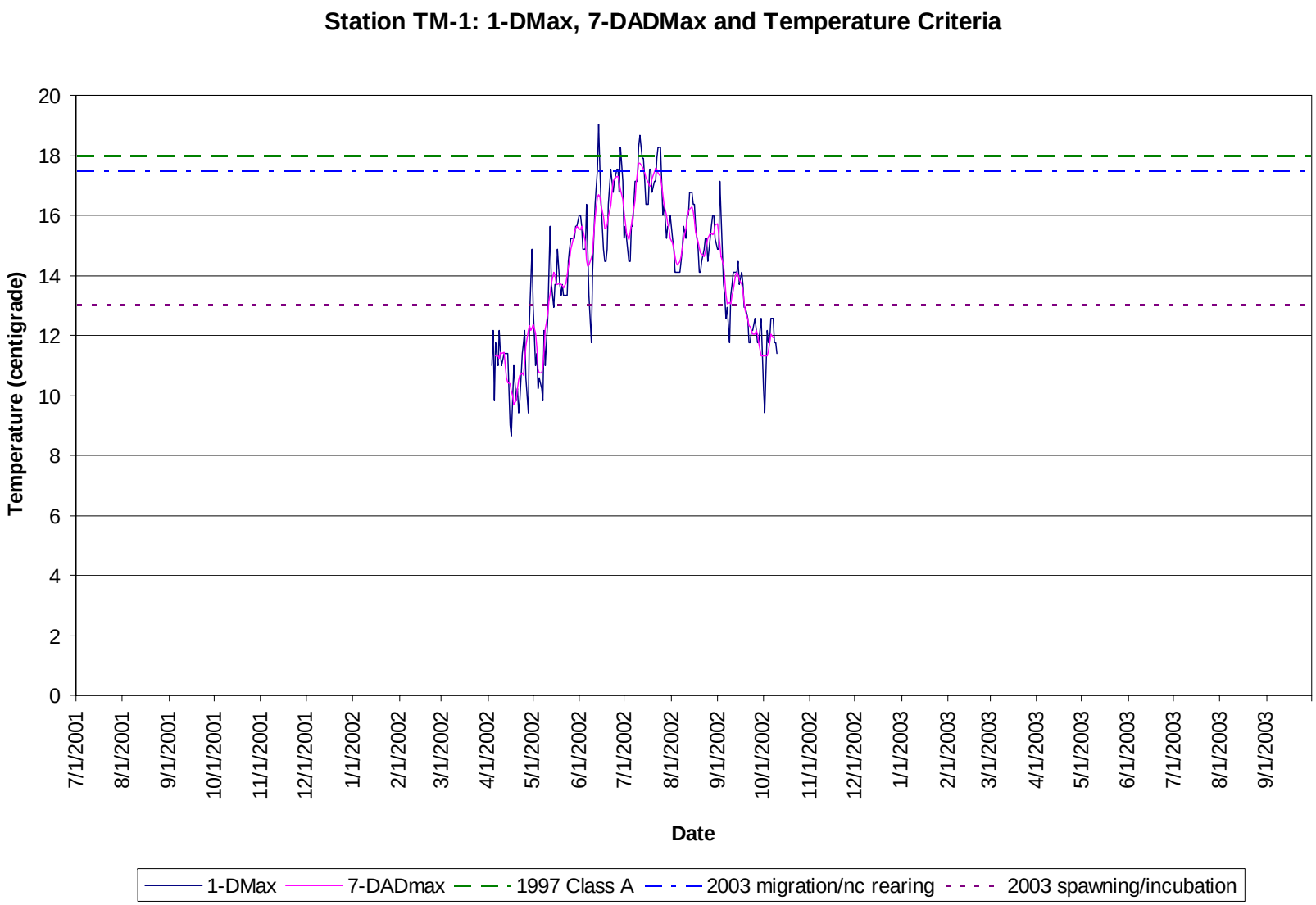

Station UW_JE1: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

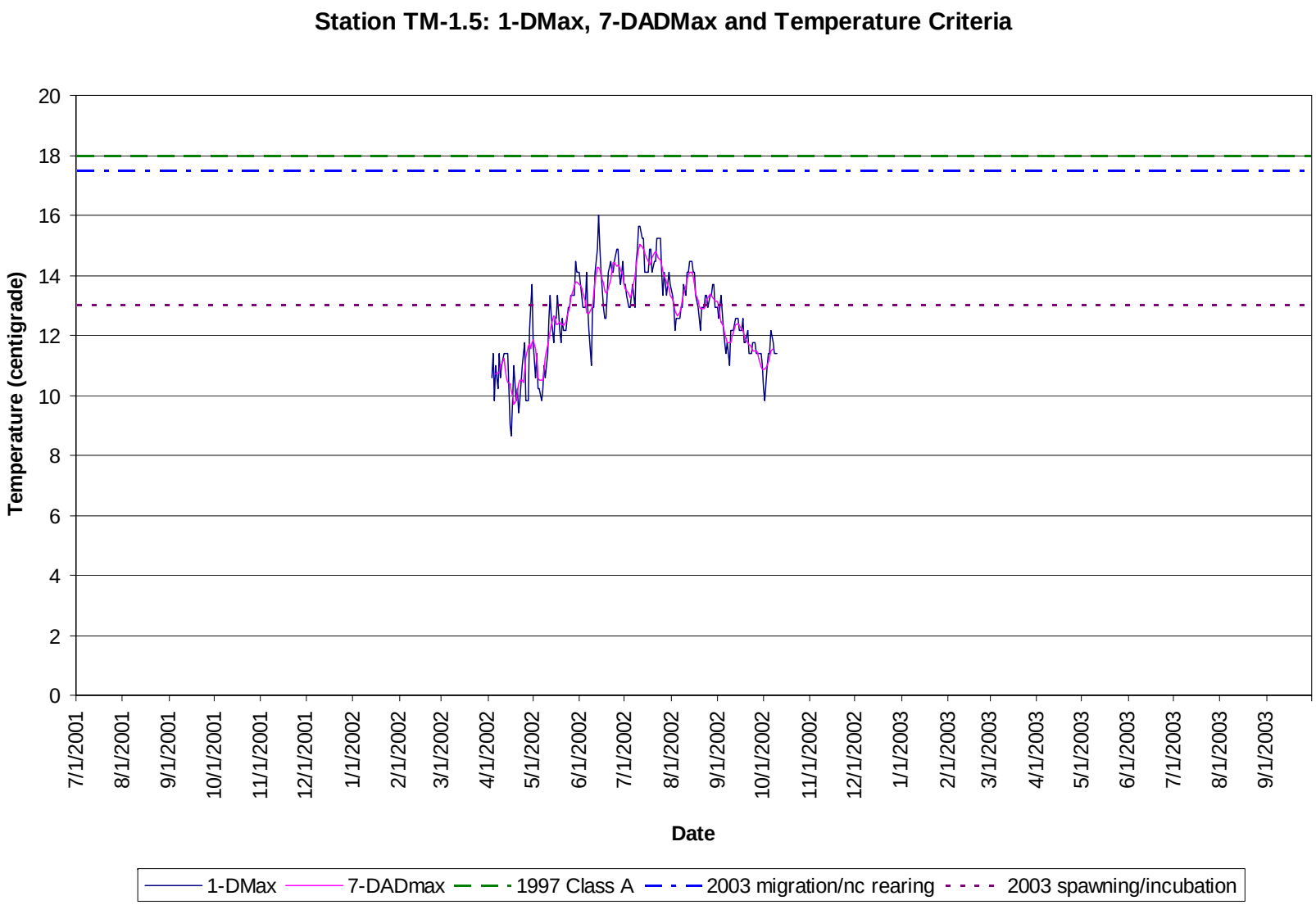

Station UW_JE2: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
18
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

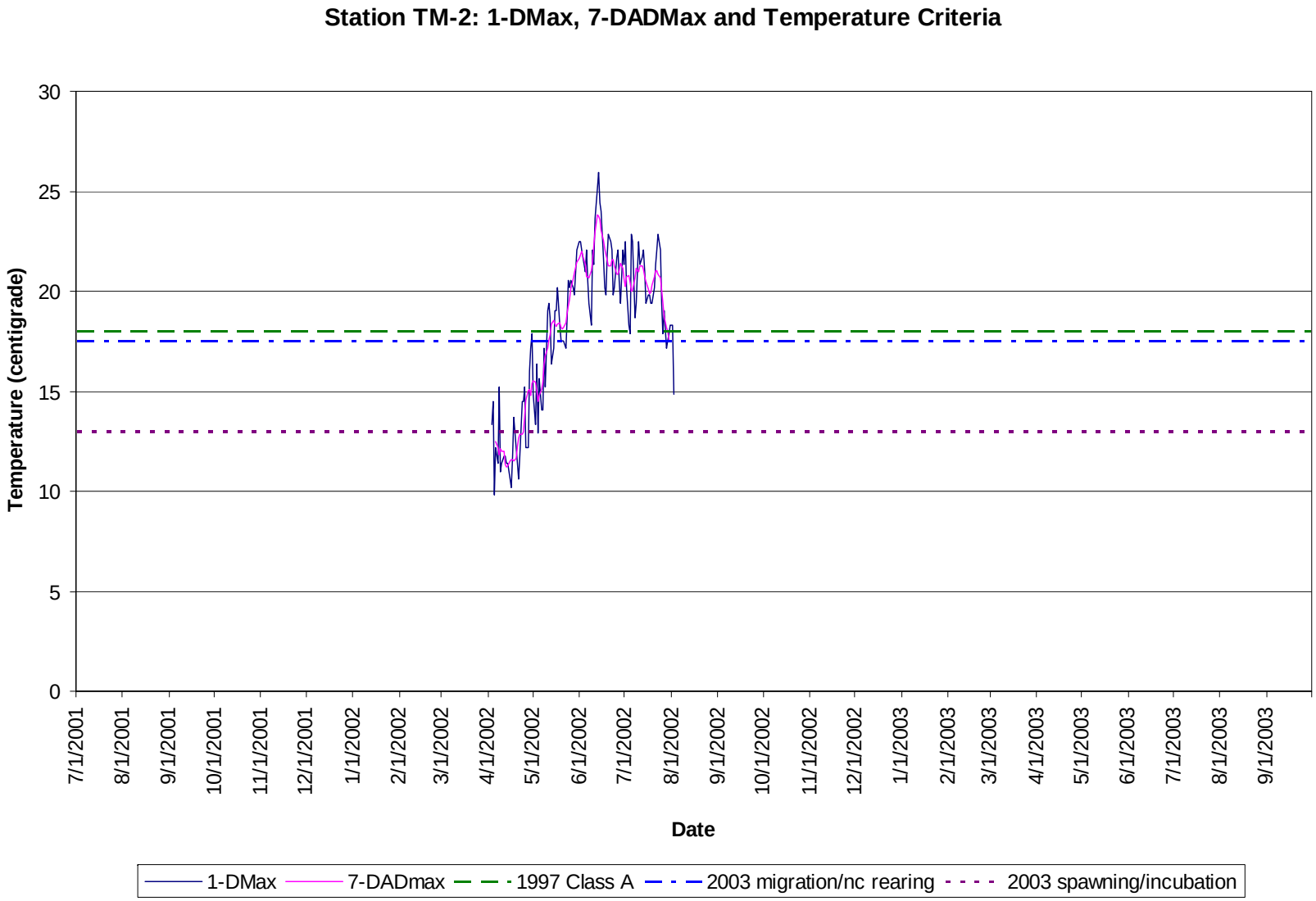

Station UW_LS1: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

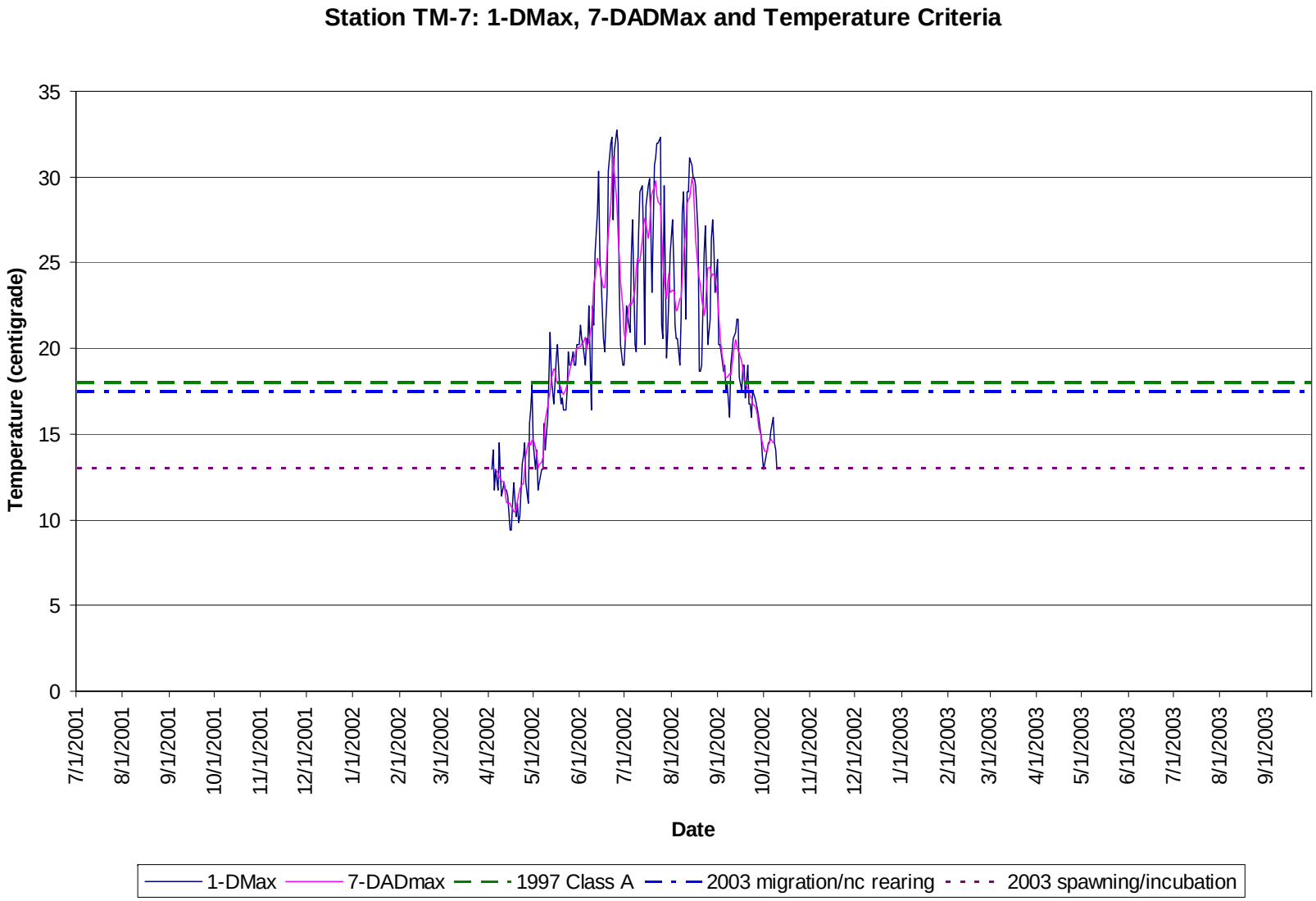

Station UW_LS2: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

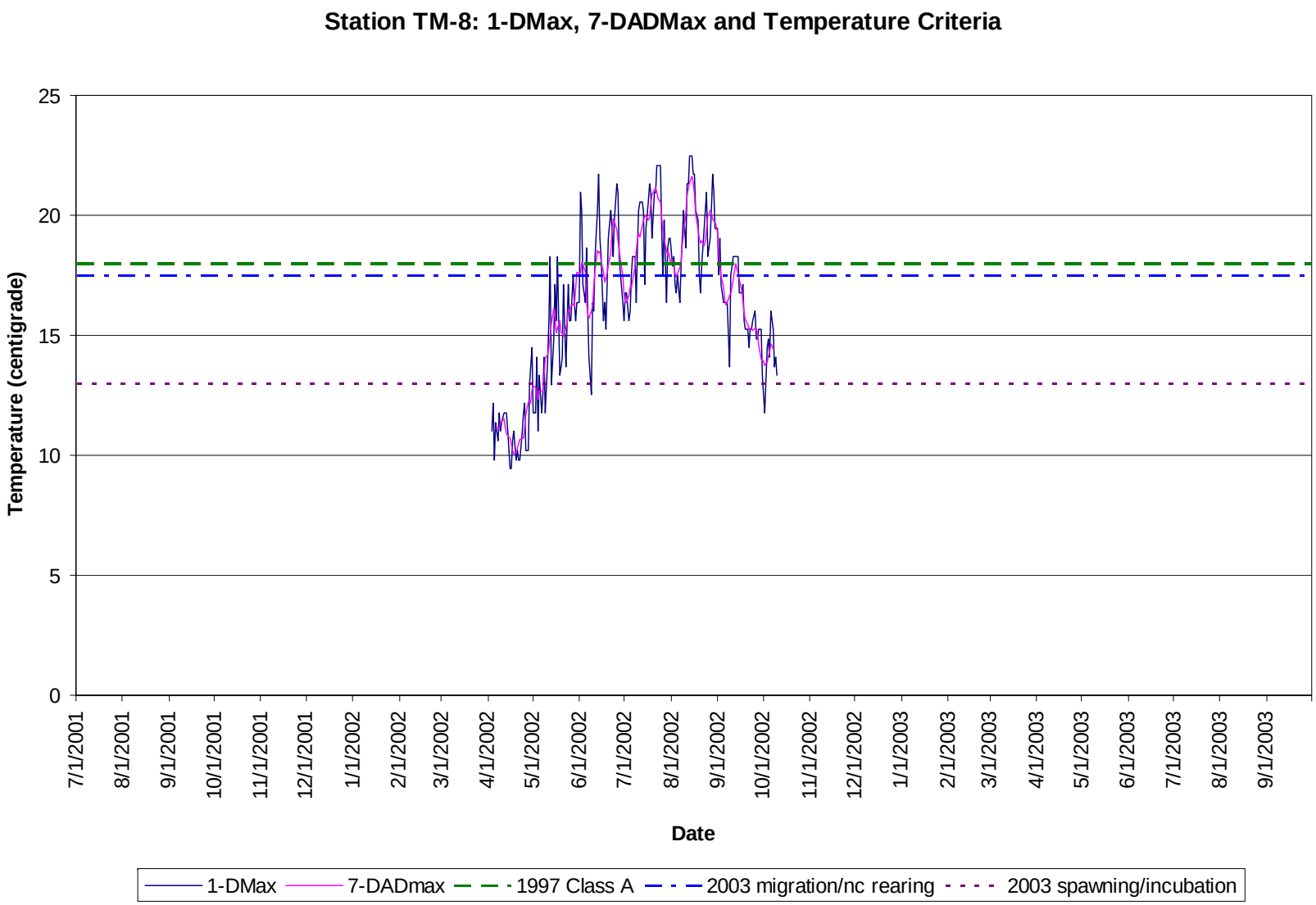

Station UW_ST1: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

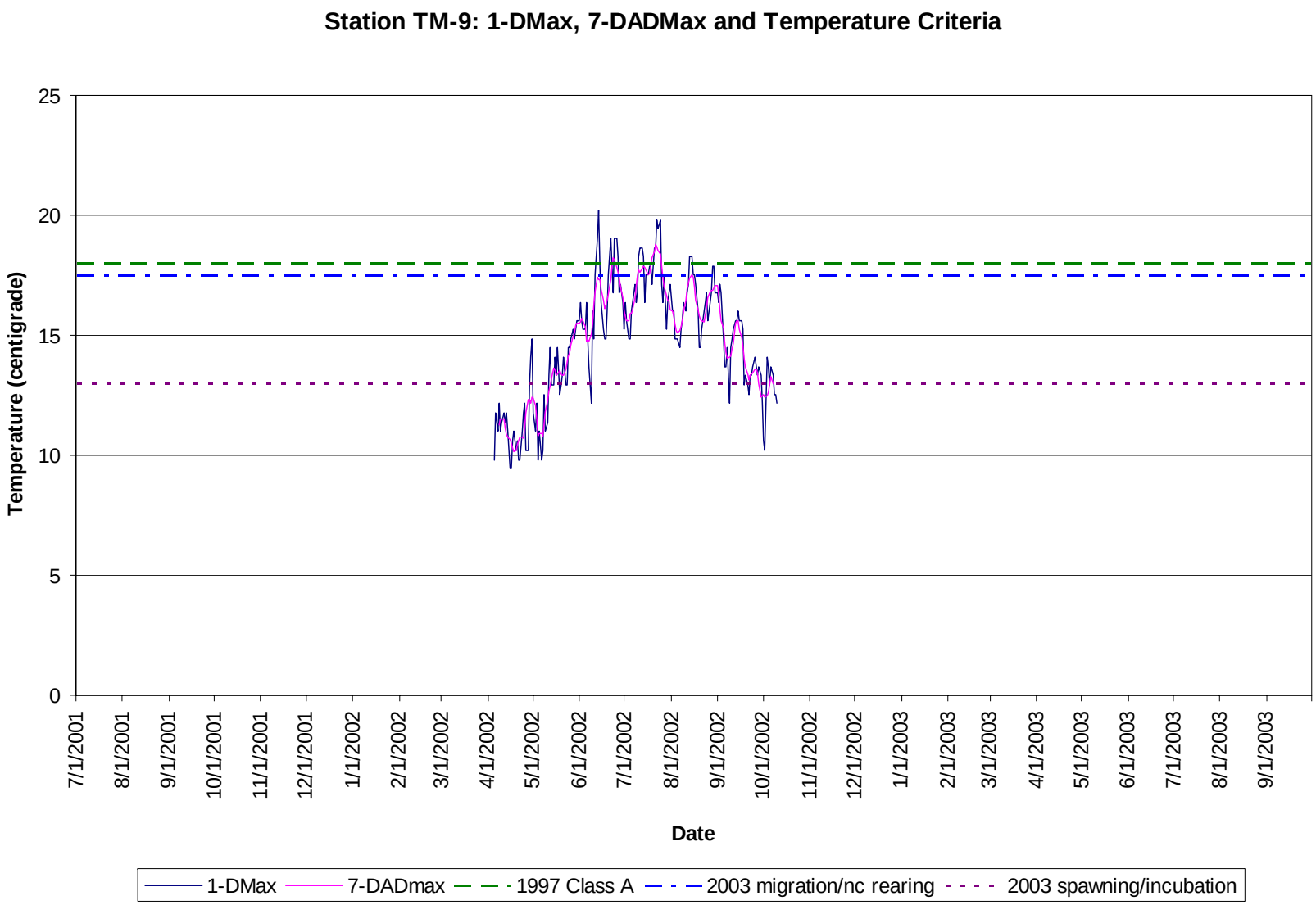

Station TM-1: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
18
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

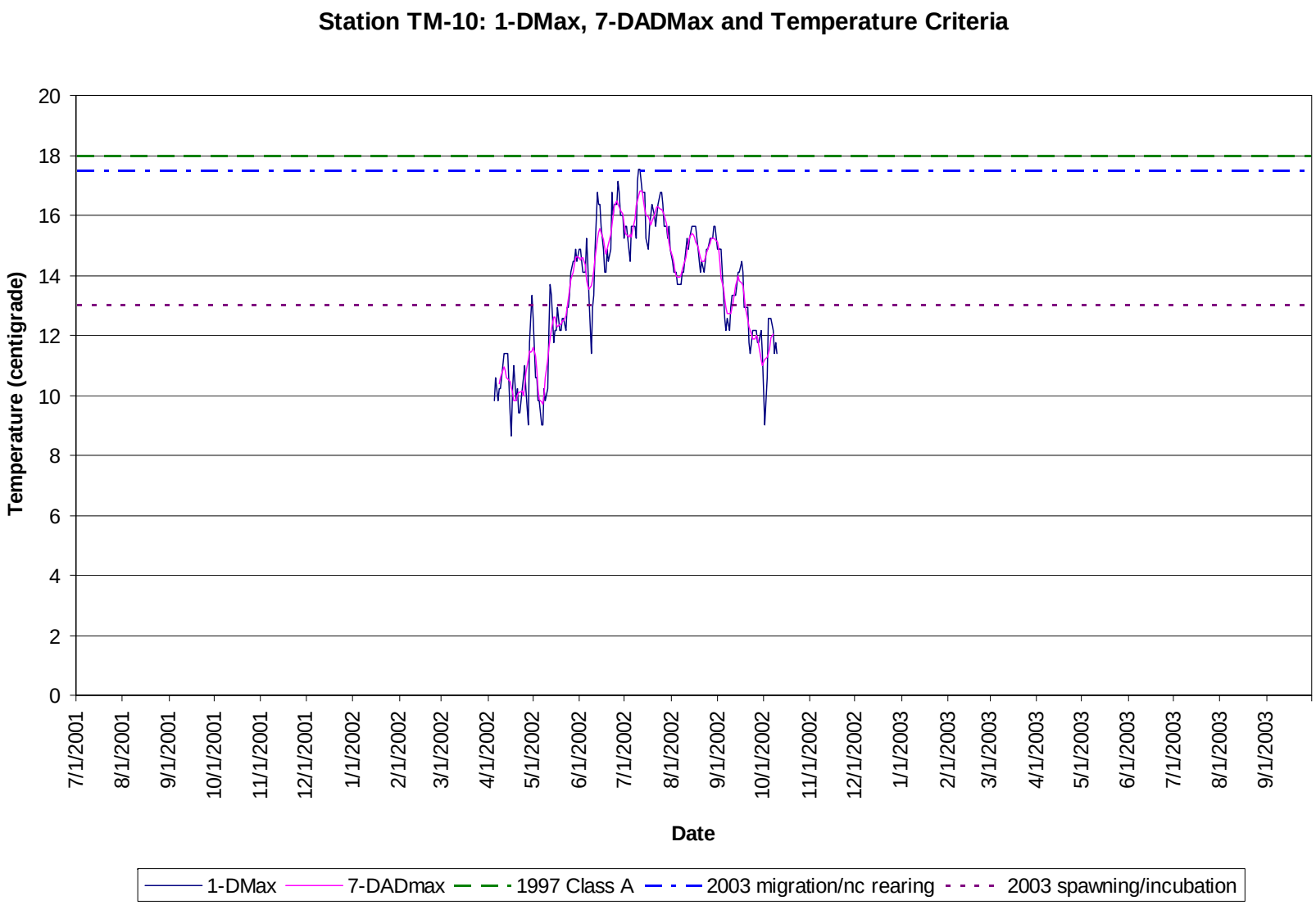

Station TM-1.5: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
18
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

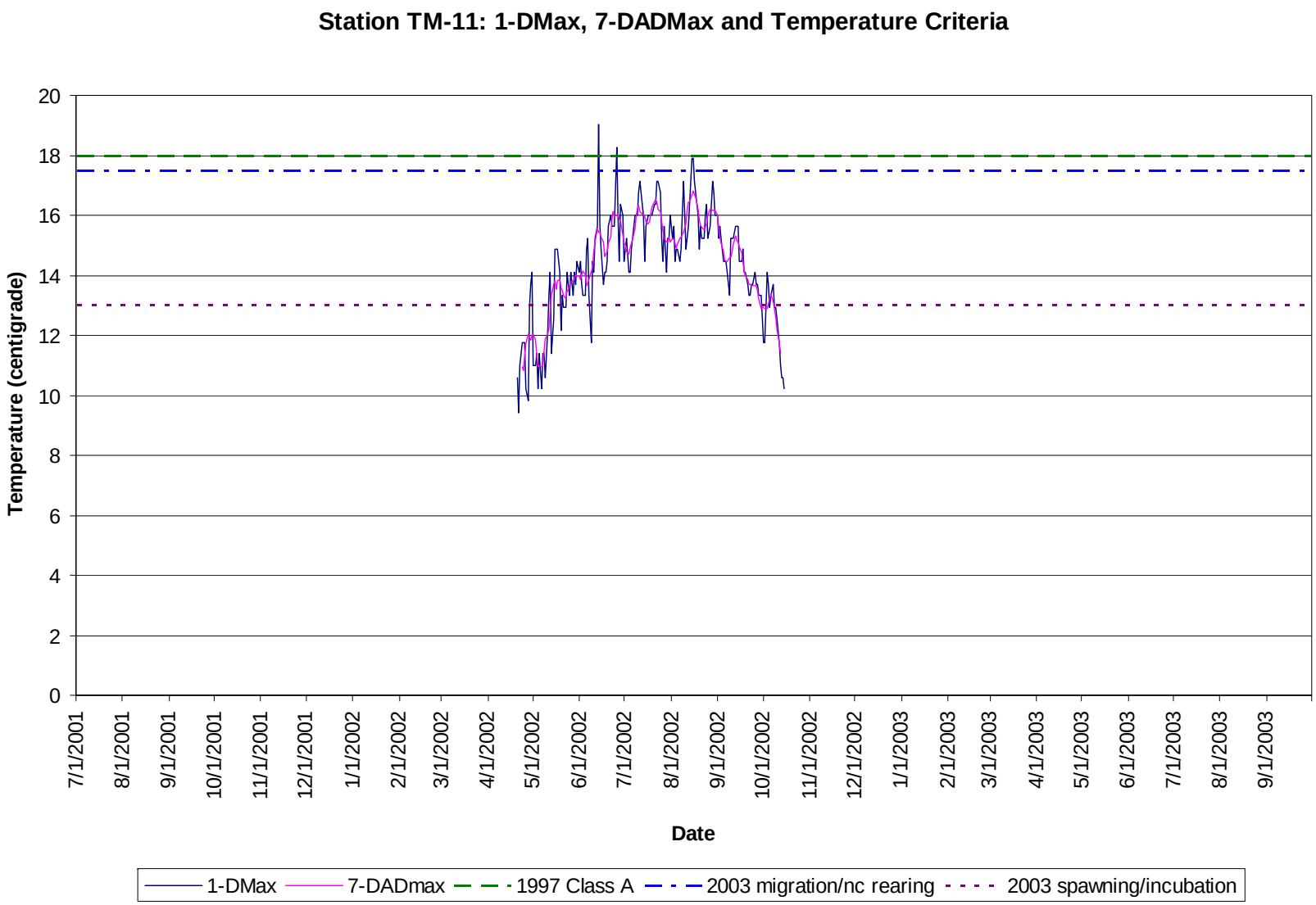

Station TM-2: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
30
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

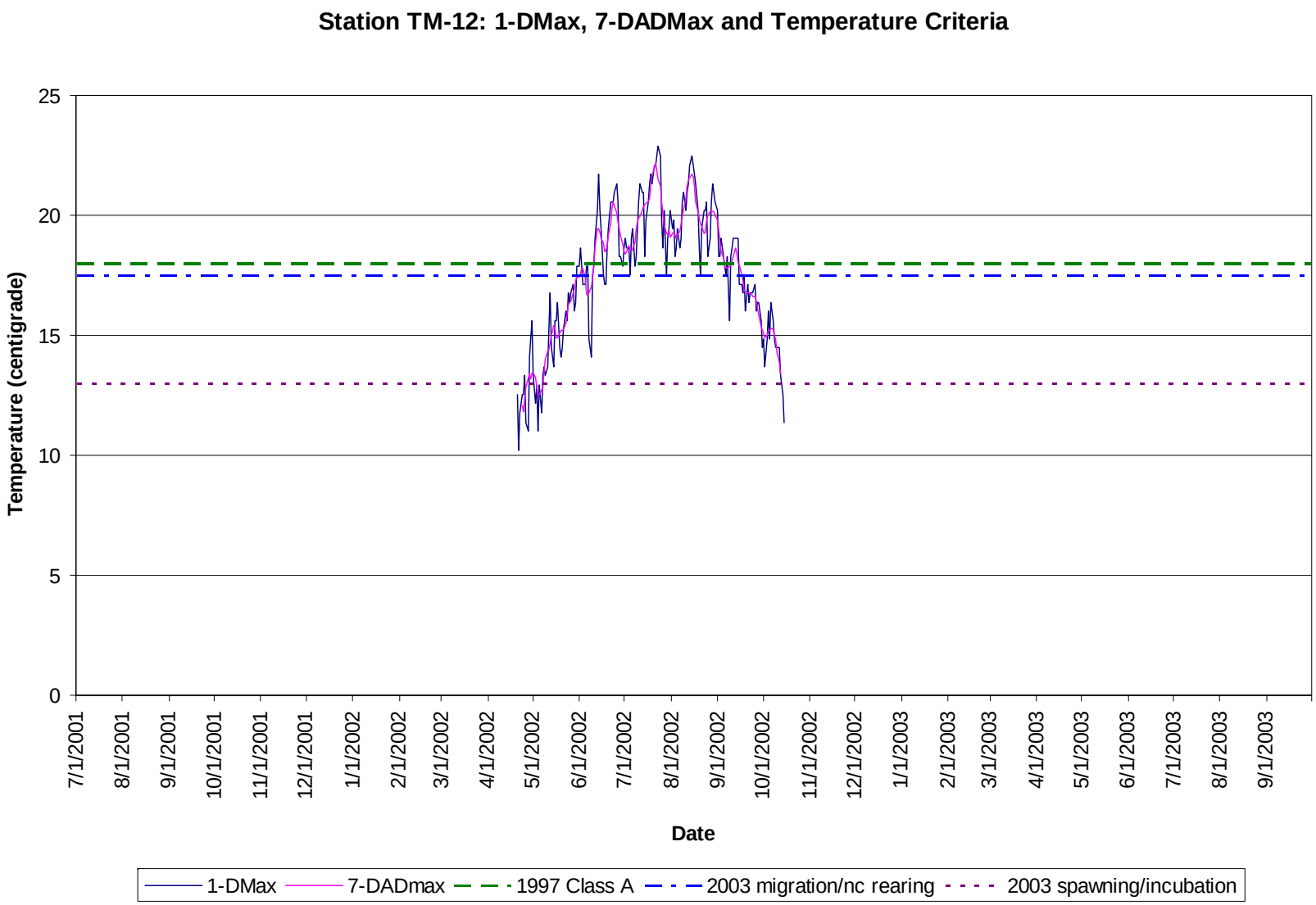

Station TM-7: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
35
30
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

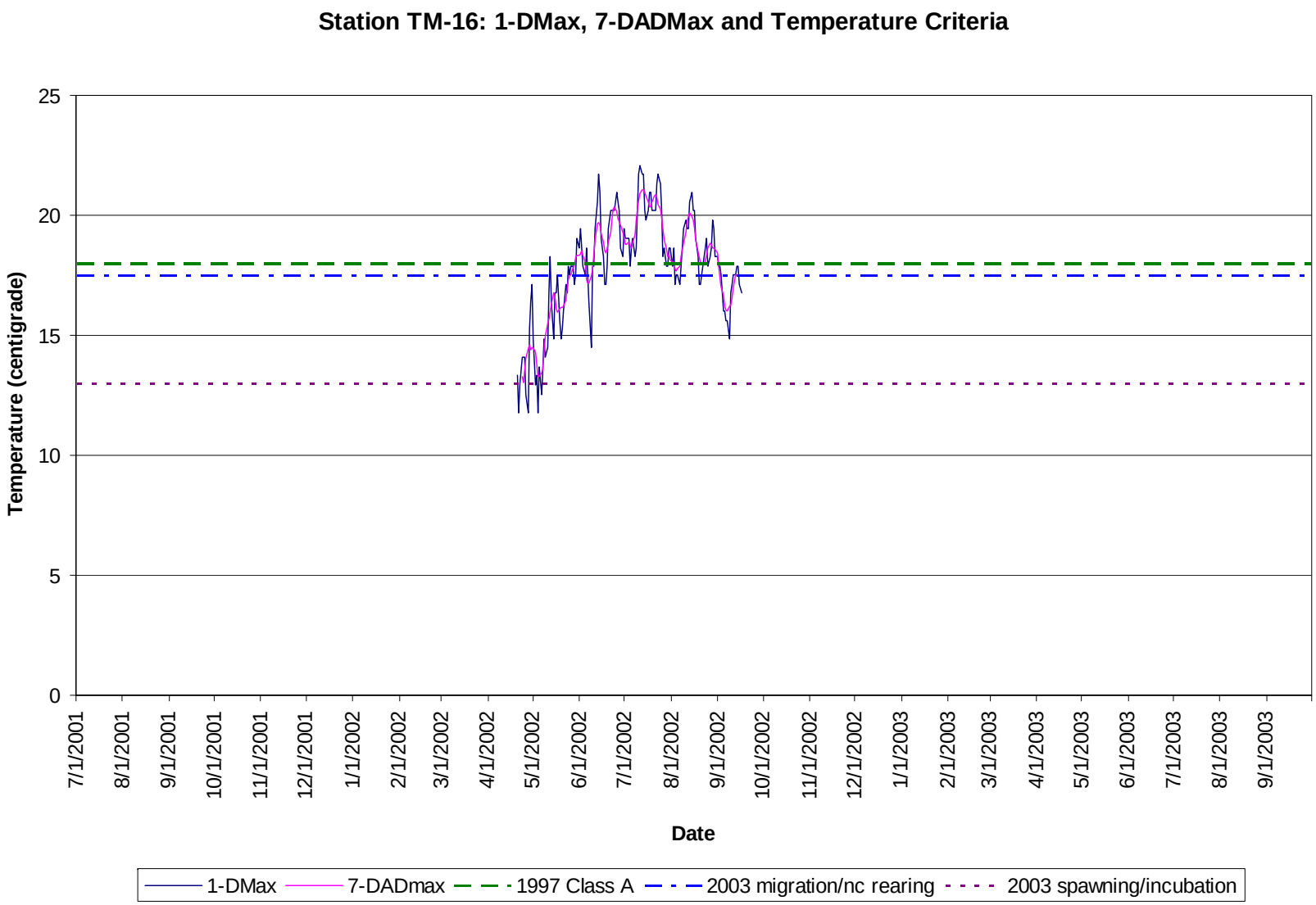

Station TM-8: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

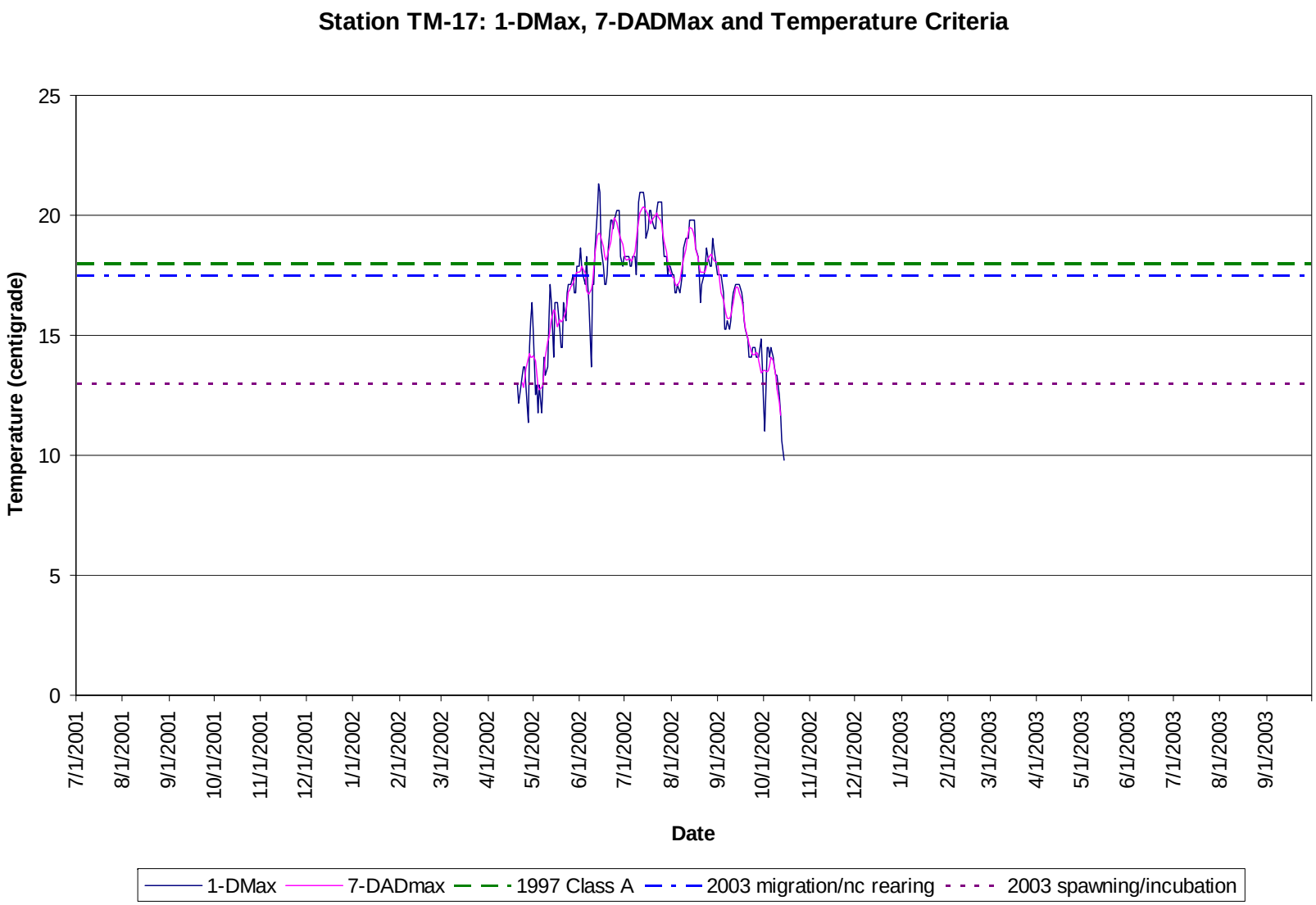

Station TM-9: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

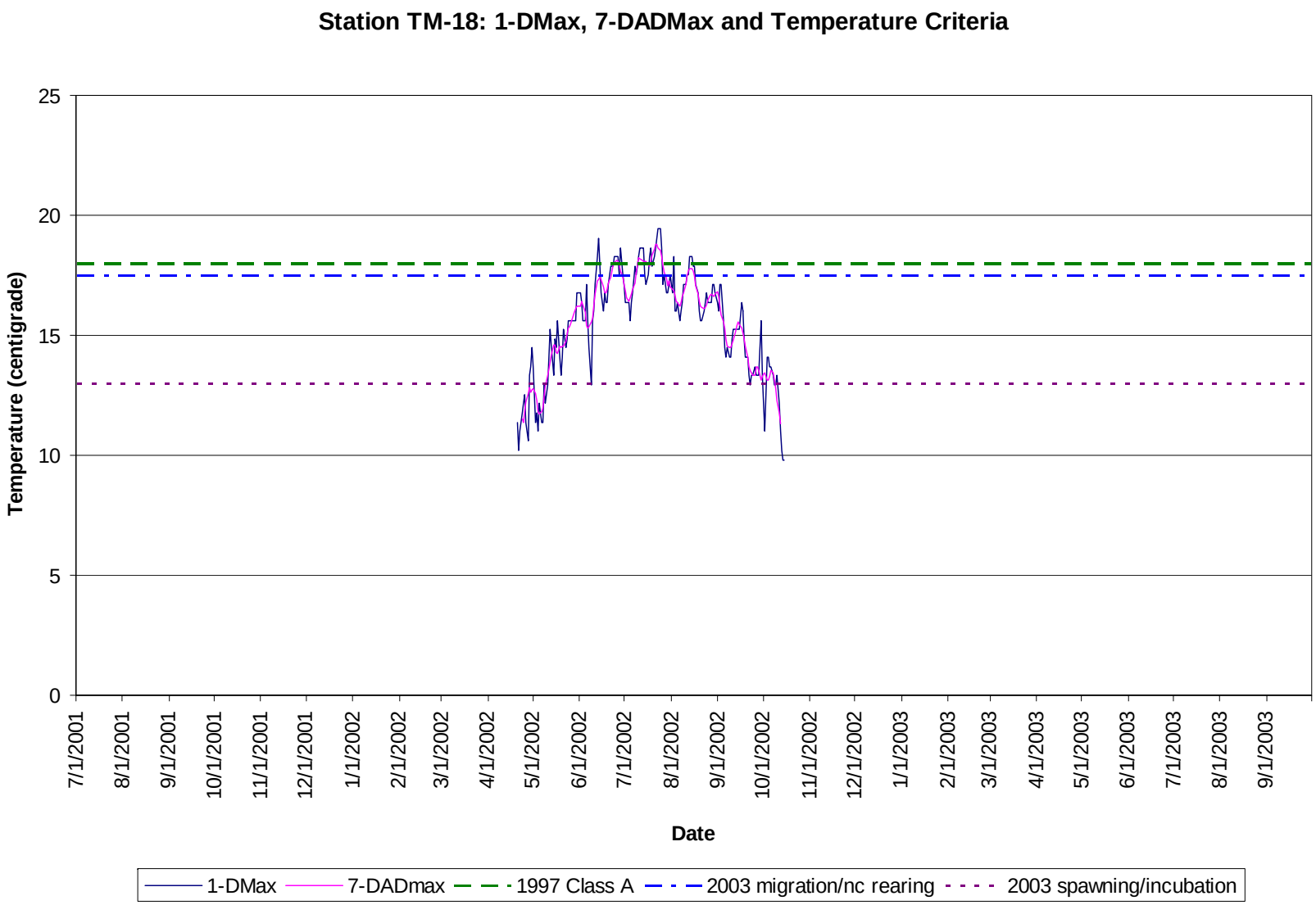

Station TM-10: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
18
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

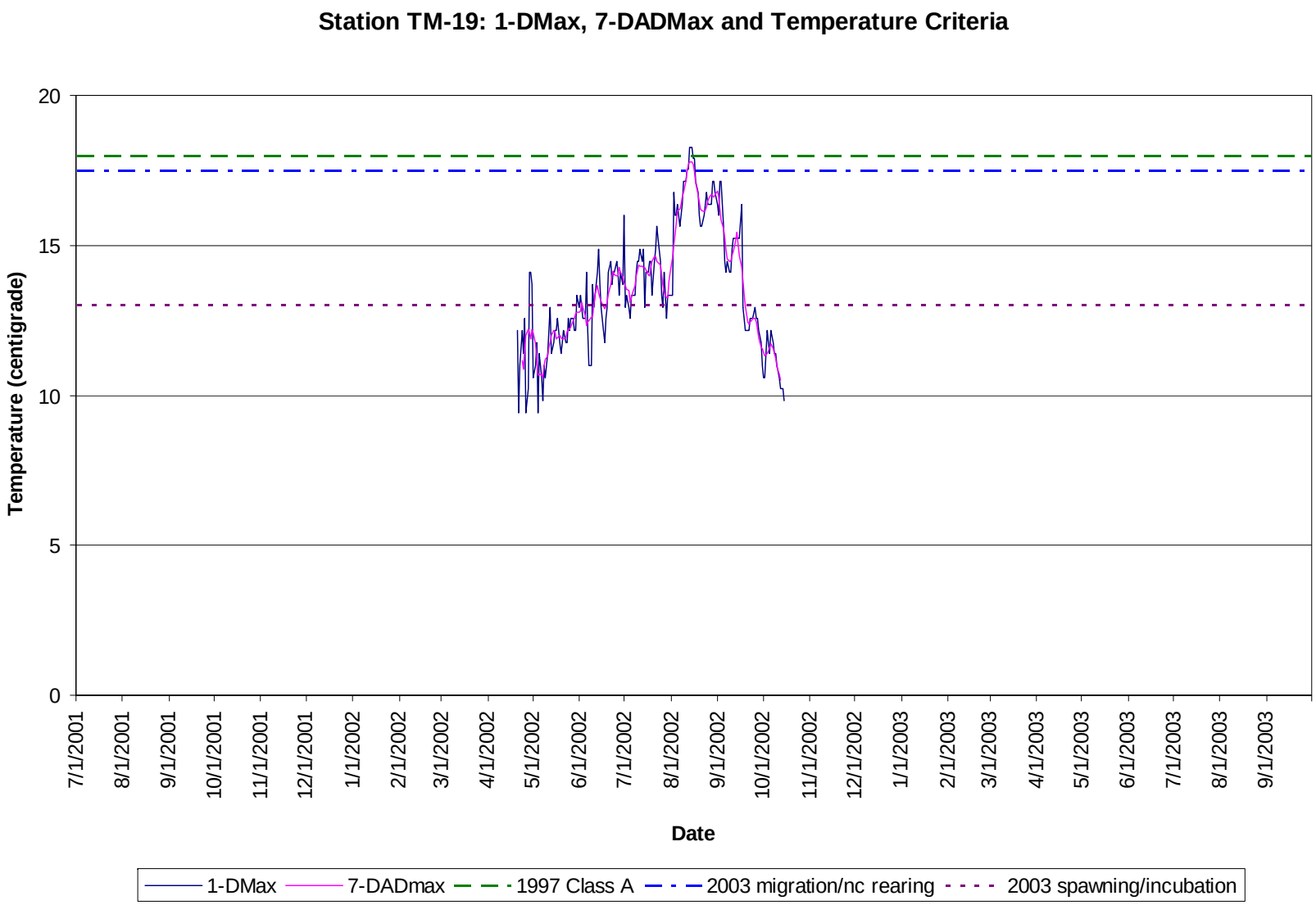

Station TM-11: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
18
16
14
12
10
8
6
4
2
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

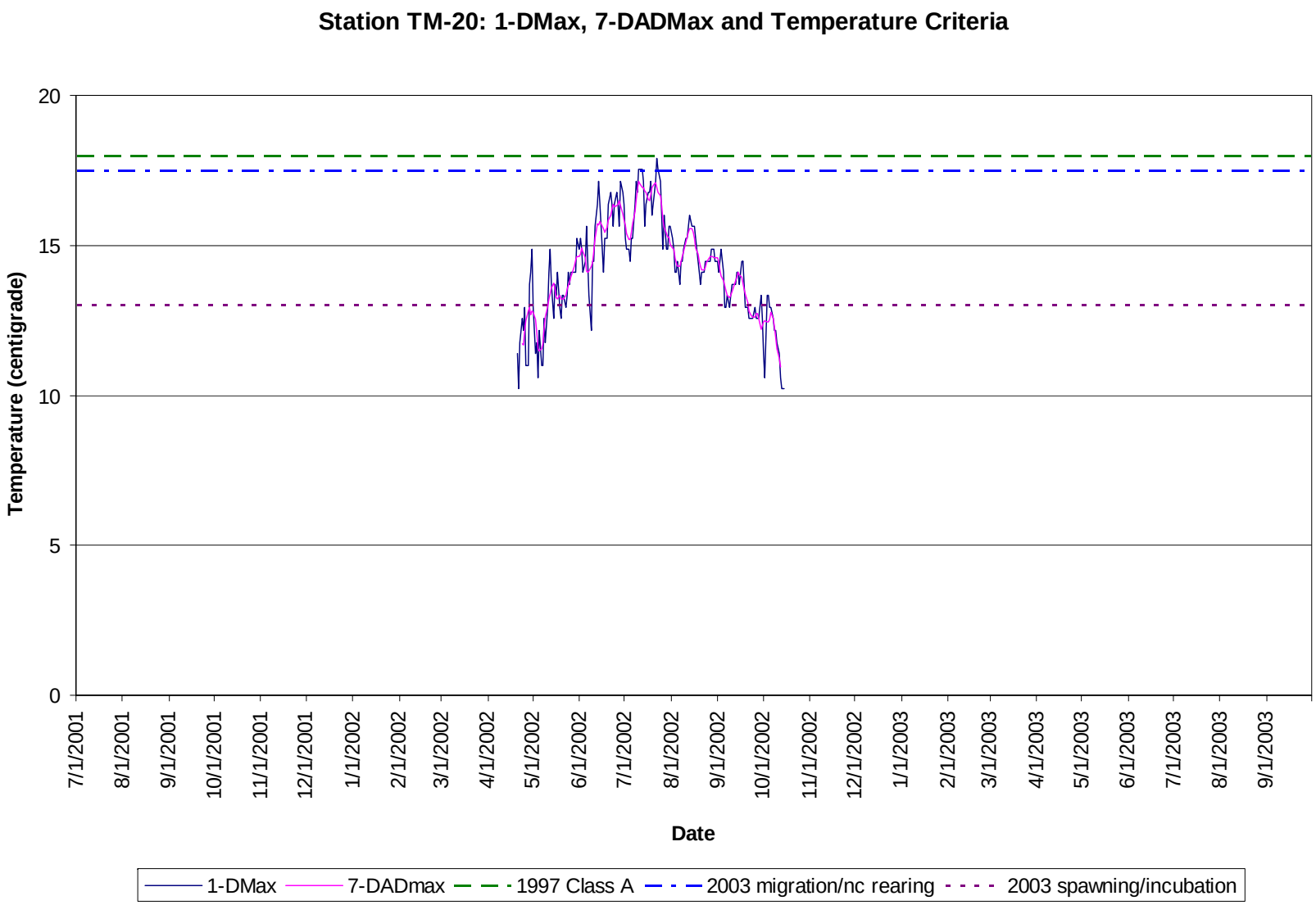

Station TM-12: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

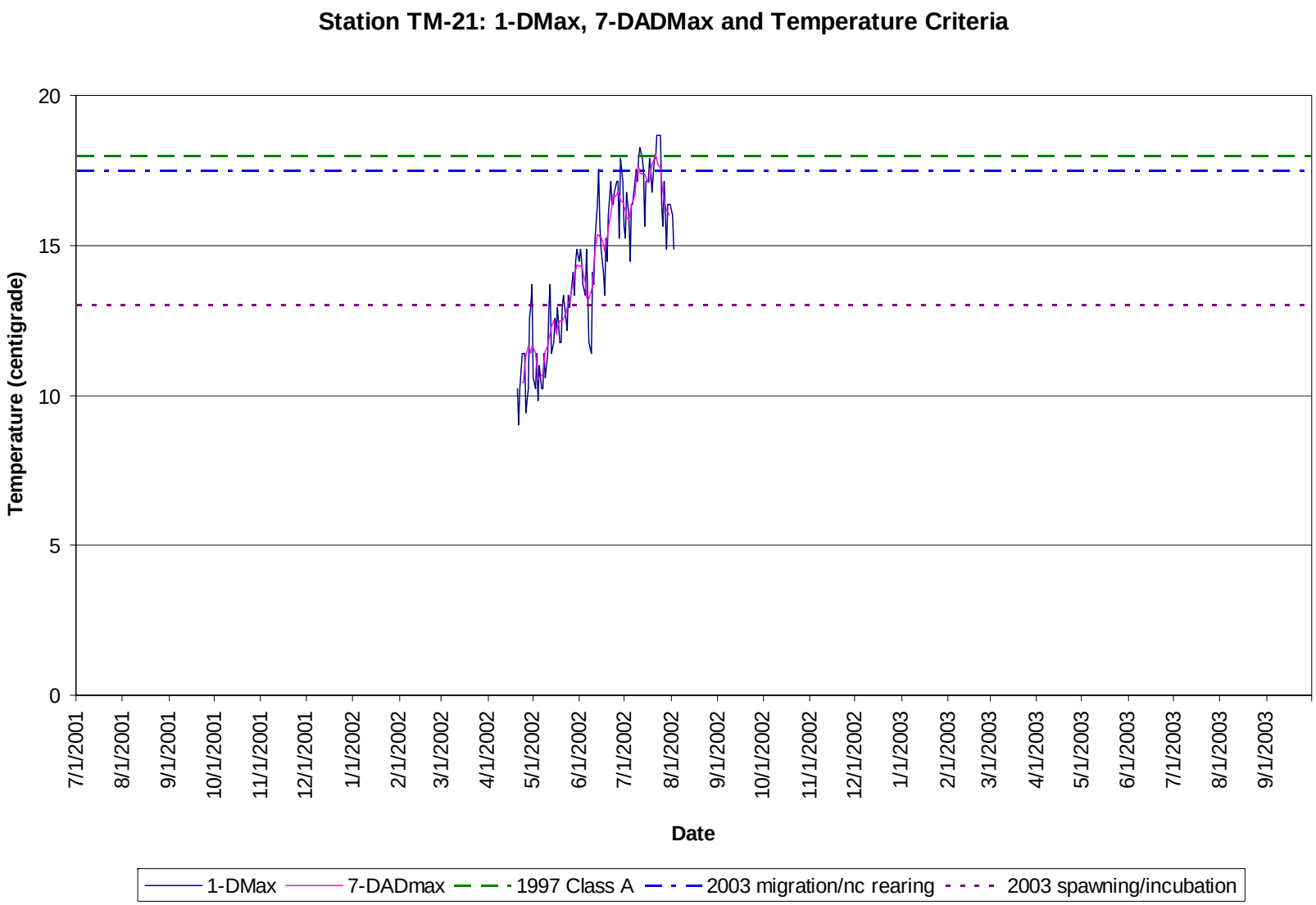

Station TM-16: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

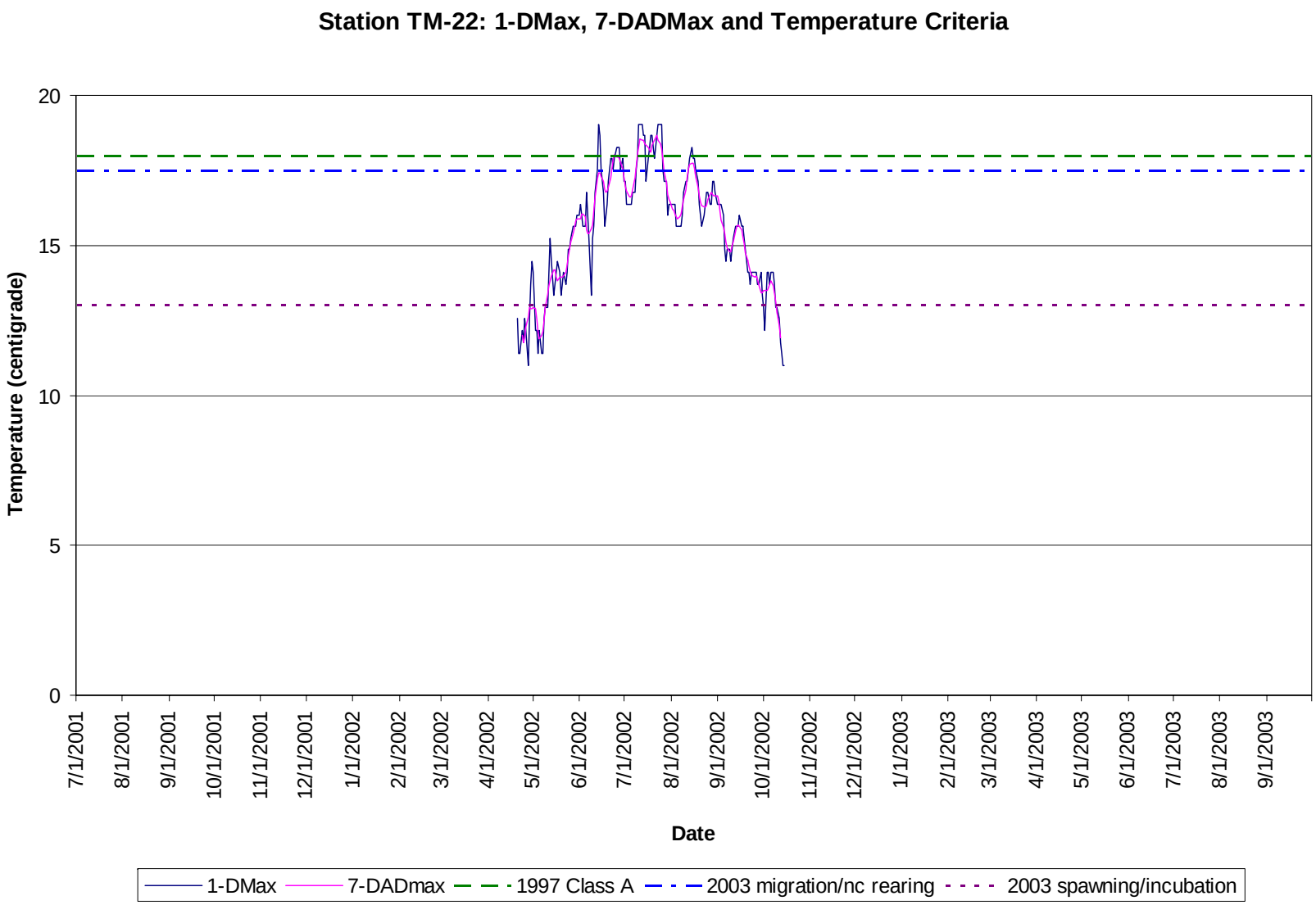

Station TM-17: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

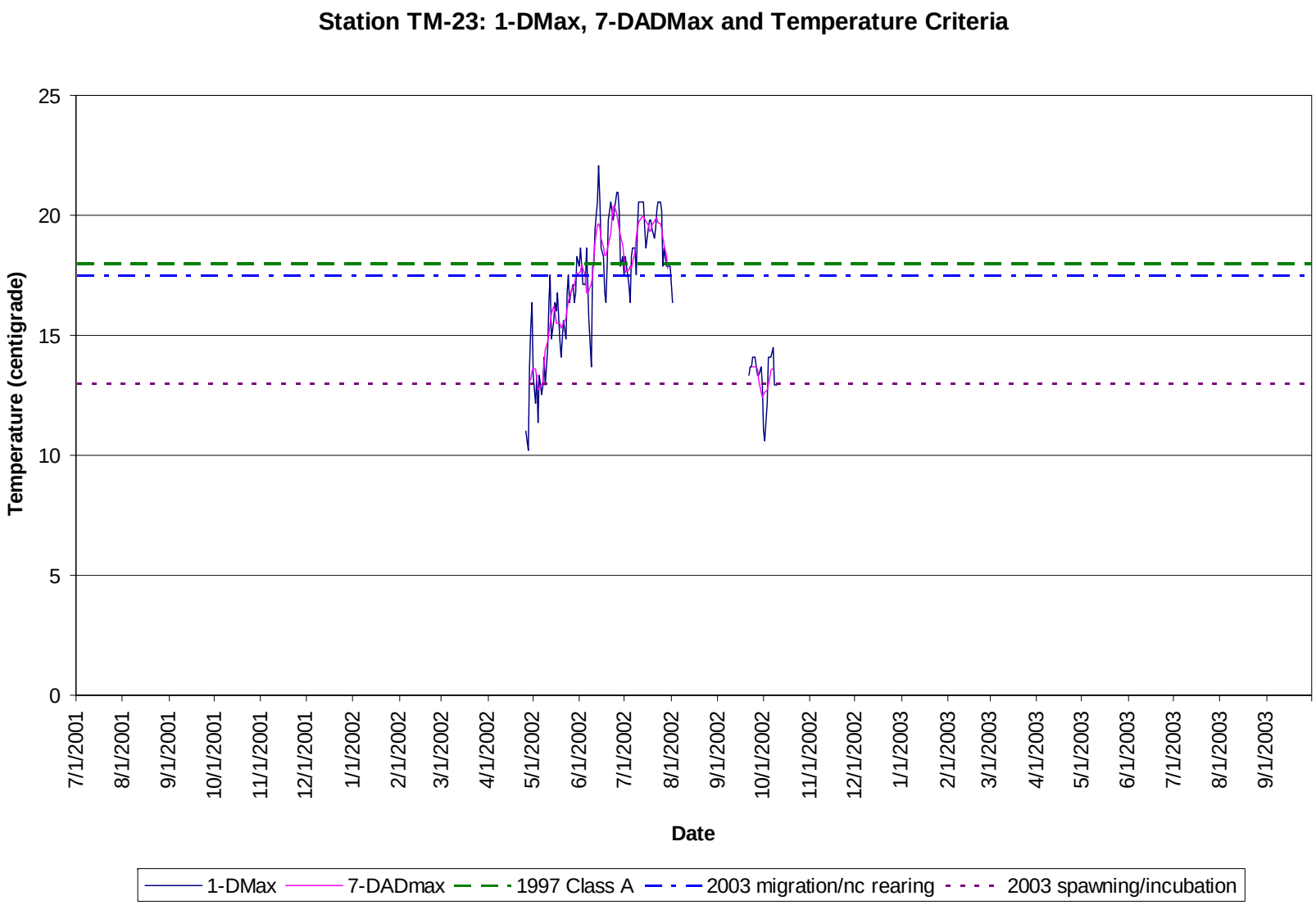

Station TM-18: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

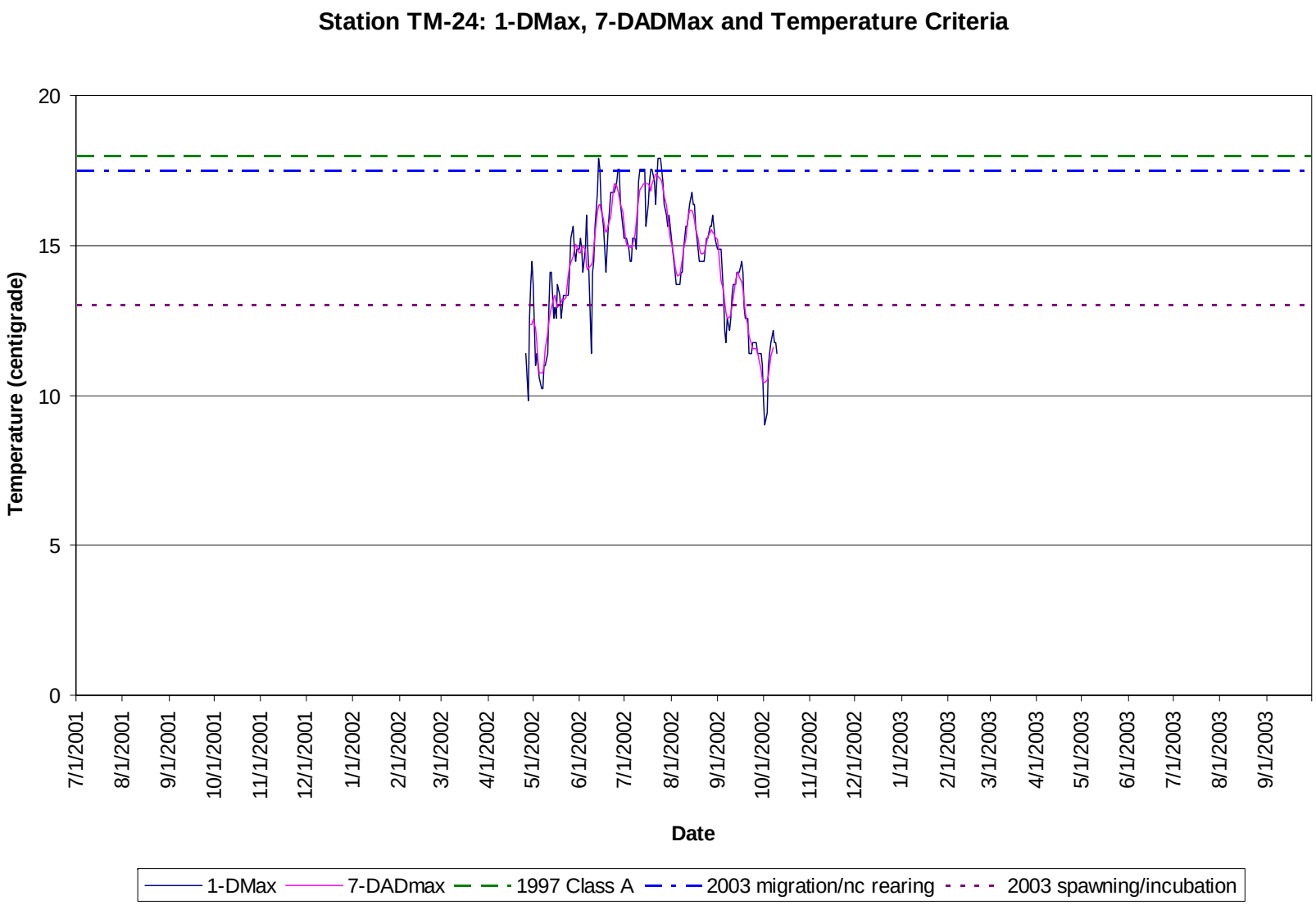

Station TM-19: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

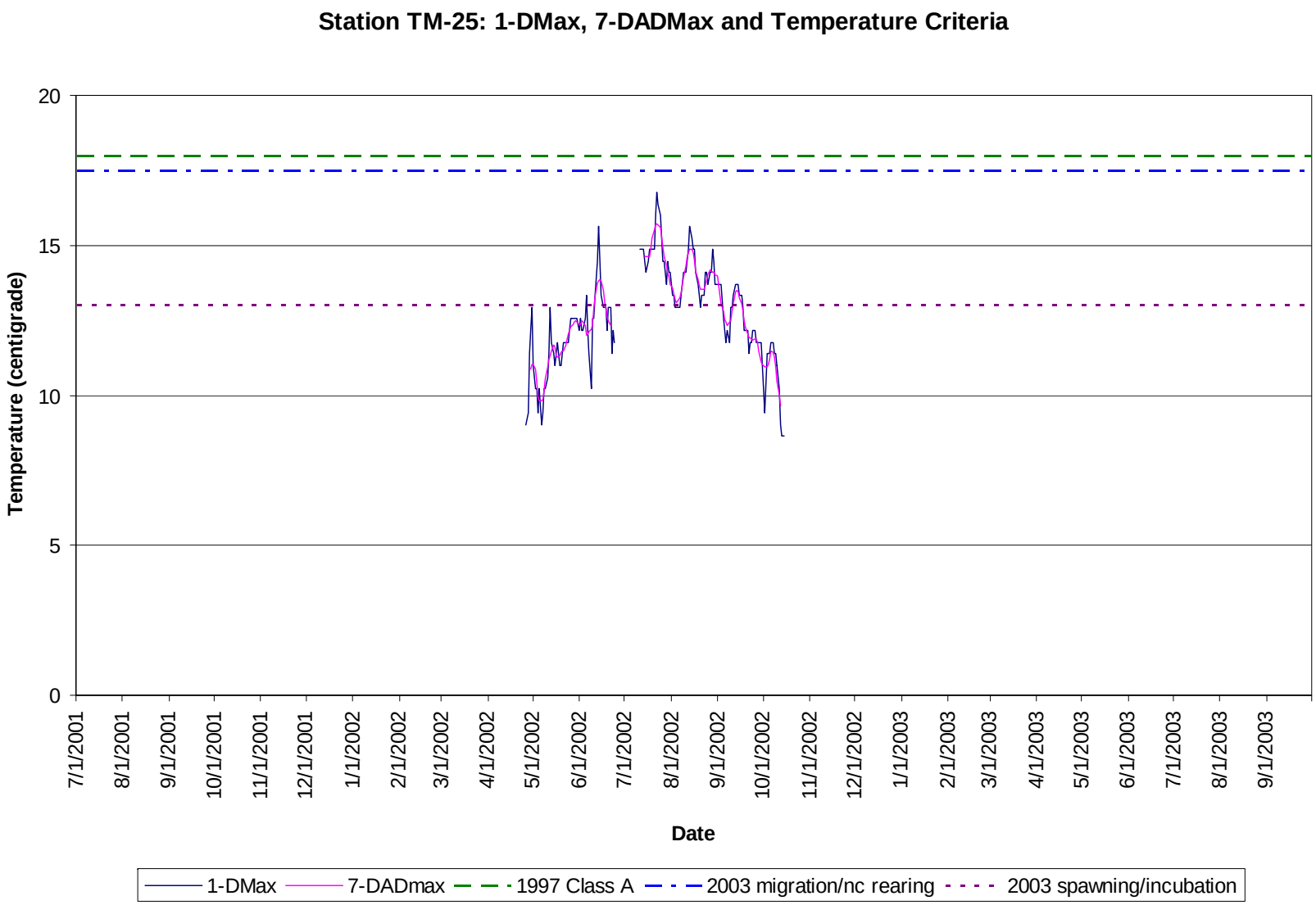

Station TM-20: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

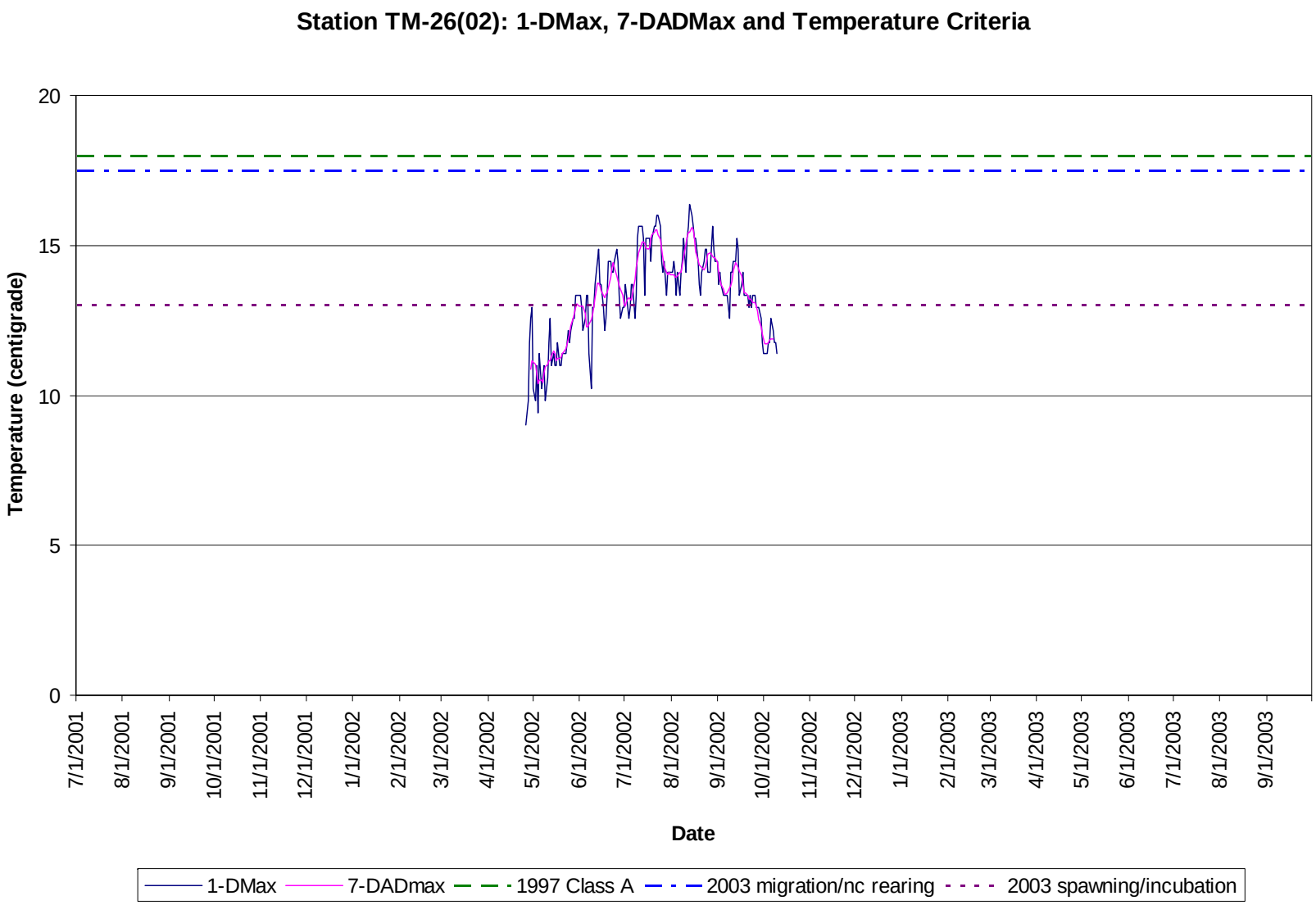

Station TM-21: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

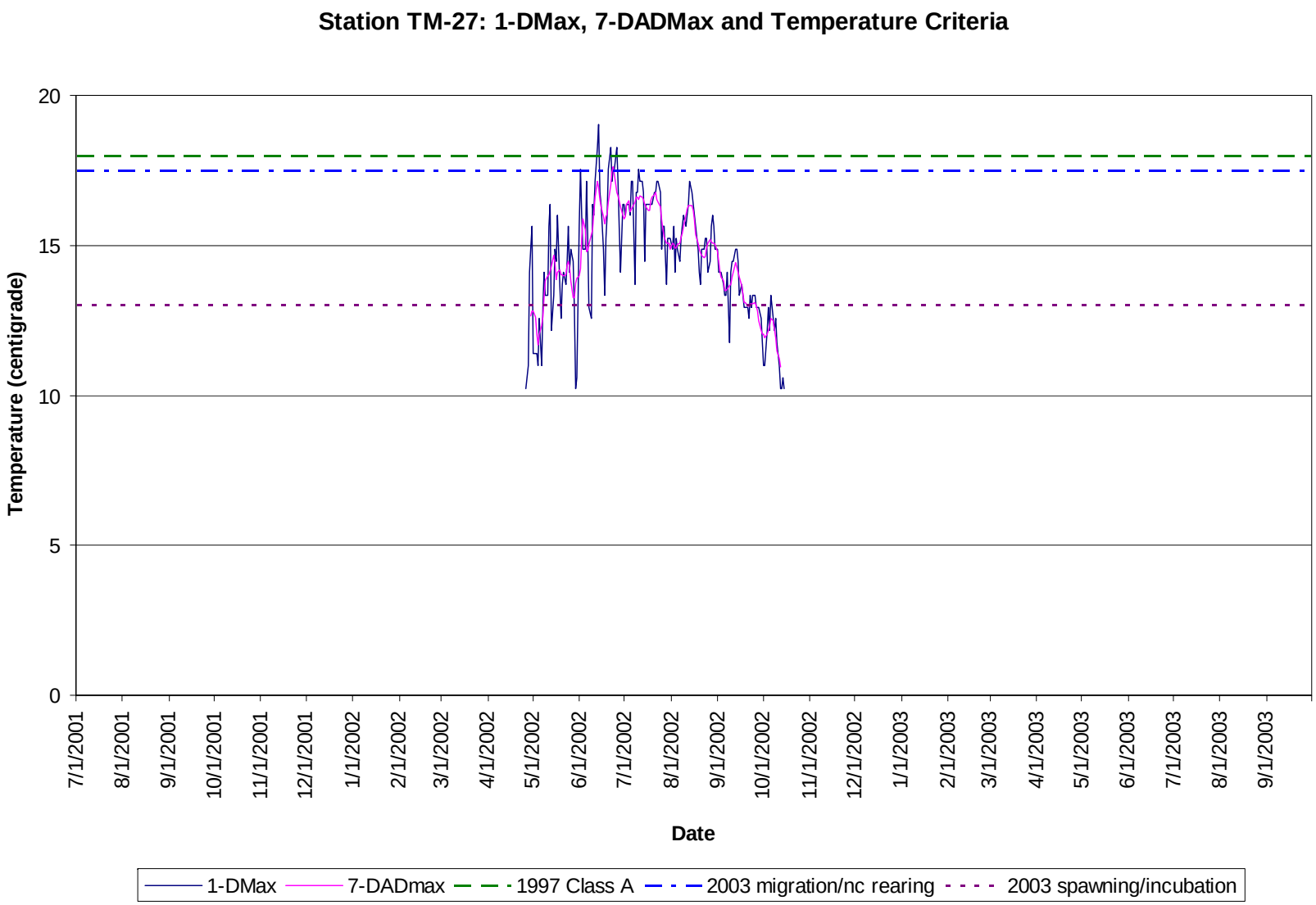

Station TM-22: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

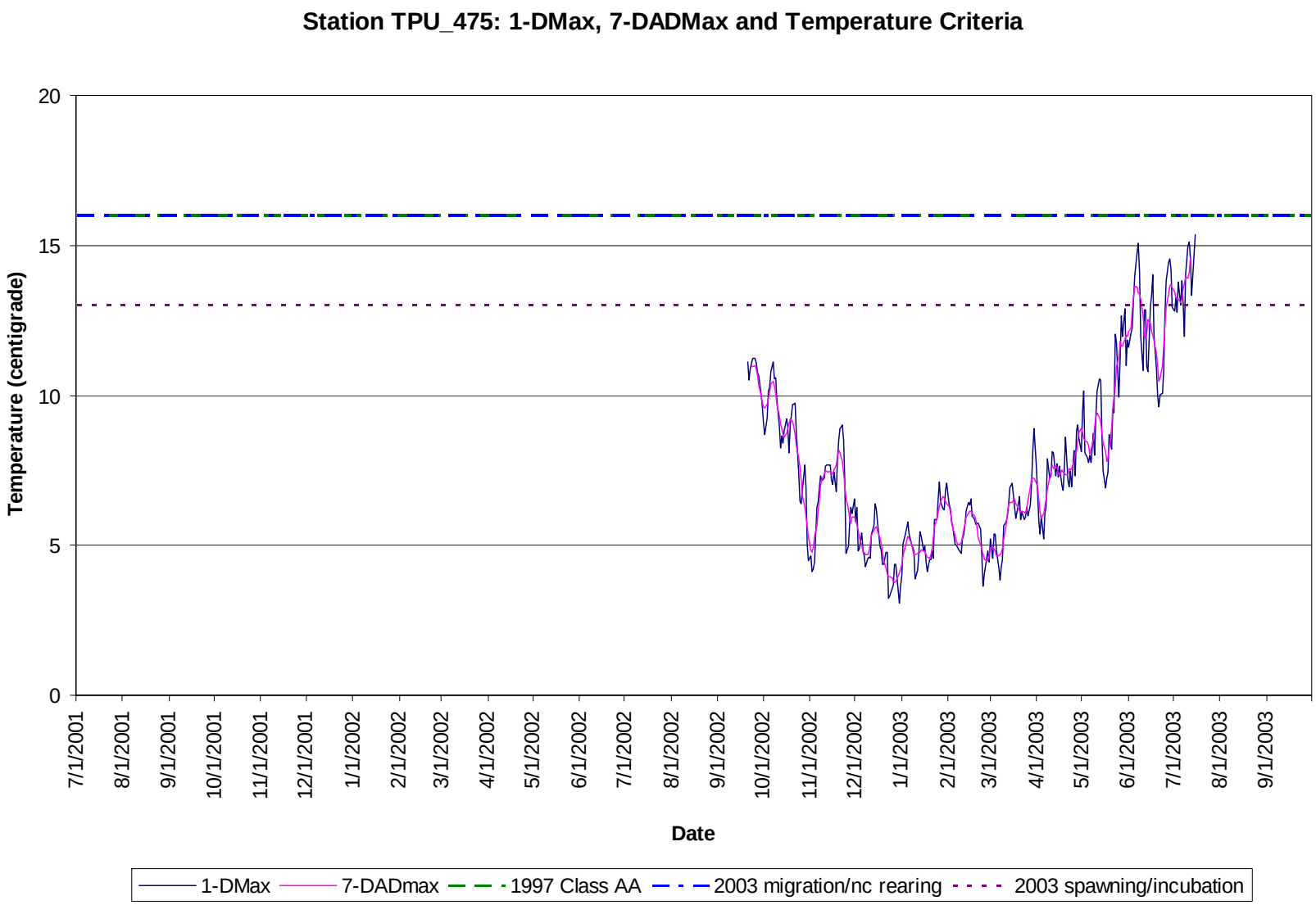

Station TM-23: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

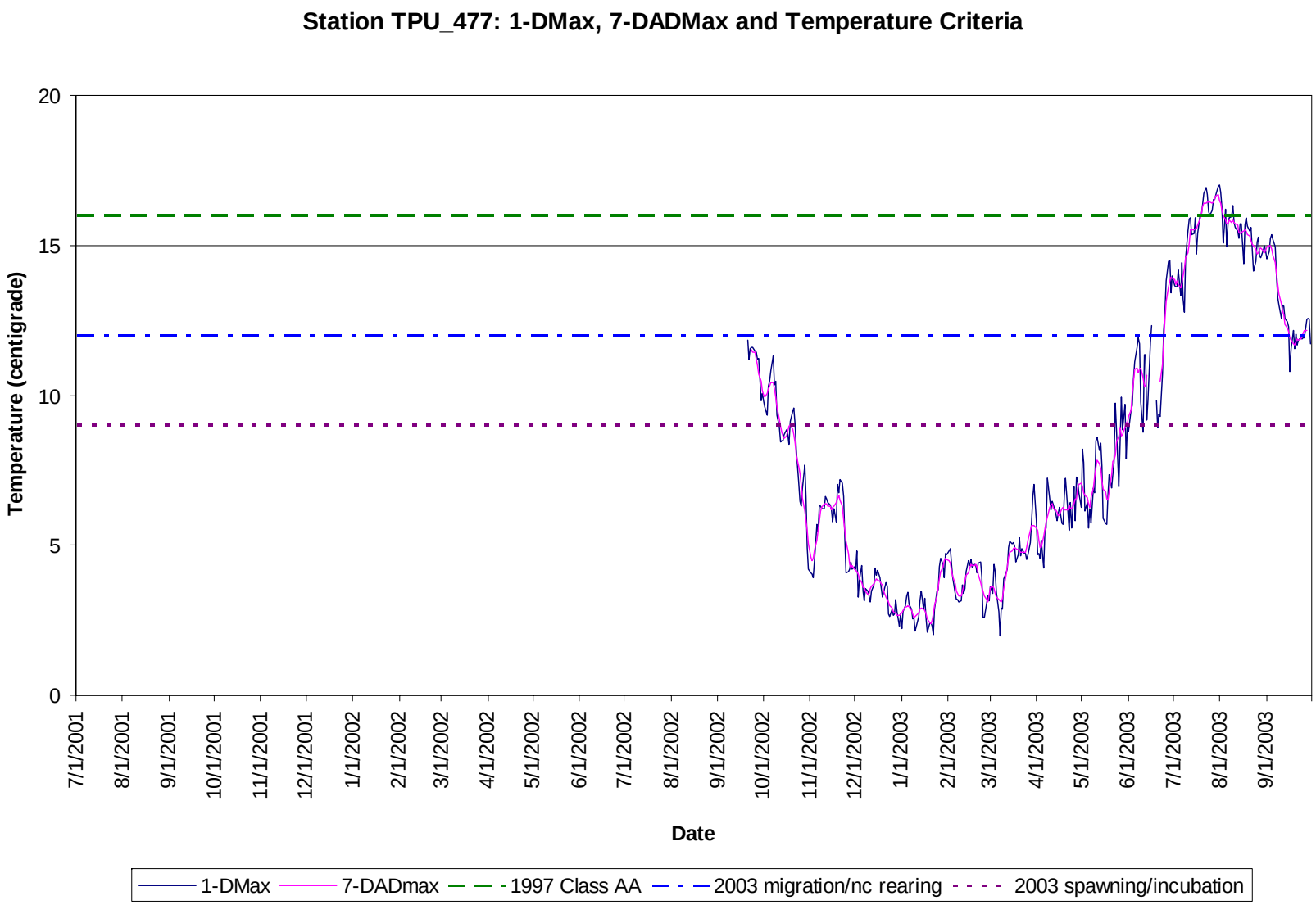

Station TM-24: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

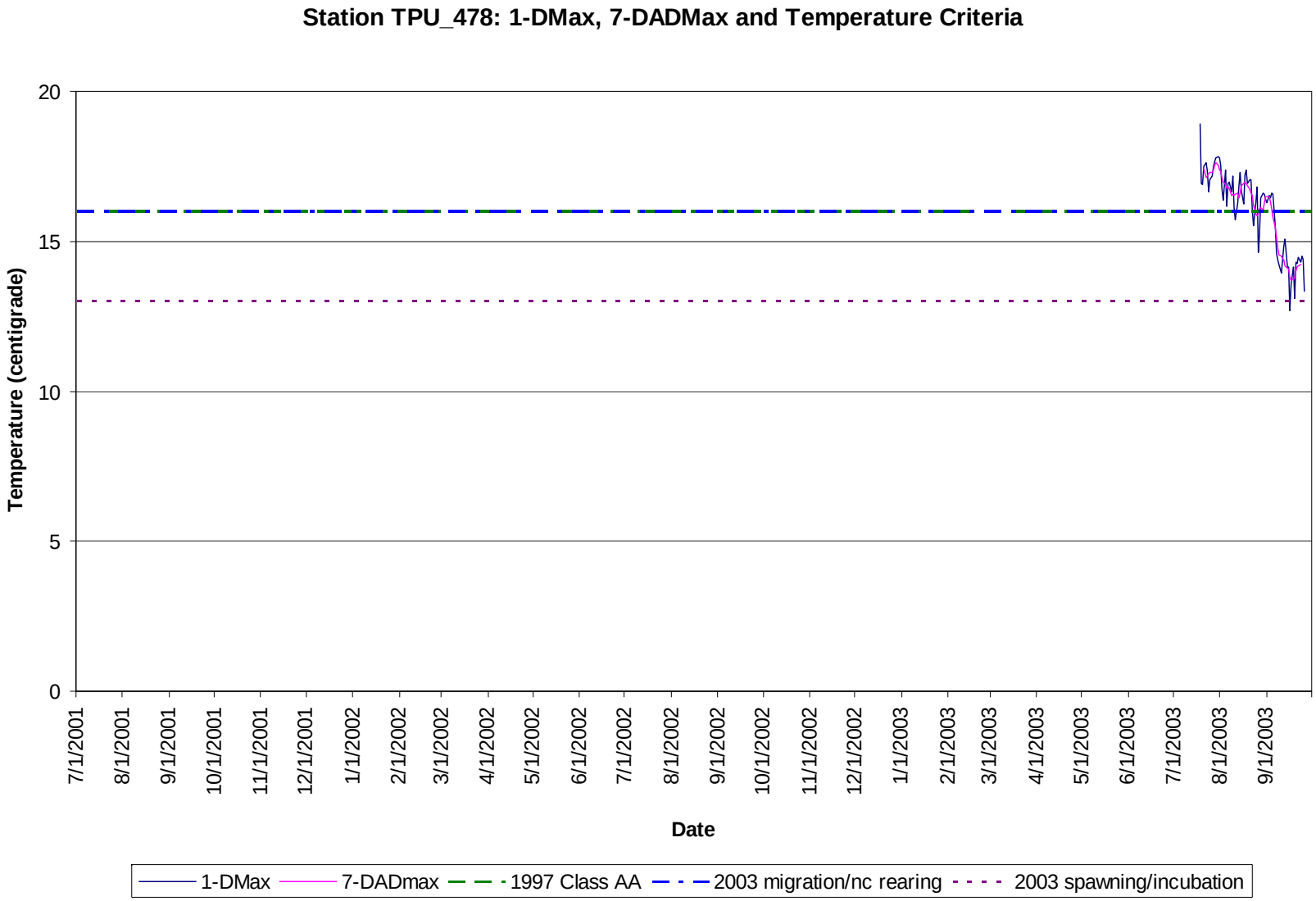

Station TM-25: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

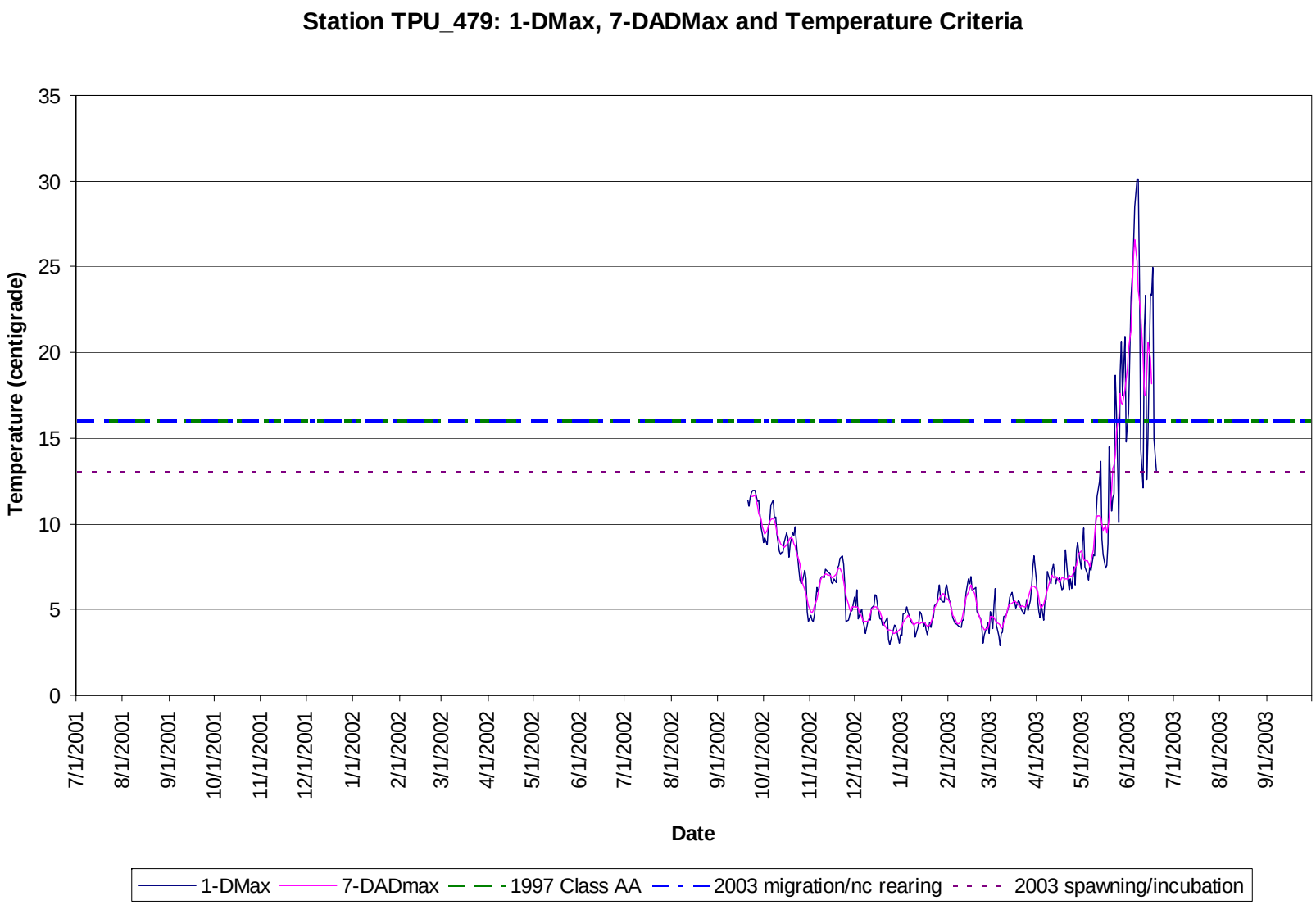

Station TM-26(02): 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

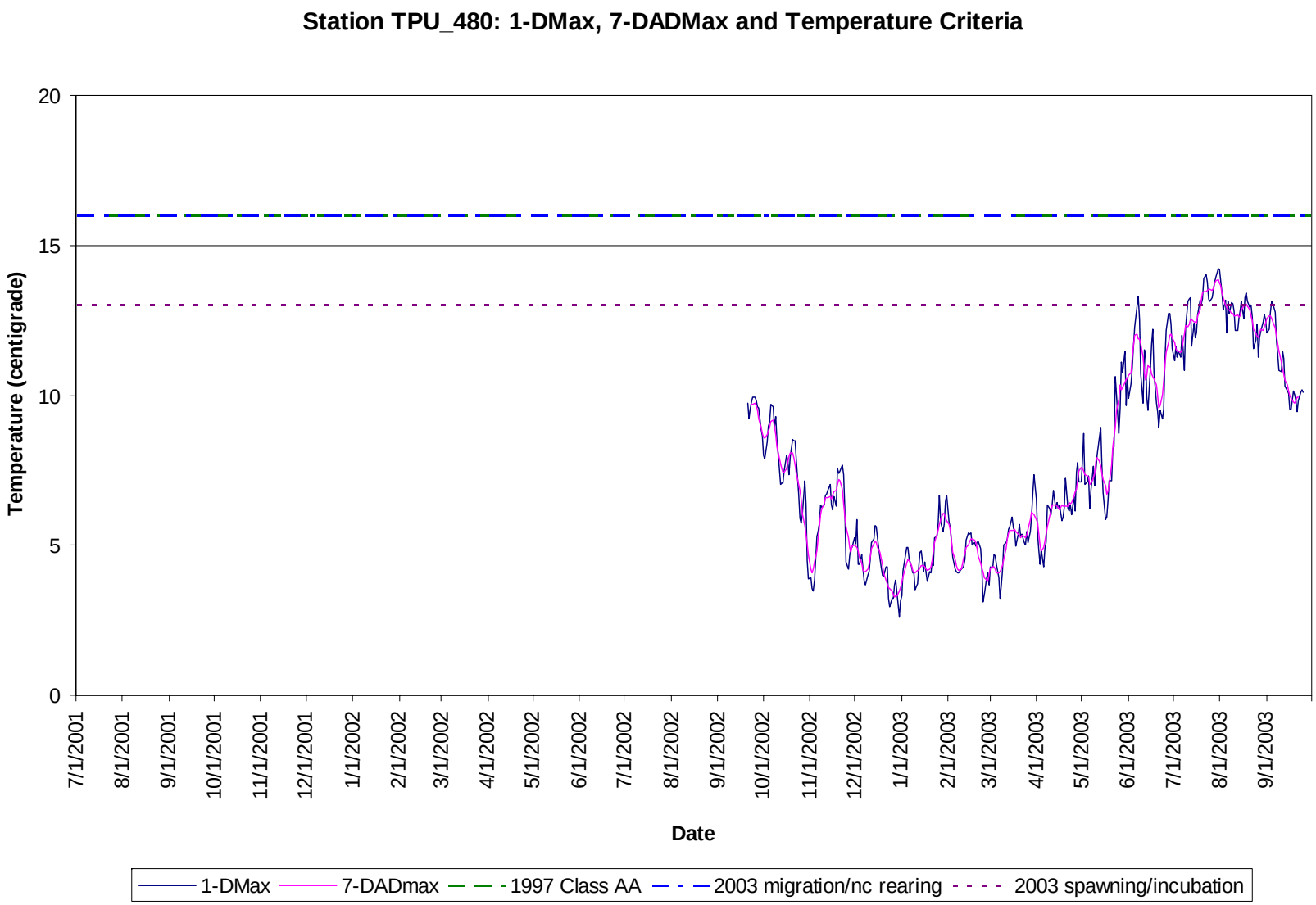

Station TM-27: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class A
2003 migration/nc rearing
2003 spawning/incubation

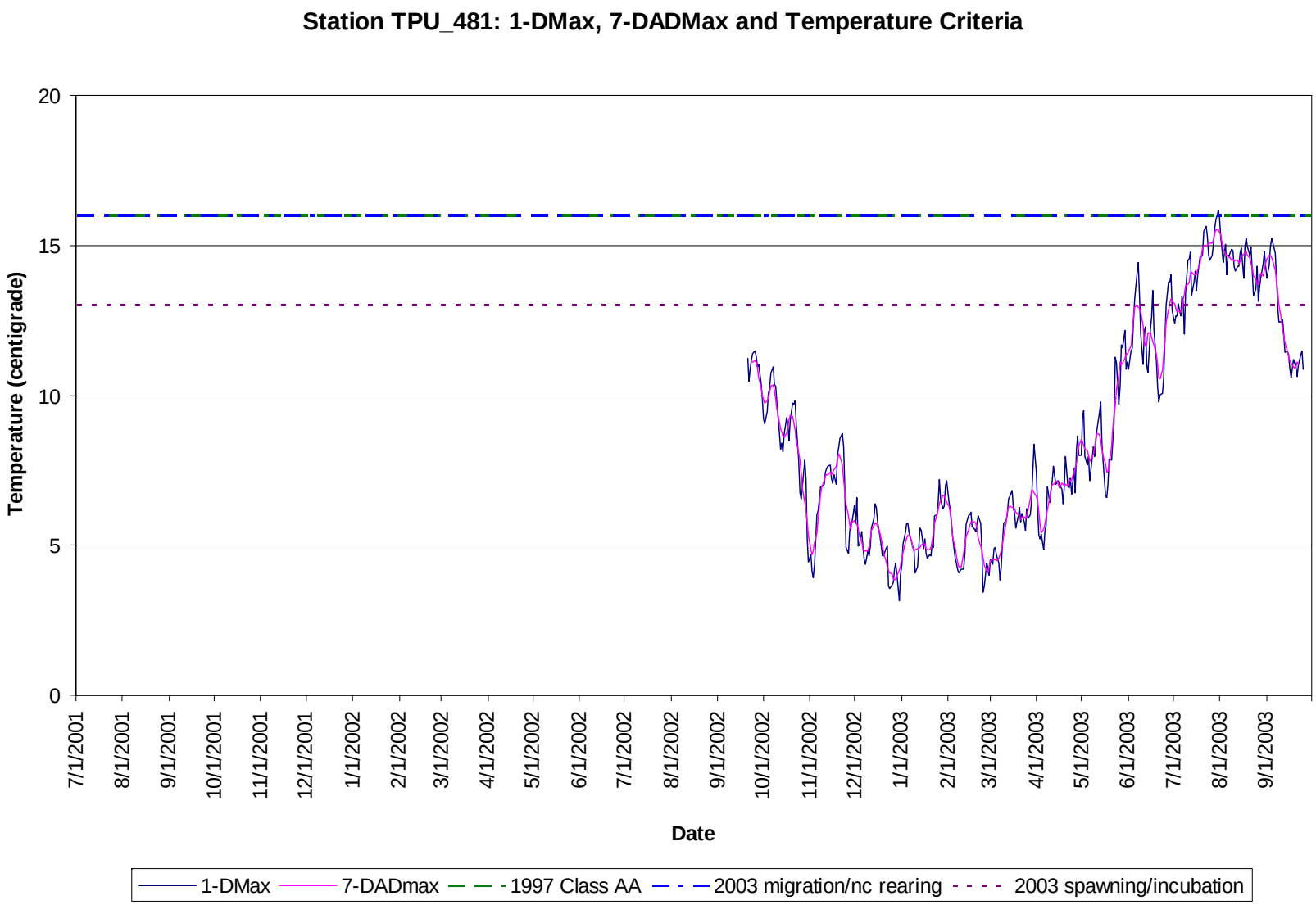

Station TPU_475: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation

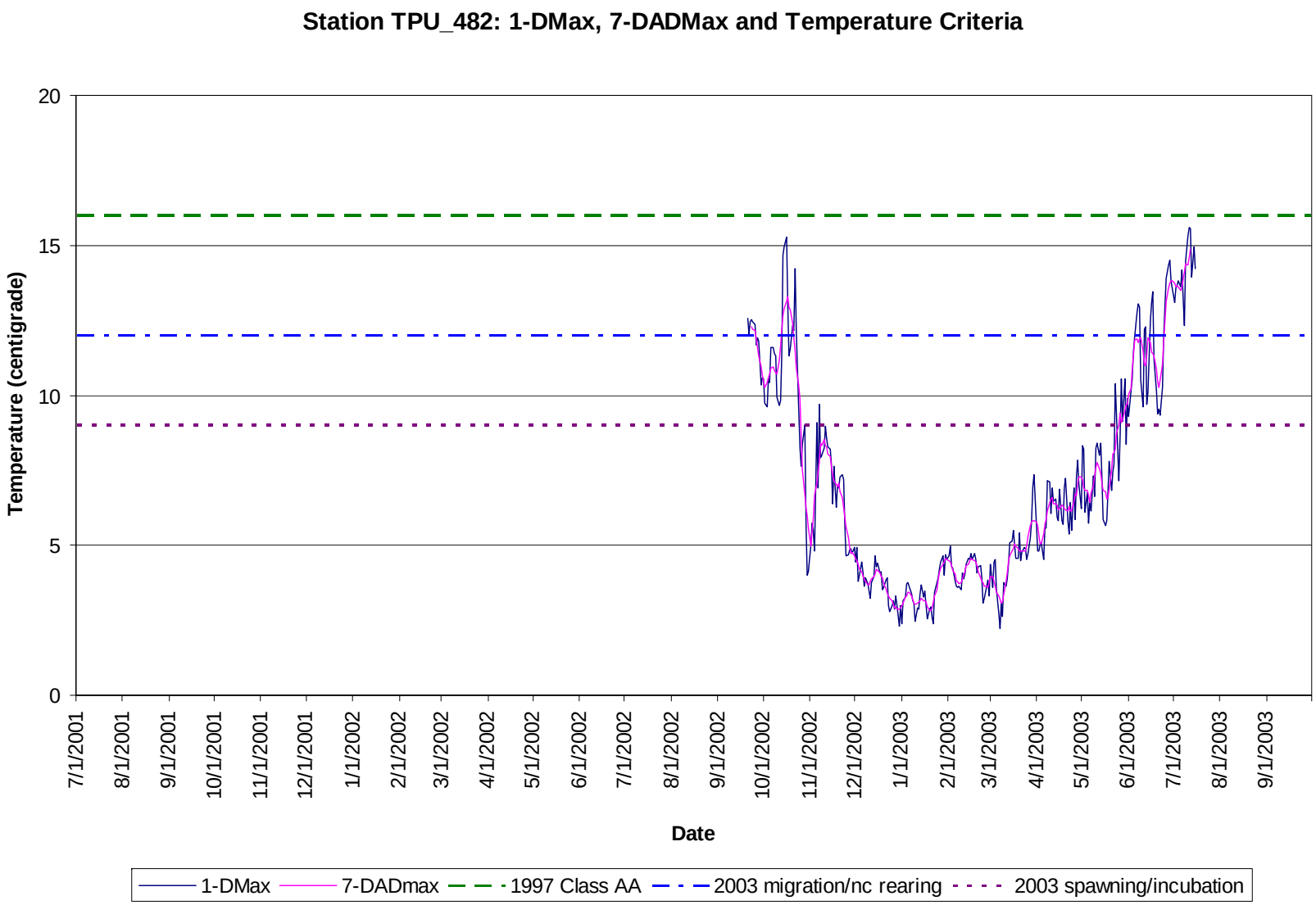

Station TPU_477: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation

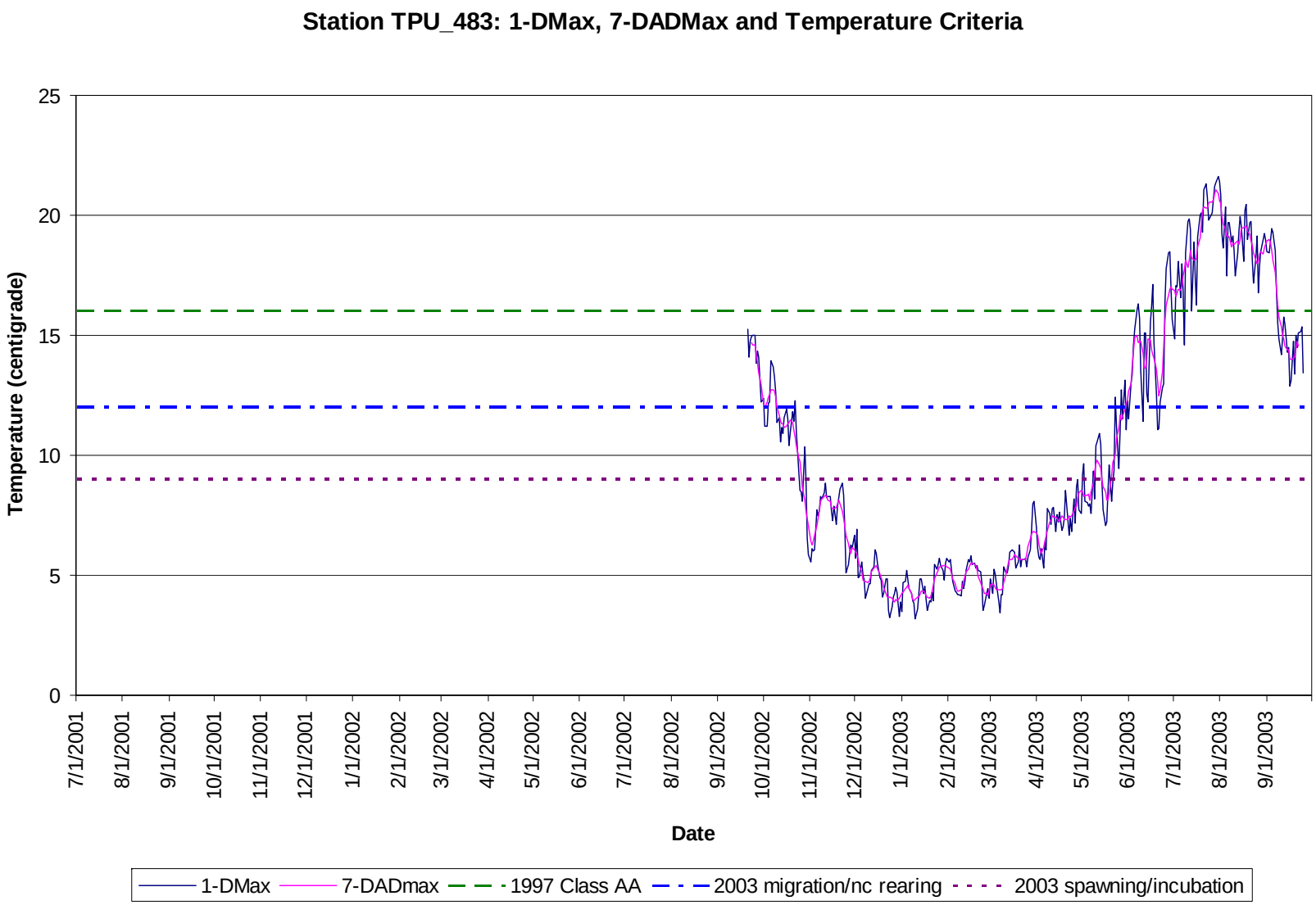

Station TPU_478: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation


Station TPU_479: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
35
30
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation


Station TPU_480: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation


Station TPU_481: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation


Station TPU_482: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation


Station TPU_483: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
25
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation

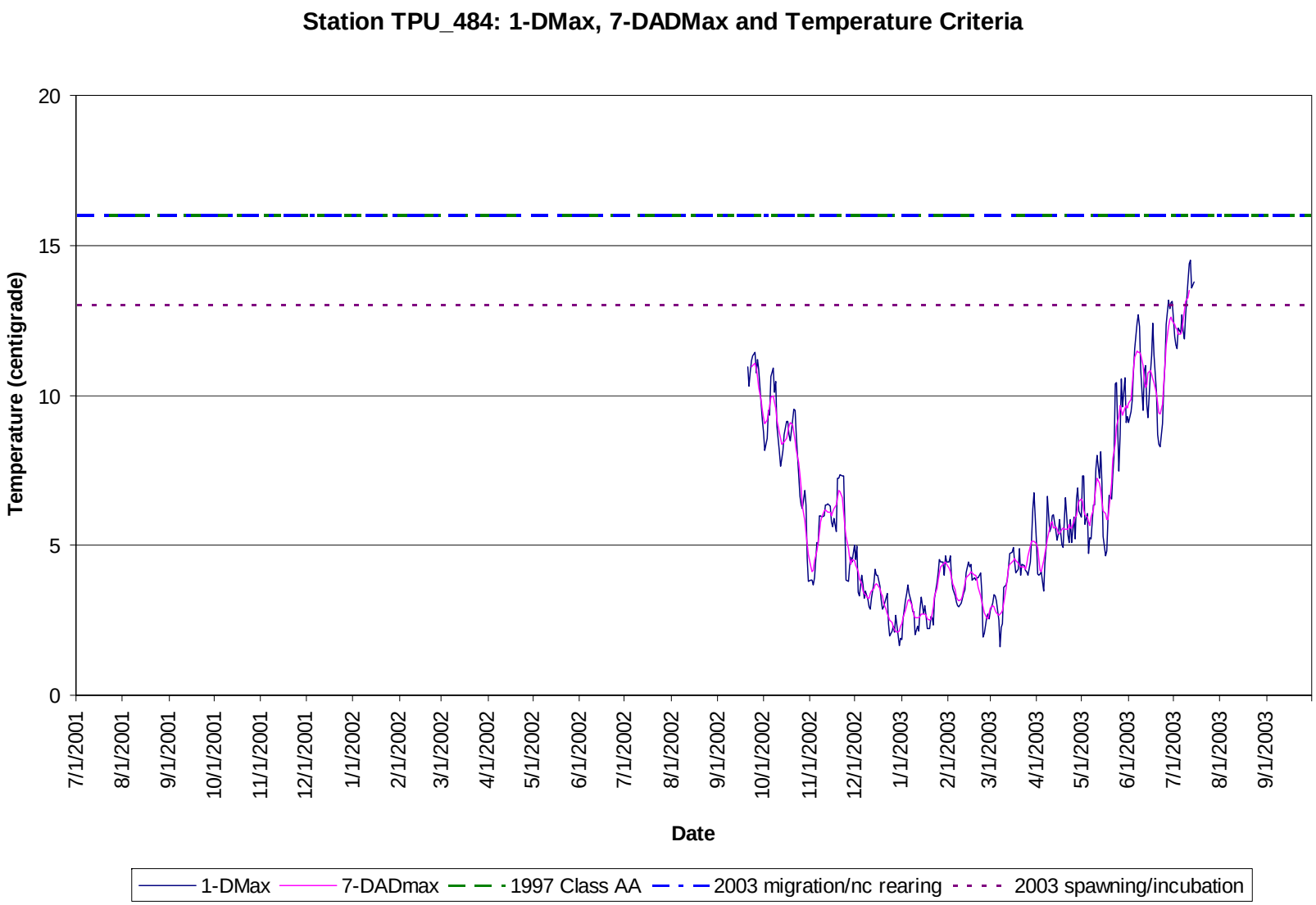

Station TPU_484: 1-DMax, 7-DADMax and Temperature Criteria
Temperature (centigrade)
20
15
10
5
0
7/1/2001
8/1/2001
9/1/2001
10/1/2001
11/1/2001
12/1/2001
1/1/2002
2/1/2002
3/1/2002
4/1/2002
5/1/2002
6/1/2002
7/1/2002
8/1/2002
9/1/2002
10/1/2002
11/1/2002
12/1/2002
1/1/2003
2/1/2003
3/1/2003
4/1/2003
5/1/2003
6/1/2003
7/1/2003
8/1/2003
9/1/2003
Date
1-DMax
7-DADmax
1997 Class AA
2003 migration/nc rearing
2003 spawning/incubation

Table 1: Monthly Temperature Summary for Station GRT01

Month	Max	Mean	Min	7-DADmax
Jul-01*	18.3	16.2	14.3	17.1
Aug-01	21.0	16.9	14.3	20.3
Sep-01	17.9	15.4	13.2	17.6
Oct-01	14.8	11.5	8.0	14.2
Nov-01	10.4	8.1	5.8	9.6
Dec-01	7.6	6.0	4.2	7.0
Jan-02	8.9	5.9	4.1	7.6
Feb-02*	8.1	6.2	4.7	7.5
Mar-02*	9.6	6.7	4.7	8.6
Apr-02	12.1	8.5	6.9	10.9
May-02	13.5	10.3	7.8	12.2
Jun-02	18.6	13.5	9.6	17.3
Jul-02	20.5	16.6	13.2	19.3
Aug-02	21.9	17.4	15.1	20.6
Sep-02	19.1	15.5	12.9	18.2
Oct-02	14.5	12.0	8.3	13.9
Nov-02	11.0	9.4	6.1	10.6
Dec-02	9.3	7.5	5.5	9.2
Jan-03	8.9	6.4	4.2	7.9
Feb-03	8.1	6.2	3.8	7.9
Mar-03	10.9	7.6	5.5	9.5
Apr-03	12.6	9.6	7.5	12.5
May-03	15.9	12.4	9.8	15.5
Jun-03	20.9	16.1	13.2	19.9
Jul-03	23.2	18.7	15.1	22.0
Aug-03	22.0	18.2	16.0	21.7
Sep-03	20.0	16.2	14.1	19.6

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class B (21C)		
2001*	1	0.03
2002	2	0.45
2003	14	1.12
2003 migration/nc rearing (17.5C)		
2001*	25	1.05
2002	56	1.14
2003	82	2.49
2003 spawning/incubation (13C)		
2001*	63	4.29
2002	123	4.01
2003	146	4.97

*Data collection for WY2001 is from July 27 to September 30, 2001

Table 1: Monthly Temperature Summary for Station GRT02

Month	Max	Mean	Min	7-DADmax
Jul-01*	20.6	17.8	14.5	20.0
Aug-01	29.4	18.7	15.3	24.5
Sep-01	24.4	16.0	9.8	19.9
Oct-01	14.8	11.7	8.8	14.5
Nov-01	11.9	9.4	5.0	11.3
Dec-01	8.4	7.0	5.0	8.0
Jan-02	10.5	7.3	4.4	9.6
Feb-02*	10.0	7.4	5.3	9.4
Mar-02*	13.4	8.1	4.4	12.3
Apr-02	17.1	11.6	7.9	14.6
May-02	19.0	13.8	10.1	18.2
Jun-02	22.2	16.0	10.4	21.6
Jul-02	23.5	18.5	13.2	22.5
Aug-02	33.5	18.8	12.3	29.4
Sep-02	28.9	15.7	8.4	23.5
Oct-02	15.9	12.0	6.6	14.9
Nov-02	12.4	8.9	2.2	11.6
Dec-02	9.8	7.3	3.4	8.9
Jan-03	11.3	7.8	4.4	10.2
Feb-03	10.3	8.3	5.5	9.8
Mar-03	14.4	10.0	7.0	13.2
Apr-03	15.9	11.9	9.3	15.4
May-03	19.7	14.2	9.9	18.8
Jun-03	26.4	17.0	13.4	23.3
Jul-03	30.6	20.7	14.3	27.3
Aug-03	30.6	19.7	10.9	27.6
Sep-03	24.0	16.9	8.7	21.8

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	42	3.07
2002**	111	4.17
2003***	100	4.77
2003 migration/nc rearing (17.5C)		
2001*	47	3.03
2002**	124	4.09
2003***	108	4.71
2003 spawning/incubation (13C)		
2001*	63	6.45
2002**	186	6.23
2003***	181	6.38

*Data collection for WY2001 is from July 27 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station GRT03

Month	Max	Mean	Min	7-DADmax
Jul-01*	14.3	13.3	11.8	14.1
Aug-01	16.2	13.8	11.6	15.7
Sep-01	14.6	12.8	10.1	14.6
Oct-01	12.9	10.3	7.1	12.6
Nov-01	11.2	8.4	6.1	9.9
Dec-01	7.9	5.9	3.2	7.2
Jan-02	8.8	5.9	3.2	8.1
Feb-02*	8.5	5.5	3.4	7.2
Mar-02*	9.5	6.5	3.9	9.3
Apr-02	12.6	8.9	5.7	11.0
May-02	13.2	10.4	7.3	12.9
Jun-02	15.2	12.4	9.3	14.4
Jul-02	16.3	13.7	11.0	15.7
Aug-02	16.3	14.0	11.8	15.8
Sep-02	15.1	12.9	10.2	14.7
Oct-02	13.0	10.5	6.1	12.4
Nov-02	10.2	8.4	5.3	10.0
Dec-02	8.7	6.8	4.5	8.2
Jan-03	9.5	6.4	3.9	8.7
Feb-03	8.5	6.0	2.9	8.2
Mar-03	11.2	7.9	4.8	10.1
Apr-03	11.6	9.5	6.5	11.5
May-03	12.9	10.6	7.9	12.6
Jun-03	15.4	12.7	10.7	14.5
Jul-03	17.0	14.3	11.3	16.3
Aug-03	16.3	14.7	12.1	16.0
Sep-03	16.2	13.8	11.6	15.8

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	59	1.36
2002**	110	1.37
2003***	110	1.86

*Data collection for WY2001 is from July 27 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station GRT04

Month	Max	Mean	Min	7-DADmax
Jul-01*	17.4	15.3	13.1	16.9
Aug-01	20.5	16.5	13.0	20.0
Sep-01	17.9	14.8	11.8	17.5
Oct-01	14.4	10.7	7.4	14.2
Nov-01	9.3	7.5	4.6	8.7
Dec-01	6.8	5.5	3.5	6.3
Jan-02	7.4	5.4	3.8	6.6
Feb-02*	7.7	5.7	4.2	7.1
Mar-02*	7.7	5.9	4.5	7.7
Apr-02	11.6	7.4	5.3	9.6
May-02	11.3	8.8	6.8	10.9
Jun-02	16.0	11.3	8.5	14.8
Jul-02	19.2	14.6	10.8	17.8
Aug-02	20.5	16.4	12.8	19.6
Sep-02	17.5	14.6	11.4	17.5
Oct-02	14.8	11.1	5.4	14.1
Nov-02	9.9	7.8	4.3	9.5
Dec-02	7.0	5.9	3.7	6.7
Jan-03	7.7	5.7	4.2	6.9
Feb-03	7.6	5.7	2.9	7.3
Mar-03	9.4	6.7	4.9	8.7
Apr-03	11.3	8.4	6.3	10.8
May-03	14.4	10.5	7.9	13.9
Jun-03	20.5	14.3	11.1	19.1
Jul-03	22.3	18.0	13.1	21.3
Aug-03	20.8	17.7	13.8	20.8
Sep-03	20.0	15.4	12.1	19.4

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	17	1.06
2002**	23	0.87
2003***	75	1.70
2003 migration/nc rearing (17.5C)		
2001*	19	1.13
2002**	29	0.81
2003***	75	2.11
2003 spawning/incubation (13C)		
2001*	63	4.01
2002**	109	3.27
2003***	134	4.65

*Data collection for WY2001 is from July 27 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station GRT05

Month	Max	Mean	Min	7-DADmax
Jul-01*	15.4	14.4	13.3	14.9
Aug-01	15.9	14.6	13.0	15.7
Sep-01	15.4	13.1	10.9	15.1
Oct-01	12.1	10.1	8.2	11.8
Nov-01	11.0	8.4	6.2	9.9
Dec-01	7.5	5.7	3.9	7.0
Jan-02	7.9	5.7	3.9	7.5
Feb-02*	8.2	5.4	4.2	6.8
Mar-02*	10.1	6.9	4.4	9.7
Apr-02	14.3	10.1	7.0	12.4
May-02	15.7	12.1	8.4	15.1
Jun-02*	--	--	--	--
Jul-02*	--	--	--	--
Aug-02*	19.5	15.2	13.1	18.7
Sep-02	16.8	13.4	10.4	16.5
Oct-02	13.1	10.1	5.2	12.6
Nov-02	10.3	7.6	3.8	9.7
Dec-02	8.6	6.2	3.9	7.9
Jan-03	9.5	6.3	3.8	8.8
Feb-03	8.6	6.3	3.6	8.4
Mar-03	12.7	8.6	5.5	11.4
Apr-03	13.5	10.8	7.5	13.4
May-03	16.5	12.6	9.3	16.2
Jun-03	18.9	15.1	12.4	17.8
Jul-03	19.2	17.1	14.6	18.8
Aug-03	19.2	16.6	14.4	18.4
Sep-03	17.1	14.7	12.6	16.7

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002	6	0.84
2003	26	0.55
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002	7	0.76
2003	36	0.64
2003 spawning/incubation (13C)		
2001*	61	1.47
2002	72	2.64
2003	143	3.32

*Data collection for WY2001 is from July 23 to September 30, 2001

Table 1: Monthly Temperature Summary for Station GRT06

Month	Max	Mean	Min	7-DADmax
Jul-01*	15.5	13.8	12.4	14.5
Aug-01	16.6	14.2	12.0	16.2
Sep-01	14.8	12.7	9.9	15.0
Oct-01	12.0	10.2	8.2	11.7
Nov-01	11.4	9.6	7.7	11.0
Dec-01	9.7	8.3	6.2	9.2
Jan-02	9.9	8.1	6.5	9.5
Feb-02*	9.6	7.7	5.4	9.0
Mar-02*	10.0	7.9	6.0	9.8
Apr-02	12.7	9.3	6.9	11.3
May-02	12.8	10.1	7.9	12.1
Jun-02	14.2	11.4	8.8	13.5
Jul-02	14.7	12.7	10.5	14.1
Aug-02	15.8	13.3	11.4	15.2
Sep-02	14.5	12.1	9.6	14.2
Oct-02	12.8	9.6	3.8	12.2
Nov-02	10.8	7.5	2.7	10.1
Dec-02	8.6	6.7	4.3	8.1
Jan-03	10.2	7.8	5.8	9.6
Feb-03	9.6	8.1	5.4	9.4
Mar-03	12.0	8.9	6.6	11.0
Apr-03	12.4	9.6	6.9	11.6
May-03	13.7	10.7	7.7	13.2
Jun-03	15.6	12.6	10.2	14.9
Jul-03	17.7	14.8	11.6	17.0
Aug-03	16.9	14.6	11.4	16.6
Sep-03	16.4	13.2	10.2	15.8

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002	0	--
2003	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002	0	--
2003	0	--
2003 spawning/incubation (13C)		
2001*	60	1.45
2002	81	0.85
2003	112	1.99

*Data collection for WY2001 is from July 24 to September 30, 2001

Table 1: Monthly Temperature Summary for Station GRT07

Month	Max	Mean	Min	7-DADmax
Jul-01*	12.1	11.7	10.7	12.2
Aug-01	13.6	12.0	10.2	13.3
Sep-01	12.5	11.2	9.1	12.6
Oct-01	11.1	9.6	7.1	10.8
Nov-01	10.4	8.4	6.5	9.9
Dec-01	7.7	6.0	3.7	7.2
Jan-02	8.5	6.0	3.7	7.9
Feb-02*	8.0	5.8	3.7	7.4
Mar-02*	9.7	6.7	4.5	9.4
Apr-02	12.1	8.8	5.9	10.6
May-02	11.9	9.8	7.1	11.5
Jun-02	13.1	11.2	8.8	12.6
Jul-02	13.8	12.0	9.9	13.3
Aug-02	13.6	11.9	9.7	13.2
Sep-02	12.7	11.0	8.2	12.5
Oct-02	11.4	9.3	5.2	11.1
Nov-02	10.2	8.0	4.5	9.8
Dec-02	9.1	7.1	4.9	8.5
Jan-03	9.1	7.1	5.1	8.3
Feb-03	8.3	6.2	3.2	7.9
Mar-03	11.6	7.9	5.1	10.2
Apr-03	11.3	9.2	5.9	11.2
May-03	12.2	9.9	6.8	11.9
Jun-03*	13.6	11.7	9.3	12.9
Jul-03	14.5	12.4	9.7	13.9
Aug-03	13.9	12.4	9.9	13.7
Sep-03	13.8	11.6	9.1	13.4

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002	0	--
2003	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002	0	--
2003	0	--
2003 spawning/incubation (13C)		
2001*	6	0.20
2002	15	0.16
2003	56	0.41

*Data collection for WY2001 is from July 27 to September 30, 2001

Table 1: Monthly Temperature Summary for Station GRT09

Month	Max	Mean	Min	7-DADmax
Jul-01*	16.7	14.0	12.0	15.4
Aug-01	17.7	14.3	11.4	17.3
Sep-01	15.0	12.5	9.4	15.3
Oct-01*	11.9	9.8	8.2	11.4
Nov-01*	--	--	--	--
Dec-01*	--	--	--	--
Jan-01*	--	--	--	--
Feb-02*	--	--	--	--
Mar-02*	9.8	7.0	4.3	9.6
Apr-02	13.0	9.4	6.5	11.5
May-02	14.0	11.0	7.8	13.7
Jun-02	16.8	13.4	9.8	16.2
Jul-02	17.4	14.6	11.3	16.7
Aug-02	17.9	13.8	9.8	17.7
Sep-02	17.0	11.9	6.7	16.4
Oct-02	12.9	9.0	3.2	12.1
Nov-02	9.9	6.9	2.3	9.3
Dec-02	8.4	5.5	2.9	7.5
Jan-03	10.2	6.3	3.4	8.9
Feb-03	8.5	6.3	2.7	8.3
Mar-03	12.4	8.2	5.4	10.8
Apr-03	12.3	9.7	6.2	12.2
May-03	15.5	11.2	7.6	14.6
Jun-03	18.1	13.2	10.5	16.6
Jul-03	19.2	15.0	11.0	18.6
Aug-03	18.7	14.6	10.5	17.6
Sep-03	16.3	12.7	9.9	15.6

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	0	--
2003***	13	0.63
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	2	0.13
2003***	18	0.66
2003 spawning/incubation (13C)		
2001*	61	1.85
2002**	114	2.40
2003***	116	2.83

*Data collection for WY2001 is from July 23 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station GRT10

Month	Max	Mean	Min	7-DADmax
Jul-01*	19.4	15.6	13.1	17.5
Aug-01	21.4	16.3	12.8	20.9
Sep-01*	17.5	15.1	12.9	17.9
Oct-01	--	--	--	--
Nov-01*	8.6	7.0	4.1	8.1
Dec-01	6.6	5.5	3.9	6.2
Jan-02	6.9	5.4	4.1	6.6
Feb-02*	7.3	5.7	4.4	6.8
Mar-02*	7.2	5.8	4.5	7.3
Apr-02	10.8	7.3	5.3	9.3
May-02	10.9	8.7	6.9	10.6
Jun-02	14.6	11.0	8.6	14.1
Jul-02	19.1	14.4	10.6	18.0
Aug-02	21.9	16.6	12.9	20.9
Sep-02	19.4	14.4	9.6	18.6
Oct-02	12.9	9.0	3.2	12.1
Nov-02	9.9	6.9	2.3	9.3
Dec-02	8.4	5.5	2.9	7.5
Jan-03	10.2	6.3	3.4	8.9
Feb-03	8.5	6.2	3.3	8.3
Mar-03	8.9	6.6	4.9	8.4
Apr-03	10.6	8.3	6.6	10.4
May-03	13.6	10.3	8.1	13.3
Jun-03*	16.9	13.2	10.9	15.3
Jul-03*	23.4	20.6	17.0	--
Aug-03	22.1	17.9	13.9	21.8
Sep-03	21.2	15.6	12.0	20.6

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	40	2.31
2002**	63	2.27
2003***	60	3.42
2003 migration/nc rearing (17.5C)		
2001*	23	1.40
2002**	43	1.29
2003***	40	2.77
2003 spawning/incubation (13C)		
2001*	39	5.11
2002**	98	3.94
2003***	71	5.19

*Data collection for WY2001 is from July 24 to September 06, 2001

**Data collection for WY2002 is from November 16 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station GRT11

Month	Max	Mean	Min	7-DADmax
Jul-01*	12.6	12.1	11.8	12.4
Aug-01	13.7	12.5	10.7	13.5
Sep-01	14.3	12.0	9.8	13.9
Oct-01	10.8	9.5	5.5	10.6
Nov-01	10.7	7.8	4.6	9.8
Dec-01	7.6	5.0	3.0	6.4
Jan-02	10.1	5.3	1.8	8.4
Feb-02*	9.4	5.4	2.4	8.2
Mar-02*	11.6	7.1	2.9	11.0
Apr-02	16.3	10.2	6.5	13.9
May-02	15.4	11.3	7.7	14.7
Jun-02	15.7	11.8	9.0	14.7
Jul-02	18.1	15.1	9.3	17.4
Aug-02	15.5	13.6	10.7	15.2
Sep-02	14.6	10.9	2.4	14.0
Oct-02	12.2	8.3	4.5	11.9
Nov-02	9.8	6.4	2.4	9.0
Dec-02	8.4	4.9	1.8	7.4
Jan-03	11.2	5.8	2.1	9.2
Feb-03	8.7	5.9	2.1	8.4
Mar-03	14.4	8.5	4.3	12.5
Apr-03	15.2	10.8	6.3	14.6
May-03	17.0	12.0	7.7	15.7
Jun-03	17.6	13.0	9.9	16.6
Jul-03	21.5	15.7	10.5	20.8
Aug-03	20.5	15.0	5.9	20.7
Sep-03	20.2	12.5	4.5	19.3

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	1	0.10
2003***	48	1.44
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	51	1.68
2003 spawning/incubation (13C)		
2001*	19	0.32
2002**	132	1.55
2003***	149	3.19

*Data collection for WY2001 is from July 27 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station GRT12

Month	Max	Mean	Min	7-DADmax
Jul-01*	12.0	10.9	9.8	11.9
Aug-01	13.8	11.4	9.3	13.5
Sep-01	12.8	10.5	8.4	12.4
Oct-01	11.5	9.2	6.1	11.0
Nov-01	10.4	8.2	4.7	9.7
Dec-01	8.6	6.2	2.2	8.1
Jan-02	10.3	5.8	1.5	9.3
Feb-02*	10.1	5.8	1.9	9.2
Mar-02*	--	--	--	--
Apr-02*	--	--	--	--
May-02*	11.8	10.9	9.8	--
Jun-02	14.3	10.7	8.1	12.9
Jul-02	13.8	11.3	8.9	13.2
Aug-02	13.5	11.0	8.7	13.1
Sep-02*	12.7	10.3	7.6	12.2
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03*	13.3	11.3	9.6	12.5
Jul-03	14.1	11.3	8.7	13.5
Aug-03	13.5	11.1	9.0	13.2
Sep-03	12.9	10.5	8.4	12.7

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	6	0.32
2002**	8	0.05
2003***	17	0.28

*Data collection for WY2001 is from July 27 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 26, 2002

***Data collection for WY2003 is from June 27 to September 30, 2003

Table 1: Monthly Temperature Summary for Station GRT13

Month	Max	Mean	Min	7-DADmax
Jul-01*	9.8	9.4	9.2	9.7
Aug-01	10.6	9.7	9.2	10.4
Sep-01	10.1	9.6	8.9	10.0
Oct-01	9.8	9.2	8.1	9.7
Nov-01	9.6	9.2	8.4	9.5
Dec-01	9.5	9.1	8.7	9.3
Jan-02	9.0	8.4	7.8	9.0
Feb-02*	8.1	7.8	7.5	8.1
Mar-02*	7.3	7.1	6.9	7.3
Apr-02	7.3	7.0	6.7	7.3
May-02	7.8	7.3	6.9	7.7
Jun-02	8.4	7.8	7.3	8.3
Jul-02	9.0	8.5	7.8	8.9
Aug-02	10.1	9.1	8.4	9.7
Sep-02	10.0	9.3	8.4	9.8
Oct-02	9.6	8.9	7.3	9.6
Nov-02	9.2	8.2	6.7	9.0
Dec-02	8.3	7.4	6.4	8.0
Jan-03	9.3	8.5	7.3	9.1
Feb-03	9.0	8.7	8.3	9.0
Mar-03	8.9	8.5	8.0	8.8
Apr-03	8.1	7.8	7.5	8.2
May-03	8.4	7.9	7.5	8.4
Jun-03*	9.0	8.5	8.0	9.0
Jul-03	9.8	9.0	8.3	9.6
Aug-03	10.0	9.3	8.6	9.8
Sep-03	10.1	9.4	8.4	9.9

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (16C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	0	--
2002**	0	--
2003***	0	--

*Data collection for WY2001 is from July 24 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station GRT14

Month	Max	Mean	Min	7-DADmax
Jul-01*	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02*	6.3	5.2	4.3	6.6
Apr-02	9.7	6.7	4.4	8.7
May-02	10.2	8.1	6.8	9.9
Jun-02	17.1	10.5	8.2	15.7
Jul-02	19.0	13.5	8.8	16.7
Aug-02	21.9	15.3	10.2	19.2
Sep-02*	16.7	14.3	12.2	16.2
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03*	16.6	13.0	11.0	14.4
Jul-03*	19.8	18.2	16.9	--
Aug-03	19.0	16.6	14.4	18.7
Sep-03	18.4	14.9	12.6	17.8

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	0	--
2002**	42	1.21
2003***	43	1.74
2003 migration/nc rearing (16C)		
2001*	0	--
2002**	37	1.02
2003***	40	1.59
2003 spawning/incubation (13C)		
2001*	0	--
2002**	94	2.83
2003***	66	3.36

*No data collection for WY2001 from this site

**Data collection for WY2002 is from March 15 to September 26, 2002

***Data collection for WY2003 is from June 13 to September 30, 2003

Table 1: Monthly Temperature Summary for Station GRT16

Month	Max	Mean	Min	7-DADmax
Jul-01*	17.8	14.3	12.9	15.9
Aug-01	18.9	15.4	12.7	18.6
Sep-01	17.3	14.9	13.2	17.1
Oct-01	15.5	10.6	6.7	15.2
Nov-01	12.6	6.9	2.2	10.0
Dec-01	7.6	4.5	1.1	6.8
Jan-02	8.4	4.1	0.7	7.3
Feb-02*	10.6	4.2	0.6	7.1
Mar-02*	5.6	4.5	3.7	6.0
Apr-02	9.8	6.1	4.8	7.8
May-02	9.2	7.5	6.2	9.0
Jun-02	13.1	9.4	7.8	12.3
Jul-02	17.3	12.8	9.9	16.2
Aug-02	19.9	15.6	12.6	19.2
Sep-02	18.1	14.8	12.1	17.6
Oct-02	14.6	11.4	5.9	14.5
Nov-02	8.9	7.3	5.2	8.5
Dec-02	6.7	4.6	3.1	6.1
Jan-03	6.7	4.7	3.1	6.1
Feb-03	6.6	5.0	2.8	6.2
Mar-03	7.6	5.5	4.1	7.2
Apr-03	9.5	7.2	5.9	8.9
May-03	11.8	8.9	7.5	11.6
Jun-03	17.8	12.3	9.6	16.6
Jul-03*	17.9	14.1	11.8	16.5
Aug-03*	20.5	17.1	14.6	19.7
Sep-03*	20.2	15.5	12.4	19.8

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	42	1.25
2002**	52	1.47
2003***	48	2.53
2003 migration/nc rearing (16C)		
2001*	46	0.87
2002**	51	1.34
2003***	44	2.40
2003 spawning/incubation (13C)		
2001*	66	3.51
2002**	93	3.25
2003***	80	3.52

*Data collection for WY2001 is from July 24 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 23, 2003

Table 1: Monthly Temperature Summary for Station GRT17

Month	Max	Mean	Min	7-DADmax
Jul-01*	14.4	13.9	13.5	14.3
Aug-01	16.0	14.9	13.8	15.9
Sep-01	15.8	15.3	14.6	15.8
Oct-01	15.1	10.9	6.5	15.0
Nov-01	8.1	6.5	2.0	7.6
Dec-01	5.6	4.3	2.6	5.0
Jan-02	5.8	4.2	2.9	5.4
Feb-02*	5.4	4.3	3.3	5.2
Mar-02*	5.0	4.1	3.6	4.9
Apr-02	6.5	5.8	4.8	6.6
May-02	8.1	7.2	6.2	8.0
Jun-02	10.4	8.9	7.8	10.4
Jul-02	14.9	12.3	10.2	14.7
Aug-02	16.3	15.2	14.0	16.1
Sep-02	16.2	15.4	14.7	16.0
Oct-02	14.9	12.3	9.0	14.6
Nov-02	9.0	7.4	5.4	8.8
Dec-02	6.1	4.5	3.1	5.9
Jan-03	6.2	4.5	3.1	5.9
Feb-03	6.1	4.8	2.8	5.8
Mar-03	6.8	5.2	3.9	6.6
Apr-03	7.6	6.9	5.8	7.7
May-03	9.9	8.5	7.3	10.0
Jun-03	13.5	11.6	9.8	13.4
Jul-03	16.2	14.1	12.6	16.1
Aug-03	17.9	16.8	15.1	17.8
Sep-03	17.9	15.8	14.1	17.8

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	0	--
2002**	6	0.19
2003***	45	1.25
2003 migration/nc rearing (16C)		
2001*	0	--
2002**	8	0.04
2003***	46	1.21
2003 spawning/incubation (13C)		
2001*	66	2.38
2002**	82	2.26
2003***	107	2.66

*Data collection for WY2001 is from July 24 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station GRT18

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	19.7	17.2	15.7	18.5
Aug-02	21.5	18.0	15.3	20.7
Sep-02*	18.4	15.6	13.2	18.1
Oct-02	14.9	11.3	6.1	14.1
Nov-02	10.2	7.8	3.9	9.7
Dec-02	7.4	6.0	3.9	7.2
Jan-03	8.4	5.8	3.9	7.4
Feb-03	7.6	5.9	3.7	7.5
Mar-03	9.8	7.2	5.4	8.9
Apr-03	11.0	9.0	7.3	11.1
May-03	14.4	11.5	9.6	14.0
Jun-03*	21.6	16.0	12.2	20.2
Jul-03*	23.3	19.9	16.1	22.5
Aug-03*	--	--	--	--
Sep-03*	16.8	15.3	13.6	16.6

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	37	1.25
2003	36	3.03
2003 migration/nc rearing (17.5C)		
2001*		
2002**	49	1.23
2003	33	3.31
2003 spawning/incubation (13C)		
2001*		
2002**	75	4.98
2003	59	5.20

*No data collection for this site in WY2001

**Limited data collection from July 09 to September 27, 2002

Table 1: Monthly Temperature Summary for Station GRT19

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	21.5	18.1	15.3	20.6
Aug-02	22.7	17.5	14.3	22.2
Sep-02	18.6	15.0	11.4	18.5
Oct-02	15.3	11.6	6.5	14.5
Nov-02	11.9	9.2	4.7	11.2
Dec-02	9.4	7.7	6.3	8.6
Jan-03	10.6	7.7	5.2	9.9
Feb-03	10.3	7.8	4.7	9.4
Mar-03	13.2	9.6	6.9	12.1
Apr-03	13.9	11.6	9.4	13.9
May-03	17.8	13.7	10.9	17.0
Jun-03	19.4	16.2	13.1	18.6
Jul-03	20.7	17.6	15.0	20.0
Aug-03	20.2	17.3	15.9	19.9
Sep-03	17.3	15.4	13.7	17.2

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	57	1.93
2003	49	1.03
2003 migration/nc rearing (17.5C)		
2001*		
2002**	65	1.95
2003	65	1.10
2003 spawning/incubation (13C)		
2001*		
2002**	81	5.74
2003	164	3.73

*No data collection for this site in WY2001

**Data collection for WY2002 is from July 09 to September 30, 2002

Table 1: Monthly Temperature Summary for Station GRT20

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	18.9	15.9	14.9	17.0
Aug-02	21.0	16.6	11.4	20.5
Sep-02	20.5	14.3	7.3	19.2
Oct-02*	14.1	12.4	9.7	13.6
Nov-02*	--	--	--	--
Dec-02*	5.9	5.7	5.2	6.1
Jan-03	8.3	5.8	3.8	7.2
Feb-03	7.6	5.8	3.0	7.5
Mar-03	9.9	7.0	5.4	9.0
Apr-03*	9.7	8.0	6.6	8.9
May-03*	--	--	--	--
Jun-03*	19.4	18.1	16.6	18.3
Jul-03	22.5	18.8	15.5	21.6
Aug-03*	21.0	18.1	15.3	21.0
Sep-03*	18.2	15.2	12.7	17.0

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	28	1.61
2003	49	1.96
2003 migration/nc rearing (17.5C)		
2001*		
2002**	34	1.45
2003	45	2.45
2003 spawning/incubation (13C)		
2001*		
2002**	81	4.59
2003	73	5.01

*No data collection for this site in WY2001

**Data collection for WY2002 is from July 09 to September 30, 2002

Table 1: Monthly Temperature Summary for Station GRT21

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	21.0	18.6	15.2	20.4
Aug-02	20.5	17.1	14.9	19.6
Sep-02	17.1	14.4	11.0	17.1
Oct-02	14.7	11.0	5.6	14.0
Nov-02	11.2	7.8	1.8	10.5
Dec-02	9.0	6.4	3.7	8.2
Jan-03	10.9	6.5	3.2	9.7
Feb-03	9.9	6.7	3.2	9.1
Mar-03	13.5	8.9	5.9	12.4
Apr-03	15.2	11.3	7.8	15.2
May-03	20.3	13.6	9.6	19.2
Jun-03	23.3	16.6	13.2	21.4
Jul-03	21.5	17.8	14.1	20.3
Aug-03	25.4	16.5	8.4	22.6
Sep-03*	24.5	15.8	9.5	22.7

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	39	1.49
2003***	78	1.94
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	46	1.42
2003***	100	1.77
2003 spawning/incubation (13C)		
2001*	0	--
2002**	80	4.52
2003***	153	4.84

*No data collection from this site for WY2001

**Data collection for WY2002 is from July 09 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 15, 2003

Table 1: Monthly Temperature Summary for Station GRT22

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	18.6	16.2	15.4	17.1
Aug-02	21.3	17.5	14.8	20.4
Sep-02	18.1	15.1	12.4	17.7
Oct-02	14.4	11.1	5.3	13.9
Nov-02	10.1	7.7	3.9	9.7
Dec-02	8.1	5.9	3.6	7.2
Jan-03	8.4	5.8	3.9	7.3
Feb-03	7.6	5.9	3.3	7.5
Mar-03	9.8	7.1	5.5	9.1
Apr-03	11.3	8.9	6.9	11.4
May-03	14.3	11.2	8.7	14.2
Jun-03	20.5	15.3	12.1	19.3
Jul-03	23.0	19.3	15.5	22.2
Aug-03	21.7	18.7	15.5	21.5
Sep-03	20.4	16.0	13.1	19.7

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	27	1.20
2003	75	2.24
2003 migration/nc rearing (17.5C)		
2001*		
2002**	38	1.04
2003	76	2.64
2003 spawning/incubation (13C)		
2001*		
2002**	81	4.33
2003	136	4.91

*No data collection for this site in WY2001

**Data collection for WY2002 is from July 09 to September 30, 2002

Table 1: Monthly Temperature Summary for Station GRT23

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	11.3	9.2	8.5	10.2
Aug-02	11.8	10.0	8.7	11.4
Sep-02	12.1	10.1	8.7	11.7
Oct-02	10.5	8.9	6.5	10.2
Nov-02	9.6	7.8	6.1	8.9
Dec-02	8.1	6.7	5.3	7.7
Jan-03	8.4	7.5	6.4	8.1
Feb-03	8.5	7.8	7.0	8.2
Mar-03	8.8	8.0	7.3	8.6
Apr-03	9.1	8.0	7.4	8.8
May-03	9.5	8.1	6.7	9.1
Jun-03	10.5	8.5	7.8	10.2
Jul-03	13.5	9.6	7.9	12.2
Aug-03	13.3	11.1	9.8	13.1
Sep-03	13.6	11.3	9.6	13.3

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*		
2002**	0	--
2003	0	--
2003 migration/nc rearing (16C)		
2001*		
2002**	0	--
2003	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	0	--
2003	5	0.17

*No data collection for this site in WY2001

**Data collection for WY2002 is from July 10 to September 30, 2002

Table 1: Monthly Temperature Summary for Station GRT24

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	16.4	13.8	12.7	14.9
Aug-02	17.6	13.2	9.8	16.4
Sep-02	14.5	11.5	8.3	14.1
Oct-02	12.5	8.9	3.8	11.8
Nov-02	10.2	7.1	2.7	9.4
Dec-02	8.4	5.7	3.2	7.6
Jan-03	10.5	6.4	3.8	8.8
Feb-03	8.6	6.4	2.7	8.2
Mar-03	12.2	8.1	4.9	10.9
Apr-03	12.3	9.5	6.4	11.9
May-03	13.9	10.7	7.7	13.2
Jun-03	15.3	12.1	10.2	14.4
Jul-03	16.2	13.4	10.5	15.6
Aug-03*	15.1	13.2	11.2	15.3
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	61	1.65
2003***	63	1.36

*No data collection for this site in WY2001

**Data collection for WY2002 is from July 12 to September 30, 2002

***Data collection for WY2003 is from October 01 to August 13, 2003

Table 1: Monthly Temperature Summary for Station GRT25

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	15.1	12.5	11.3	13.9
Aug-02	15.0	12.3	9.4	14.2
Sep-02	14.0	11.0	8.0	13.1
Oct-02	11.9	8.9	5.0	11.2
Nov-02	10.0	7.7	4.3	9.6
Dec-02	8.6	6.0	3.5	7.7
Jan-03	10.5	6.4	3.8	8.9
Feb-03	8.8	6.2	2.5	8.2
Mar-03	12.3	8.1	5.2	11.0
Apr-03	12.3	9.5	6.4	11.9
May-03	13.4	10.5	7.5	12.8
Jun-03	14.8	11.7	9.9	13.7
Jul-03	14.8	12.4	9.9	14.4
Aug-03*	13.6	11.9	10.2	13.7
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	46	0.77
2003***	50	0.62

*No data collection for this site in WY2001

**Data collection for WY2002 is from July 12 to September 30, 2002

***Data collection for WY2003 is from October 01 to August 14, 2003

Table 1: Monthly Temperature Summary for Station GRT26

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	15.3	12.8	11.8	13.9
Aug-02	15.0	12.3	9.9	14.5
Sep-02	14.5	11.2	8.4	13.3
Oct-02	12.4	9.1	4.2	11.8
Nov-02	10.5	7.5	3.6	9.7
Dec-02	9.0	6.0	3.6	8.0
Jan-03	10.5	6.7	4.2	8.9
Feb-03	8.8	6.8	3.1	8.4
Mar-03	11.9	8.2	5.1	10.7
Apr-03	12.2	9.4	6.5	11.7
May-03	13.6	10.5	7.8	12.8
Jun-03	14.7	11.7	9.9	13.9
Jul-03	15.6	12.9	10.2	15.0
Aug-03	15.0	13.0	10.4	14.6
Sep-03	14.5	12.1	9.8	14.1

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	0	--
2003	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	0	--
2003	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	46	0.77
2003	85	1.01

*No data collection for this site in WY2001

**Data collection for WY2002 is from July 12 to September 30, 2002

Table 1: Monthly Temperature Summary for Station GRT27

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	15.0	12.6	11.7	13.7
Aug-02	15.0	12.2	9.8	14.4
Sep-02	--	--	--	--
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03*	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	44	0.73
2003***	0	--

*No data collection for this site in WY2001

**Data collection for WY2002 is from July 12 to August 31, 2002

**No data collection for this site in WY2003

Table 1: Monthly Temperature Summary for Station GRT28

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	20.0	15.0	13.3	17.2
Aug-02	20.0	14.5	9.9	19.0
Sep-02	17.9	12.7	7.6	17.1
Oct-02	13.8	8.9	2.7	12.2
Nov-02	10.3	6.7	1.2	9.6
Dec-02	8.9	5.1	1.5	7.5
Jan-03	9.3	6.4	3.6	8.4
Feb-03	8.3	5.8	2.7	7.9
Mar-03	12.3	7.0	4.1	9.9
Apr-03	11.8	7.9	4.4	11.2
May-03	15.8	9.8	5.8	14.7
Jun-03	19.8	13.3	9.2	18.1
Jul-03	22.6	16.3	10.3	21.2
Aug-03	20.7	16.2	11.2	20.5
Sep-03	20.3	13.9	9.2	19.3

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	17	0.97
2003	58	1.61
2003 migration/nc rearing (17.5C)		
2001*		
2002**	18	0.65
2003	67	1.55
2003 spawning/incubation (13C)		
2001*		
2002**	76	3.33
2003	127	4.21

*No data collection for this site in WY2001

**Data collection for WY2002 is from July 12 to September 30, 2002

Table 1: Monthly Temperature Summary for Station GRT29

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	15.8	13.0	12.0	14.2
Aug-02	15.5	12.4	9.4	14.7
Sep-02	13.7	10.9	7.4	13.5
Oct-02	12.2	8.6	3.8	11.6
Nov-02	10.2	7.1	2.5	9.4
Dec-02	8.9	5.7	3.0	7.7
Jan-03	10.2	6.5	4.0	8.8
Feb-03	8.8	6.4	2.9	8.2
Mar-03	12.4	7.8	4.6	10.9
Apr-03	12.8	9.2	5.8	12.0
May-03	14.7	10.4	7.1	13.6
Jun-03	15.9	11.9	9.1	14.8
Jul-03	16.4	13.1	9.7	15.6
Aug-03	15.5	12.8	9.6	15.2
Sep-03	14.8	11.7	8.5	14.2

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	0	--
2003	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	0	--
2003	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	45	1.01
2003	97	1.23

*No data collection for this site in WY2001

**Data collection for WY2002 is from July 12 to September 30, 2002

Table 1: Monthly Temperature Summary for Station GRT31

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	20.2	15.8	13.1	19.2
Aug-02	21.2	16.2	13.1	20.6
Sep-02*	18.6	15.0	13.3	18.0
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03*	15.5	11.7	9.6	15.3
Jun-03	20.7	14.7	11.4	19.7
Jul-03	23.7	17.4	13.3	22.9
Aug-03	23.1	17.4	14.2	22.5
Sep-03	19.9	15.6	13.7	19.9

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class B (21C)		
2001*	0	--
2002**	2	0.14
2003***	24	0.93
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	45	1.25
2003***	81	2.74
2003 spawning/incubation (13C)		
2001*	0	--
2002**	65	5.22
2003***	129	5.60

*No data collection from this site for WY2001

**Data collection for WY2002 is from July 12 to September 20, 2003

***Data collection for WY2003 is from May 02 to September 30, 2003

Table 1: Monthly Temperature Summary for Station GRT33

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	16.9	16.7	16.1	--
Aug-02	18.8	16.0	14.0	18.3
Sep-02	16.9	13.9	11.1	16.1
Oct-02	14.3	10.8	5.1	13.7
Nov-02	11.6	8.4	3.2	10.9
Dec-02	9.7	6.8	4.5	8.7
Jan-03	11.1	7.3	4.6	9.9
Feb-03	9.6	7.3	4.2	9.3
Mar-03	13.9	9.5	6.6	12.7
Apr-03	15.0	11.6	8.5	14.7
May-03	17.8	13.7	10.2	17.1
Jun-03	20.4	16.0	13.1	18.8
Jul-03	20.4	17.4	14.3	19.5
Aug-03	19.1	16.7	13.7	19.0
Sep-03	17.2	14.9	12.5	16.8

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	5	0.46
2003	43	0.98
2003 migration/nc rearing (17.5C)		
2001*		
2002**	7	0.48
2003	62	0.95
2003 spawning/incubation (13C)		
2001*		
2002**	58	2.87
2003	170	3.47

*No data collection for this site in WY2001

**Data collection for WY2002 is from July 31 to September 30, 2002

Table 1: Monthly Temperature Summary for Station GRT34

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	15.6	15.1	14.2	--
Aug-02	18.5	15.1	12.5	17.6
Sep-02	17.3	13.5	10.2	15.7
Oct-02	15.1	11.0	4.3	14.8
Nov-02	12.2	8.2	2.9	10.9
Dec-02	10.0	6.7	4.1	8.8
Jan-03	10.8	6.9	3.8	9.6
Feb-03	8.9	6.0	2.4	8.9
Mar-03	13.7	8.6	5.2	11.9
Apr-03	12.5	10.2	6.8	12.2
May-03	15.0	11.2	7.5	14.5
Jun-03	17.8	14.0	11.1	17.5
Jul-03	22.4	16.3	12.5	18.8
Aug-03	23.2	16.1	12.5	19.1
Sep-03	20.4	14.7	11.4	18.2

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	2	0.38
2003	33	1.32
2003 migration/nc rearing (17.5C)		
2001*		
2002**	2	0.08
2003	57	0.85
2003 spawning/incubation (13C)		
2001*		
2002**	58	2.54
2003	140	3.56

*No data collection for this site in WY2001

**Data collection for WY2002 is from July 31 to September 30, 2002

Table 1: Monthly Temperature Summary for Station GRT35

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	17.2	17.1	16.9	--
Aug-02	19.6	16.7	13.9	19.0
Sep-02	17.0	14.7	12.3	17.0
Oct-02	14.4	11.0	5.5	13.9
Nov-02	10.0	7.8	4.3	9.6
Dec-02	7.4	6.0	3.5	7.1
Jan-03	8.3	5.8	3.8	7.2
Feb-03	7.7	5.8	3.0	7.5
Mar-03	9.9	7.0	5.2	8.9
Apr-03	11.6	8.7	6.5	11.2
May-03	14.5	10.9	8.3	14.2
Jun-03	19.8	14.7	11.4	18.8
Jul-03	21.3	18.4	14.5	20.6
Aug-03	20.4	18.0	15.0	20.2
Sep-03	19.3	15.6	12.7	18.8

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	11	0.76
2003***	63	1.37
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	16	0.71
2003***	74	1.55
2003 spawning/incubation (13C)		
2001*	0	--
2002**	59	3.52
2003***	136	4.24

*No data collection from this site for WY2001

**Data collection for WY2002 is from July 31 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station GRT36

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02	--	--	--	--
Aug-02	--	--	--	--
Sep-02	--	--	--	--
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03*	6.7	5.0	3.1	5.5
Mar-03	8.8	6.4	4.7	8.2
Apr-03	10.5	8.1	6.3	10.2
May-03	13.4	10.0	7.7	13.0
Jun-03	20.9	14.8	10.6	19.9
Jul-03	23.2	18.7	15.1	22.0
Aug-03	21.6	17.3	13.7	21.3
Sep-03	20.9	15.2	11.9	20.2

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	0	--
2002**	0	--
2003***	97	3.51
2003 migration/nc rearing (16C)		
2001*	0	--
2002**	0	--
2003***	96	3.45
2003 spawning/incubation (13C)		
2001*	0	--
2002**	0	--
2003***	120	5.51

*No data collection from this site for WY2001

*No data collection from this site for WY2002

***Data collection for WY2003 is from February 21 to September 30, 2003

Table 1: Monthly Temperature Summary for Station 03G

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02*	5.6	5.4	5.0	--
Feb-02	9.7	7.0	5.3	9.0
Mar-02	11.5	7.6	4.2	10.8
Apr-02	14.6	11.2	9.0	13.1
May-02	16.2	13.2	10.0	16.0
Jun-02	18.9	16.0	12.1	18.0
Jul-02	18.1	16.6	14.6	17.8
Aug-02	18.1	15.9	14.8	17.5
Sep-02	16.7	14.4	12.7	16.5
Oct-02	14.4	11.6	7.3	14.0
Nov-02*	11.7	8.9	5.6	11.1
Dec-02	9.8	7.4	5.8	8.8
Jan-03	11.0	7.9	6.3	10.1
Feb-03	10.0	7.7	5.3	9.7
Mar-03	13.4	9.5	6.7	12.2
Apr-03	13.7	11.4	8.7	13.8
May-03	16.7	13.4	10.4	16.2
Jun-03	18.7	15.6	13.4	17.7
Jul-03	18.9	17.1	14.9	18.3
Aug-03	18.3	16.7	14.6	18.1
Sep-03	17.0	15.5	13.4	16.6

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	11	0.28
2003***	20	0.37
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	17	0.21
2003***	41	0.33
2003 spawning/incubation (13C)		
2001*	0	--
2002**	150	2.94
2003***	147	3.23

*No data collection from this site for WY2001

**Data collection for WY2002 is from January 30 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station 09A

Month	Max	Mean	Min	7-DADmax
Jul-01	16.9	13.1	10.9	15.9
Aug-01	13.9	12.0	10.5	13.4
Sep-01*	12.5	11.2	9.8	12.6
Oct-01	12.6	10.8	8.4	12.0
Nov-01	10.7	9.0	7.5	10.3
Dec-01	7.8	7.1	6.1	7.7
Jan-02	8.6	7.0	5.2	8.3
Feb-02	8.2	6.6	5.6	7.8
Mar-02	8.8	6.9	5.8	8.6
Apr-02	11.3	9.4	8.2	10.6
May-02	12.8	10.9	8.8	12.8
Jun-02	15.1	13.3	10.9	14.7
Jul-02	16.3	14.8	13.0	16.0
Aug-02	17.1	14.5	12.0	16.3
Sep-02	15.6	12.9	9.7	15.4
Oct-02	11.2	9.9	8.3	11.4
Nov-02	11.5	9.3	7.7	10.3
Dec-02	9.5	8.4	6.7	9.3
Jan-03	10.2	7.8	6.4	9.0
Feb-03	8.0	6.6	4.1	7.8
Mar-03	11.7	8.0	6.0	10.6
Apr-03	12.8	10.3	7.1	12.8
May-03	15.3	12.0	8.6	14.6
Jun-03	15.8	12.3	10.0	14.9
Jul-03	13.1	11.7	10.0	12.8
Aug-03	12.3	11.2	9.8	12.4
Sep-03*	12.0	10.9	10.0	11.8

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	25	0.91
2002**	109	1.69
2003***	27	0.96

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 18, 2003

Table 1: Monthly Temperature Summary for Station 26A

Month	Max	Mean	Min	7-DADmax
Jul-01	15.8	14.1	13.3	15.3
Aug-01	16.3	14.7	13.3	16.1
Sep-01	15.1	13.4	11.5	14.8
Oct-01	12.6	10.8	8.4	12.3
Nov-01	10.7	9.0	7.5	10.3
Dec-01	7.8	7.1	6.1	7.7
Jan-02	8.6	7.0	5.2	8.3
Feb-02	8.2	6.6	5.6	7.8
Mar-02	8.8	6.9	5.8	8.6
Apr-02	11.3	9.4	8.2	10.6
May-02	12.8	10.9	8.8	12.8
Jun-02	15.1	13.3	10.9	14.7
Jul-02	16.3	14.8	13.0	16.0
Aug-02	17.1	14.5	12.0	16.3
Sep-02	15.6	12.9	9.7	15.4
Oct-02	13.4	10.1	5.8	12.6
Nov-02	10.8	8.1	4.0	10.3
Dec-02	8.9	7.1	5.2	8.4
Jan-03	9.7	7.4	5.5	8.9
Feb-03	8.9	7.2	4.3	8.6
Mar-03	11.7	8.6	6.3	10.6
Apr-03	12.3	10.0	6.9	12.2
May-03	14.8	11.4	8.0	14.3
Jun-03	17.5	13.6	11.1	16.2
Jul-03	18.8	15.5	11.9	18.0
Aug-03	17.8	15.0	12.2	17.6
Sep-03	16.7	13.6	11.1	16.4

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002	0	--
2003	7	0.47
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002	0	--
2003	14	0.33
2003 spawning/incubation (13C)		
2001*	86	1.57
2002	109	1.69
2003	128	2.60

*Data collection for WY2001 is from July 01 to September 30, 2001

Table 1: Monthly Temperature Summary for Station 40D

Month	Max	Mean	Min	7-DADmax
Jul-01	15.1	12.1	10.2	14.6
Aug-01	14.4	12.3	10.7	14.3
Sep-01	13.3	11.5	9.6	13.1
Oct-01	11.7	10.1	8.6	11.5
Nov-01	10.9	9.4	7.8	10.4
Dec-01	9.0	8.0	6.3	8.7
Jan-02	9.8	8.2	6.7	9.4
Feb-02	9.8	8.2	6.7	9.5
Mar-02	10.4	8.5	6.7	10.5
Apr-02	12.8	10.2	8.4	11.8
May-02	13.5	11.2	9.0	13.1
Jun-02	15.1	12.4	10.0	14.6
Jul-02	15.3	12.8	10.7	14.7
Aug-02	14.6	12.6	10.7	14.3
Sep-02	13.3	11.8	10.2	13.1
Oct-02	12.4	10.4	8.0	11.8
Nov-02	10.9	9.4	6.9	10.7
Dec-02	10.2	8.8	7.1	9.8
Jan-03	10.4	8.7	7.1	9.8
Feb-03	10.0	8.7	6.5	9.8
Mar-03	12.6	9.6	7.8	11.8
Apr-03	12.8	10.6	8.4	12.2
May-03	14.4	11.3	8.8	13.7
Jun-03	15.6	12.2	10.2	14.8
Jul-03	15.6	12.9	10.4	15.2
Aug-03	15.6	13.2	10.7	15.1
Sep-03	14.4	11.9	10.0	14.1

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	42	0.68
2002**	92	0.77
2003***	99	1.20

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station 44F

Month	Max	Mean	Min	7-DADmax
Jul-01	18.1	13.8	11.5	15.6
Aug-01	18.6	14.8	9.8	17.7
Sep-01*	18.9	13.2	8.4	18.0
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01*	10.4	8.4	4.1	9.4
Jan-02	10.3	7.8	2.8	9.4
Feb-02	8.7	7.3	3.4	8.1
Mar-02	8.9	7.4	3.9	8.9
Apr-02	12.7	9.5	7.5	11.2
May-02	17.0	11.0	7.9	14.3
Jun-02	19.2	13.2	6.9	16.9
Jul-02	20.4	14.7	10.6	17.0
Aug-02	21.0	14.5	8.6	19.3
Sep-02	19.9	13.1	4.2	18.3
Oct-02	15.9	9.1	0.9	14.8
Nov-02*	12.4	8.0	-2.0	11.8
Dec-02*	9.9	8.0	3.4	9.5
Jan-03	11.5	7.8	1.5	9.7
Feb-03	9.9	7.8	3.1	9.3
Mar-03	11.0	8.3	3.6	10.2
Apr-03	13.1	10.2	7.6	11.7
May-03	14.1	11.4	8.9	13.8
Jun-03	18.4	13.2	8.7	17.3
Jul-03*	17.8	13.8	8.7	16.8
Aug-03	--	--	--	--
Sep-03*	21.3	13.8	6.4	19.8

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	8	0.49
2002**	22	1.18
2003***	10	1.41
2003 migration/nc rearing (17.5C)		
2001*	6	0.26
2002**	19	0.76
2003***	7	1.34
2003 spawning/incubation (13C)		
2001*	74	3.02
2002**	135	3.05
2003***	63	2.34

*Data collection for WY2001 is from July 01 to September 18, 2001

**Data collection for WY2002 is from December 04 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station 44G

Month	Max	Mean	Min	7-DADmax
Jul-01*	15.8	13.5	11.5	--
Aug-01*	15.6	13.8	11.3	15.2
Sep-01	14.5	12.2	9.6	14.6
Oct-01	12.2	9.8	6.1	11.9
Nov-01	11.9	8.2	5.5	10.1
Dec-01	7.8	6.1	3.8	7.3
Jan-02	9.6	6.1	2.9	8.6
Feb-02	9.6	6.2	3.5	8.9
Mar-02	11.3	6.8	3.5	10.7
Apr-02	15.3	10.1	6.4	13.4
May-02	15.9	11.8	7.8	15.1
Jun-02	18.0	14.1	10.1	16.8
Jul-02	18.0	15.1	11.6	17.5
Aug-02	16.2	13.8	11.0	15.8
Sep-02	14.8	12.4	9.0	14.5
Oct-02	12.7	9.8	5.5	12.2
Nov-02	10.1	7.6	3.5	9.9
Dec-02	8.4	6.0	3.2	7.7
Jan-03	11.0	6.3	3.2	9.2
Feb-03	9.6	6.8	3.2	8.8
Mar-03	13.6	8.4	5.2	12.0
Apr-03	14.2	10.2	6.1	13.1
May-03	15.6	11.4	7.6	14.8
Jun-03	17.4	13.3	10.1	15.9
Jul-03	16.8	13.9	10.4	16.1
Aug-03	17.1	13.6	9.9	16.3
Sep-03*	15.9	12.2	8.7	15.5

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	4	0.01
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	35	1.11
2002**	138	1.97
2003***	126	1.89

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station 44H

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	14.2	12.7	10.8	13.6
Aug-02	16.3	12.9	9.9	15.6
Sep-02	14.6	11.6	8.0	14.0
Oct-02	11.9	8.5	3.5	11.2
Nov-02	9.6	6.8	2.5	9.2
Dec-02	8.5	5.4	2.9	7.4
Jan-03	9.0	6.5	4.3	8.2
Feb-03	7.7	5.8	2.9	7.7
Mar-03	11.0	6.8	3.8	9.0
Apr-03	10.5	7.6	4.6	10.0
May-03	13.3	9.1	5.8	12.5
Jun-03	16.5	11.8	8.8	15.0
Jul-03	18.4	14.1	9.9	17.2
Aug-03	16.9	14.2	10.8	16.8
Sep-03	17.1	12.6	9.4	16.1

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	0	--
2003	1	0.38
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003	0	--
2003 spawning/incubation (13C)		
2001*	0	--
2002**	41	1.11
2003	89	2.30

*No data collection for this site in WY2001

**Data collection for WY2002 is from July 26 to September 30, 2002

Table 1: Monthly Temperature Summary for Station 54A

Month	Max	Mean	Min	7-DADmax
Jul-01	18.3	14.3	10.4	17.6
Aug-01	18.3	14.6	10.2	18.0
Sep-01*	16.0	13.2	10.9	15.7
Oct-01	12.8	10.0	6.9	11.8
Nov-01	10.9	8.4	6.0	10.0
Dec-01	8.0	6.5	4.5	7.5
Jan-02	9.0	6.4	3.8	8.3
Feb-02	9.0	6.3	4.1	8.2
Mar-02	9.9	6.9	4.3	9.5
Apr-02	13.9	9.7	6.7	12.0
May-02	15.3	11.4	8.0	14.8
Jun-02	18.3	13.6	9.7	17.2
Jul-02	19.1	14.7	11.4	18.2
Aug-02	18.1	14.1	11.2	17.4
Sep-02	15.3	12.5	9.0	15.3
Oct-02	13.1	9.6	4.4	12.4
Nov-02	10.4	7.6	3.3	9.8
Dec-02	8.4	6.4	4.1	7.8
Jan-03	9.7	6.7	4.2	8.7
Feb-03	8.7	6.7	3.4	8.4
Mar-03	12.1	8.4	5.8	10.8
Apr-03	12.8	10.2	6.7	12.7
May-03	16.4	11.7	8.0	15.3
Jun-03	18.8	13.7	10.9	17.2
Jul-03	19.7	15.4	11.2	18.9
Aug-03	18.1	14.8	11.2	18.3
Sep-03	17.0	13.2	10.1	16.5

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	7	0.19
2002**	9	0.52
2003***	23	0.74
2003 migration/nc rearing (17.5C)		
2001*	6	0.28
2002**	10	0.29
2003***	24	0.89
2003 spawning/incubation (13C)		
2001*	69	2.96
2002**	129	2.50
2003***	130	3.14

*Data collection for WY2001 is from July 01 to September 13, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station 54C

Month	Max	Mean	Min	7-DADmax
Jul-01	18.9	14.7	9.0	18.1
Aug-01	25.6	15.3	6.6	23.4
Sep-01	21.7	12.7	4.4	20.4
Oct-01	18.9	9.3	2.3	13.8
Nov-01	11.3	8.1	4.4	10.2
Dec-01	8.1	5.7	2.0	7.3
Jan-02	9.5	5.6	2.5	8.6
Feb-02	9.0	5.4	1.9	8.3
Mar-02	11.5	5.9	1.5	10.9
Apr-02	16.0	9.4	4.4	13.3
May-02	16.2	11.5	6.4	15.8
Jun-02	19.5	14.2	9.0	16.9
Jul-02	26.8	15.6	8.4	22.6
Aug-02	--	--	--	--
Sep-02*	14.4	12.5	8.7	--
Oct-02	--	--	--	--
Nov-02*	11.0	7.5	2.3	9.8
Dec-02	8.7	5.4	2.2	7.8
Jan-03	10.3	6.1	2.3	9.0
Feb-03	8.6	5.6	1.5	8.5
Mar-03	13.2	7.9	3.6	11.6
Apr-03	14.0	9.9	5.3	13.5
May-03	16.7	11.6	6.7	15.9
Jun-03	24.5	13.9	9.3	18.6
Jul-03*	14.0	11.5	10.3	--
Aug-03	--	--	--	--
Sep-03*	24.5	12.7	4.7	21.2

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	35	2.17
2002**	20	2.24
2003***	13	2.87
2003 migration/nc rearing (17.5C)		
2001*	37	2.00
2002**	18	2.49
2003***	13	1.43
2003 spawning/incubation (13C)		
2001*	87	4.77
2002**	89	3.13
2003***	58	3.10

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 03, 2002

***Data collection for WY2003 is from November 05 to September 30, 2003

Table 1: Monthly Temperature Summary for Station 54H

Month	Max	Mean	Min	7-DADmax
Jul-01	17.9	15.0	12.9	17.3
Aug-01	16.8	14.9	12.2	16.3
Sep-01*	16.0	12.4	9.0	16.0
Oct-01	11.7	9.2	6.0	10.9
Nov-01	10.9	7.7	4.5	9.5
Dec-01	7.8	5.4	2.4	7.0
Jan-02	9.0	5.5	2.7	8.0
Feb-02	8.6	5.1	2.6	7.4
Mar-02	9.4	5.7	2.6	9.1
Apr-02	13.5	9.0	5.6	11.3
May-02	14.4	10.4	6.9	13.4
Jun-02	15.3	12.2	9.0	14.2
Jul-02	15.1	13.1	10.7	14.7
Aug-02	14.2	12.6	10.4	13.8
Sep-03	13.5	11.4	8.6	13.1
Oct-02	11.7	9.0	4.9	11.3
Nov-02	9.8	7.0	3.1	9.3
Dec-02	8.2	5.6	2.6	7.5
Jan-03	9.8	5.8	2.6	8.6
Feb-03	8.4	5.6	2.1	8.1
Mar-03*	10.0	6.7	4.5	8.1
Apr-03*	12.1	10.0	7.7	12.1
May-03	14.2	10.6	7.1	13.6
Jun-03	14.4	12.2	10.0	13.8
Jul-03	15.1	13.2	10.2	14.6
Aug-03	14.6	13.1	10.4	14.5
Sep-03	14.2	12.2	9.6	13.8

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	66	2.76
2002**	78	0.62
2003***	96	0.78

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 03, 2002

***Data collection for WY2003 is from November 05 to September 30, 2003

Table 1: Monthly Temperature Summary for Station 54I

Month	Max	Mean	Min	7-DADmax
Jul-01	21.4	17.5	14.4	20.5
Aug-01	21.7	17.9	14.6	21.1
Sep-01	18.6	15.8	11.9	19.0
Oct-01	15.3	11.5	7.5	14.8
Nov-01	11.9	9.1	6.3	11.0
Dec-01	8.2	6.5	4.3	7.5
Jan-02	9.2	6.2	3.3	8.4
Feb-02	9.4	5.9	3.4	8.4
Mar-02	10.2	6.3	3.6	9.7
Apr-02	15.3	9.8	6.1	12.8
May-02	17.3	12.5	7.5	17.1
Jun-02	22.0	16.3	10.9	20.6
Jul-02	22.9	17.9	13.3	21.7
Aug-02	22.3	17.2	13.5	20.9
Sep-03	18.9	14.8	10.2	18.2
Oct-02	15.1	10.8	5.2	14.0
Nov-02	10.7	7.5	2.4	10.1
Dec-02	8.4	6.0	3.1	7.7
Jan-03	10.2	6.9	4.0	9.0
Feb-03	9.2	6.3	2.4	8.5
Mar-03	12.6	7.9	4.9	10.8
Apr-03	13.7	10.2	6.1	13.5
May-03	18.3	12.8	8.4	17.5
Jun-03	22.3	16.3	12.6	20.0
Jul-03	23.2	18.5	13.9	21.7
Aug-03	22.0	18.0	13.5	21.4
Sep-03	20.8	15.7	11.9	19.8

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	58	1.47
2002**	67	2.00
2003***	85	1.93
2003 migration/nc rearing (17.5C)		
2001*	69	1.46
2002**	85	1.81
2003***	89	2.16
2003 spawning/incubation (13C)		
2001*	89	5.43
2002**	154	4.66
2003***	155	4.79

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station HA5

Month	Max	Mean	Min	7-DADmax
Jul-01	15.3	12.8	12.4	13.9
Aug-01	16.8	13.0	12.4	14.1
Sep-01	15.3	12.4	11.5	13.9
Oct-01	13.3	10.8	9.2	12.1
Nov-01	12.4	9.7	8.0	10.9
Dec-01	13.0	8.1	6.5	9.1
Jan-02	10.4	7.8	6.1	10.0
Feb-02	9.2	7.5	6.5	8.7
Mar-02	10.2	7.6	6.3	9.7
Apr-02	15.1	9.4	8.0	11.2
May-02	16.1	10.3	8.4	13.0
Jun-02	18.9	12.0	10.4	14.5
Jul-02	19.1	12.8	11.9	14.5
Aug-02	14.6	12.8	12.1	13.8
Sep-02	16.1	12.4	11.5	14.1
Oct-02	12.4	10.8	8.0	12.1
Nov-02	10.7	9.3	7.5	10.4
Dec-02	9.4	8.4	7.3	9.0
Jan-03	10.4	8.2	7.1	9.3
Feb-03	9.4	8.0	6.5	9.3
Mar-03	13.7	8.7	7.5	10.2
Apr-03	11.3	9.8	8.8	10.5
May-03	13.9	10.6	9.6	12.1
Jun-03	13.9	12.2	11.5	13.2
Jul-03	15.3	13.0	11.9	14.7
Aug-03	17.6	13.3	12.4	14.8
Sep-03	14.2	12.6	11.7	14.1

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	3	0.77
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	60	0.50
2002**	91	0.61
2003***	78	0.89

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station mf1

Month	Max	Mean	Min	7-DADmax
Jul-01*	16.6	14.5	12.8	15.9
Aug-01	16.3	14.8	12.8	16.1
Sep-01	15.6	13.1	10.7	15.3
Oct-01	12.1	10.1	7.8	11.8
Nov-01	10.9	8.5	6.0	10.1
Dec-01	7.7	5.7	3.3	7.1
Jan-02	8.2	5.7	3.6	7.8
Feb-02*	6.1	5.3	4.1	5.8
Mar-02*	10.0	7.2	4.7	9.6
Apr-02	13.9	10.1	6.7	12.4
May-02	15.3	11.9	8.2	15.1
Jun-02	17.1	14.4	10.9	16.5
Jul-02	18.1	15.8	13.3	17.5
Aug-02	16.6	14.3	13.0	15.9
Sep-02*	14.6	13.2	11.9	14.7
Oct-02*	11.5	9.4	7.1	10.0
Nov-02	11.7	7.8	4.3	10.0
Dec-02	9.0	6.5	4.3	8.3
Jan-03	9.4	6.5	4.1	8.9
Feb-03	10.2	7.7	4.9	9.3
Mar-03	12.6	9.1	7.1	11.4
Apr-03	13.5	10.8	7.5	13.2
May-03	20.2	12.4	9.4	16.3
Jun-03	19.4	14.7	13.0	17.2
Jul-03	17.6	15.5	13.7	17.4
Aug-03	18.1	15.7	13.5	17.4
Sep-03	16.3	13.8	3.7	15.9

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002	1	0.10
2003	3	1.23
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002	0	--
2003	0	--
2003 spawning/incubation (13C)		
2001*	84	1.90
2002	120	2.28
2003	133	2.58

*Data collection for WY2001 is from July 01 to September 30, 2001

Table 1: Monthly Temperature Summary for Station BS1

Month	Max	Mean	Min	7-DADmax
Jul-01	18.4	15.6	13.0	17.6
Aug-01	17.7	15.5	12.9	17.4
Sep-01	16.5	13.0	9.3	16.0
Oct-01	11.3	9.3	5.7	11.0
Nov-01	10.7	7.3	4.3	9.3
Dec-01	7.3	4.9	2.3	6.5
Jan-02	9.0	5.1	1.5	8.1
Feb-02	8.7	4.9	2.1	7.7
Mar-02	10.4	5.7	2.1	9.7
Apr-02	15.0	9.6	5.9	13.2
May-02	17.3	12.4	7.5	16.9
Jun-02	20.5	15.2	9.9	17.9
Jul-02	19.9	15.9	12.3	18.1
Aug-02	17.4	14.6	12.3	16.9
Sep-02*	17.3	13.2	10.3	15.3
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	5	0.19
2002**	13	0.87
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	5	0.07
2002**	14	0.30
2003***	0	--
2003 spawning/incubation (13C)		
2001*	84	2.73
2002**	126	2.88
2003***	0	--

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station BS1.5

Month	Max	Mean	Min	7-DADmax
Jul-01	17.2	14.5	12.5	16.7
Aug-01	16.6	14.6	12.1	16.5
Sep-01*	15.8	13.4	11.1	15.5
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02*	10.2	8.1	6.7	9.5
Apr-02	14.2	9.6	6.7	12.3
May-02	15.8	11.9	7.9	15.6
Jun-02	18.8	14.4	10.2	17.2
Jul-02	18.2	15.0	11.6	17.4
Aug-02	16.6	14.0	11.8	16.2
Sep-02*	17.3	13.0	10.2	15.1
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	4	0.48
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	66	2.59
2002**	122	2.36
2003***	0	--

*Data collection for WY2001 is from July 01 to September 10, 2001

**Data collection for WY2002 is from March 28 to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station BS2

Month	Max	Mean	Min	7-DADmax
Jul-01	15.5	13.7	12.3	15.2
Aug-01	15.2	13.6	11.8	15.1
Sep-01	14.6	12.2	9.6	14.3
Oct-01	11.6	9.5	6.0	11.0
Nov-01	10.7	7.8	5.2	9.6
Dec-01	7.4	5.6	3.7	6.7
Jan-02	9.0	5.6	2.4	8.2
Feb-02	8.8	5.3	3.0	8.0
Mar-02	10.2	6.1	3.0	9.7
Apr-02	13.9	9.7	6.6	12.6
May-02	15.2	11.6	8.0	14.6
Jun-02	16.8	13.5	10.2	15.2
Jul-02	16.1	13.9	11.6	15.8
Aug-02	14.7	12.9	11.2	14.5
Sep-02*	13.8	12.1	10.4	13.8
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	67	1.49
2002**	114	1.29
2003***	0	--

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station BS3

Month	Max	Mean	Min	7-DADmax
Jul-01	17.2	14.6	12.8	16.6
Aug-01	17.2	14.8	12.5	16.9
Sep-01	16.0	13.0	10.0	15.6
Oct-01	12.0	9.7	6.3	11.6
Nov-01	10.8	7.9	5.2	9.7
Dec-01	7.4	5.8	3.7	6.9
Jan-02	9.1	5.8	2.9	8.3
Feb-02	8.8	5.6	3.4	8.0
Mar-02	9.9	6.2	3.2	9.5
Apr-02	13.6	9.6	6.5	12.2
May-02	15.1	11.7	7.7	14.9
Jun-02	17.7	14.1	10.2	16.4
Jul-02	17.9	15.0	11.8	17.2
Aug-02	16.8	14.2	11.9	16.4
Sep-02*	14.6	12.2	10.4	13.9
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	85	2.26
2002**	118	2.13
2003***	0	--

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station BS4

Month	Max	Mean	Min	7-DADmax
Jul-01	18.2	14.2	11.9	17.7
Aug-01	18.2	14.4	11.8	18.0
Sep-01	16.2	12.8	9.5	15.8
Oct-01	12.6	9.8	6.5	12.2
Nov-01	10.5	8.2	5.6	9.8
Dec-01	7.8	6.4	4.5	7.3
Jan-02	8.8	6.2	3.7	8.3
Feb-02	8.4	6.0	3.9	8.0
Mar-02	9.3	6.4	4.2	9.2
Apr-02	13.5	9.3	6.2	11.9
May-02	14.9	11.1	7.6	14.6
Jun-02	17.9	13.4	9.5	17.2
Jul-02	19.0	14.6	11.0	18.4
Aug-02	17.9	14.0	10.7	17.3
Sep-02*	14.7	12.3	9.9	14.3
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	9	0.14
2002**	9	0.54
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	9	0.27
2002**	15	0.41
2003***	0	--
2003 spawning/incubation (13C)		
2001*	85	2.81
2002**	112	2.84
2003***	0	--

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station CO1

Month	Max	Mean	Min	7-DADmax
Jul-01	26.1	21.6	18.9	25.4
Aug-01	23.9	20.1	17.0	23.4
Sep-01*	20.8	18.0	16.0	20.5
Oct-01*	--	--	--	--
Nov-01*	--	--	--	--
Dec-01*	--	--	--	--
Jan-01*	--	--	--	--
Feb-02*	--	--	--	--
Mar-02*	8.2	6.8	5.8	8.3
Apr-02	15.2	10.5	6.8	14.0
May-02	20.4	15.0	10.7	20.1
Jun-02*	26.2	20.8	16.2	24.7
Jul-02	26.0	21.6	17.6	25.0
Aug-02	23.1	19.3	16.5	22.5
Sep-02*	19.9	16.9	14.6	19.6
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	71	3.69
2002**	102	3.55
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	66	4.20
2002**	99	3.79
2003***	0	--
2003 spawning/incubation (13C)		
2001*	66	8.70
2002**	127	6.93
2003***	0	--

*Data collection for WY2001 is from July 01 to September 10, 2001

**Data collection for WY2002 is from March 27 to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station CO2

Month	Max	Mean	Min	7-DADmax
Jul-01	19.2	14.9	12.1	18.3
Aug-01	17.6	14.6	11.8	17.3
Sep-01	16.0	12.9	9.1	15.5
Oct-01	12.7	9.6	5.9	12.2
Nov-01	10.7	8.6	5.3	10.1
Dec-01	8.1	6.6	4.8	7.9
Jan-02	7.3	5.8	4.2	7.1
Feb-02	7.6	5.6	3.9	7.1
Mar-02	8.6	6.3	4.4	8.5
Apr-02	14.5	9.9	6.1	12.9
May-02	16.4	12.7	8.6	16.3
Jun-02*	19.9	15.2	11.2	17.9
Jul-02	18.3	15.0	11.4	17.3
Aug-02	18.0	14.3	11.2	17.2
Sep-02*	15.4	12.9	9.8	15.6
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	8	0.63
2002**	10	0.47
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	8	0.60
2002**	4	0.27
2003***	0	--
2003 spawning/incubation (13C)		
2001*	86	2.43
2002**	114	2.74
2003***	0	--

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station CT1

Month	Max	Mean	Min	7-DADmax
Jul-01	19.7	14.5	11.0	18.7
Aug-01	24.2	16.5	11.8	23.0
Sep-01	19.7	14.0	8.7	19.2
Oct-01	14.4	9.6	5.1	13.9
Nov-01	10.4	7.1	3.6	9.4
Dec-01	7.5	5.0	1.7	6.6
Jan-02	8.7	5.1	2.1	7.9
Feb-02	8.7	4.9	1.8	7.8
Mar-02	9.5	5.6	1.8	9.4
Apr-02	13.2	8.7	5.0	11.4
May-02	13.5	10.2	6.2	13.2
Jun-02*	17.6	12.6	8.1	16.4
Jul-02	21.3	14.5	10.3	19.9
Aug-02	20.2	12.6	9.6	19.2
Sep-02*	17.8	12.8	6.1	17.6
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	38	1.77
2002**	20	1.45
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	43	1.66
2002**	24	1.21
2003***	0	--
2003 spawning/incubation (13C)		
2001*	89	4.51
2002**	82	3.00
2003***	0	--

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station GR1

Month	Max	Mean	Min	7-DADmax
Jul-01	19.4	15.4	12.3	18.7
Aug-01	20.4	16.5	12.9	20.0
Sep-01*	18.1	15.2	12.9	17.7
Oct-01	--	--	--	--
Nov-01	9.3	7.4	4.7	8.8
Dec-01	6.8	5.5	3.6	6.5
Jan-02	7.3	5.4	3.9	6.7
Feb-02	7.8	5.5	3.9	7.3
Mar-02	7.8	5.8	4.3	7.7
Apr-02	11.5	7.4	5.3	9.9
May-02	11.6	8.9	6.8	11.1
Jun-02	16.0	11.4	8.4	15.1
Jul-02	19.0	14.6	10.9	17.9
Aug-02	20.5	16.6	12.9	19.8
Sep-02*	17.9	15.2	12.4	18.0
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	32	0.88
2002**	25	1.00
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	38	0.90
2002**	35	0.86
2003***	0	--
2003 spawning/incubation (13C)		
2001*	66	4.73
2002**	83	3.84
2003***	0	--

*Data collection for WY2001 is from July 01 to September 10, 2001

**Data collection for WY2002 is from November 9th to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station UW_GR3-4

Month	Max	Mean	Min	7-DADmax
Jul-01*	18.7	15.3	13.0	17.4
Aug-01	20.7	15.9	12.7	20.4
Sep-01*	17.9	14.6	12.3	17.9
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	17.9	15.4	13.3	--
Aug-02	20.6	16.0	12.5	20.1
Sep-02*	17.9	15.7	14.5	17.9
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	53	1.90
2002**	44	2.20
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	21	1.27
2002**	26	1.32
2003***	0	--
2003 spawning/incubation (13C)		
2001*	63	4.35
2002**	40	5.20
2003***	0	--

*Data collection for WY2001 is from July 24 to September 30, 2001

**Data collection for WY2002 is from July 29 to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station GR5

Month	Max	Mean	Min	7-DADmax
Jul-01*	17.9	15.0	13.1	16.8
Aug-01	19.7	15.5	12.8	19.4
Sep-01	17.5	14.5	12.4	17.2
Oct-01*	14.5	12.0	10.0	14.2
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02	--	--	--	--
Aug-02	--	--	--	--
Sep-02	--	--	--	--
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	48	1.36
2002**	0	--
2003***	0	--
2003 migration/nc rearing (16C)		
2001*	51	1.03
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	66	3.64
2002**	8	0.65
2003***	0	--

*Data collection for WY2001 is from July 24 to September 30, 2001

**Data collection for WY2002 is from October 01 to 17, 2001

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station GR6

Month	Max	Mean	Min	7-DADmax
Jul-01*	17.6	14.3	12.7	16.1
Aug-01	18.7	15.3	12.6	18.5
Sep-01*	17.1	14.7	12.9	17.0
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02*	17.0	15.1	13.3	--
Aug-02	19.4	15.9	13.0	18.7
Sep-02*	17.8	16.1	15.1	17.4
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	47	1.16
2002**	45	1.49
2003***	0	--
2003 migration/nc rearing (16C)		
2001*	54	0.76
2002**	40	1.54
2003***	0	--
2003 spawning/incubation (13C)		
2001*	63	3.62
2002**	40	4.54
2003***	0	--

*Data collection for WY2001 is from July 24 to September 30, 2001

**Data collection for WY2002 is from July 29 to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station GR7

Month	Max	Mean	Min	7-DADmax
Jul-01*	16.3	14.3	13.2	15.5
Aug-01	17.3	15.2	13.3	17.2
Sep-01	16.8	15.2	14.0	16.6
Oct-01	15.2	10.9	6.7	15.2
Nov-01	8.1	6.6	2.5	7.7
Dec-01	5.6	4.5	3.1	5.2
Jan-02	5.8	4.3	3.1	5.5
Feb-02	5.6	4.4	2.8	5.4
Mar-02	5.1	4.2	3.6	5.3
Apr-02	7.9	5.9	4.8	7.2
May-02	8.5	7.4	6.2	8.4
Jun-02	11.3	9.1	7.9	10.9
Jul-02	15.5	12.5	10.2	15.7
Aug-02	17.4	15.3	12.0	17.2
Sep-02*	17.0	15.5	14.4	16.8
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	46	0.58
2002**	36	0.83
2003***	0	--
2003 migration/nc rearing (16C)		
2001*	48	0.46
2002**	34	0.79
2003***	0	--
2003 spawning/incubation (13C)		
2001*	66	3.22
2002**	66	2.75
2003***	0	--

*Data collection for WY2001 is from July 24 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 11, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station JE1

Month	Max	Mean	Min	7-DADmax
Jul-01	16.2	13.8	12.2	15.7
Aug-01	16.5	14.1	12.2	16.3
Sep-01	15.1	12.9	10.0	14.6
Oct-01*	12.6	10.4	8.8	12.2
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02	--	--	--	--
Aug-02	--	--	--	--
Sep-02	--	--	--	--
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	85	1.62
2002**	0	--
2003***	0	--

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to 26, 2001

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station JE2

Month	Max	Mean	Min	7-DADmax
Jul-01	13.0	11.4	10.1	12.7
Aug-01	14.3	12.0	10.2	13.9
Sep-01	13.3	11.4	9.3	13.0
Oct-01	12.7	10.0	6.5	12.1
Nov-01	11.2	9.9	7.4	10.9
Dec-01	10.7	9.9	9.3	10.5
Jan-02	10.8	9.8	8.8	10.8
Feb-02	11.0	10.0	9.0	10.8
Mar-02	11.2	9.9	9.0	11.2
Apr-02	12.4	10.3	9.0	11.8
May-02	12.4	10.5	9.0	11.7
Jun-02*	13.0	11.1	9.4	12.6
Jul-02	13.6	11.6	9.9	13.1
Aug-02	14.4	11.9	9.8	13.8
Sep-02*	13.6	11.6	9.3	13.3
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	18	0.40
2002**	27	0.40
2003***	0	--

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station LS1

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01*	18.5	14.9	10.6	17.6
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02*	21.8	17.6	15.1	20.7
Jul-02	23.0	17.7	12.7	22.1
Aug-02	22.2	17.0	13.0	21.3
Sep-02*	18.9	15.0	11.3	18.9
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	5	0.35
2002**	62	2.22
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	1	0.11
2002**	71	2.18
2003***	0	--
2003 spawning/incubation (13C)		
2001*	13	3.61
2002**	77	6.45
2003***	0	--

*Data collection for WY2001 is from September 12th to 30th, 2001

**Data collection for WY2002 is from June 22nd to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station LS2

Month	Max	Mean	Min	7-DADmax
Jul-01	20.7	18.2	16.6	19.9
Aug-01	20.3	18.6	17.4	19.7
Sep-01	19.4	17.8	16.2	19.2
Oct-01	17.1	14.2	11.3	17.1
Nov-01	12.1	10.3	8.0	12.1
Dec-01	8.3	6.8	5.6	8.3
Jan-02	7.9	6.0	4.2	7.3
Feb-02	7.3	5.5	4.5	6.6
Mar-02	7.6	5.8	4.5	7.5
Apr-02	12.1	8.4	6.0	10.8
May-02	16.4	11.6	8.7	15.4
Jun-02	19.0	16.1	13.9	18.4
Jul-02	21.9	18.9	16.7	20.9
Aug-02	22.0	19.4	17.7	21.3
Sep-02*	20.8	18.8	17.3	20.4
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	84	1.02
2002**	82	1.95
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	85	1.45
2002**	81	2.38
2003***	0	--
2003 spawning/incubation (13C)		
2001*	89	5.87
2002**	137	5.05
2003***	0	--

*Data collection for WY2001 is from July 01 to September 30, 2001

**Data collection for WY2002 is from October 01 to September 12, 2002

***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station ST1

Month	Max	Mean	Min	7-DADmax
Jul-01	16.9	13.4	11.3	16.3
Aug-01	17.4	13.8	11.0	17.2
Sep-01	15.8	12.2	9.1	15.8
Oct-01*	12.4	9.6	8.0	11.8
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02	--	--	--	--
Aug-02	--	--	--	--
Sep-02	--	--	--	--
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	84	2.17
2002**	0	--
2003***	0	--

*Data collection for WY2001 is from July 01 to September 30, 2001
**Data collection for WY2002 is from October 01 to 26, 2001
***No data was collected from this site in WY2003

Table 1: Monthly Temperature Summary for Station TM-1

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	14.9	9.9	6.6	12.3
May-02	16.0	12.1	7.8	15.6
Jun-02	19.0	14.6	10.2	17.3
Jul-02	18.7	15.8	13.3	17.7
Aug-02	16.8	14.0	11.8	16.3
Sep-02	17.1	12.1	9.4	15.0
Oct-02*	12.6	10.9	7.4	12.0
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	6	0.47
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	6	0.12
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	131	2.40
2003***	0	--

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 03 to September 30, 2002

***Data collection for WY2003 is from October 01 to 10, 2002

Table 1: Monthly Temperature Summary for Station TM-1.5

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	13.7	9.7	7.0	11.8
May-02	14.5	11.2	8.2	13.8
Jun-02	16.0	12.7	9.8	14.4
Jul-02	15.6	13.5	11.8	15.0
Aug-02	14.5	12.5	11.0	14.1
Sep-02	13.3	11.4	9.8	12.7
Oct-02*	12.2	10.7	8.6	11.5
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	83	0.88
2003***	0	--

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 03 to September 30, 2002

***Data collection for WY2003 is from October 01 to 10, 2002

Table 1: Monthly Temperature Summary for Station TM-2

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	17.9	10.9	7.8	15.4
May-02	22.5	15.6	11.0	21.7
Jun-02	26.0	19.7	16.0	23.8
Jul-02	22.9	18.2	12.9	21.3
Aug-02*	18.3	14.3	12.2	--
Sep-02	--	--	--	--
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	73	2.91
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	81	3.02
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	97	6.65
2003***	0	--

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 03 to August 02, 2002

***No data collection for this site in WY2003

Table 1: Monthly Temperature Summary for Station TM-7

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	17.9	10.8	7.4	14.6
May-02	21.0	14.9	9.0	20.1
Jun-02	32.8	19.2	12.9	31.2
Jul-02	32.3	20.6	15.6	29.8
Aug-02	31.1	18.1	12.6	29.9
Sep-02	21.7	15.1	10.6	20.9
Oct-02*	16.0	12.9	7.8	14.7
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	119	5.71
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	129	5.64
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	158	8.72
2003***	7	1.34

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 03 to September 30, 2002

***Data collection for WY2003 is from October 01 to 10, 2002

Table 1: Monthly Temperature Summary for Station TM-8

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	14.5	9.6	5.4	12.7
May-02	18.3	11.8	7.0	17.6
Jun-02	21.7	15.1	9.8	19.9
Jul-02	22.1	17.0	12.9	21.2
Aug-02	22.5	16.6	11.8	21.6
Sep-02	19.0	13.9	9.0	18.0
Oct-02*	16.0	12.5	7.4	14.6
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	67	1.88
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	82	1.62
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	146	4.73
2003***	7	1.15

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 03 to September 30, 2002

***Data collection for WY2003 is from October 01 to 10, 2002

Table 1: Monthly Temperature Summary for Station TM-9

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	14.9	9.7	6.2	12.4
May-02	15.6	11.5	7.0	15.5
Jun-02	20.2	14.6	10.2	18.2
Jul-02	19.8	16.0	12.6	18.8
Aug-02	18.3	14.7	11.0	17.5
Sep-02	17.1	12.9	9.4	16.1
Oct-02*	14.1	11.7	7.4	13.3
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	17	0.91
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	22	0.49
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	138	2.89
2003***	1	0.26

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 05 to September 30, 2002

***Data collection for WY2003 is from October 01 to 10, 2002

Table 1: Monthly Temperature Summary for Station TM-10

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	13.3	9.5	7.0	11.5
May-02	14.9	11.3	7.0	14.6
Jun-02	17.1	14.2	9.8	16.5
Jul-02	17.5	15.4	12.9	16.8
Aug-02	15.6	14.1	12.2	15.4
Sep-02	14.9	12.1	9.4	14.4
Oct-02*	12.6	10.8	7.0	12.0
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	113	1.99
2003***	0	--

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 05 to September 30, 2002

***Data collection for WY2003 is from October 01 to 10, 2002

Table 1: Monthly Temperature Summary for Station TM-11

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	14.1	9.6	7.0	12.0
May-02	14.9	11.0	7.8	14.0
Jun-02	19.0	13.3	9.8	16.1
Jul-02	17.1	14.5	12.6	16.5
Aug-02	17.9	14.4	12.2	16.8
Sep-02	15.6	13.3	11.0	15.3
Oct-02*	14.1	11.8	9.4	13.4
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	2	0.66
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	139	2.04
2003***	4	0.19

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to 15, 2002

Table 1: Monthly Temperature Summary for Station TM-12

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	15.6	10.9	8.2	13.4
May-02	17.9	13.0	8.6	17.4
Jun-02	21.7	16.5	11.8	20.6
Jul-02	22.9	18.4	14.9	22.1
Aug-02	22.5	17.7	14.5	21.7
Sep-02	19.0	15.4	12.2	18.9
Oct-02*	16.4	13.1	9.4	15.3
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	86	1.98
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	102	2.04
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	152	5.27
2003***	12	1.77

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to 15, 2002

Table 1: Monthly Temperature Summary for Station TM-16

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	17.1	12.0	9.0	14.6
May-02	19.0	14.0	9.4	18.3
Jun-02	21.7	17.3	12.2	20.4
Jul-02	22.1	18.9	15.6	21.1
Aug-02	21.0	17.3	14.9	20.1
Sep-02*	17.9	15.6	13.3	17.5
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	72	1.65
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	96	1.59
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	144	4.94
2003***	0	--

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 20 to September 16, 2002

***No data collection for this site in WY2003

Table 1: Monthly Temperature Summary for Station TM-17

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	16.4	11.9	9.4	14.2
May-02	17.9	13.9	9.0	17.6
Jun-02	21.3	17.2	12.2	19.9
Jul-02	21.0	18.8	16.4	20.4
Aug-02	19.8	17.4	15.6	19.5
Sep-02	17.5	14.8	12.2	17.2
Oct-02*	14.5	12.2	9.4	14.1
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	57	1.40
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	85	1.24
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	156	4.30
2003***	9	0.65

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to 15, 2002

Site initially was called Tm-21; updated May2004

Table 1: Monthly Temperature Summary for Station TM-18

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	14.5	10.8	8.6	12.8
May-02	16.8	12.8	9.0	16.2
Jun-02	19.0	15.6	11.4	18.1
Jul-02	19.4	16.9	14.1	18.8
Aug-02	18.3	16.0	14.1	17.8
Sep-02	17.1	13.9	11.8	16.2
Oct-02*	14.1	11.7	8.6	13.5
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	21	0.59
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	31	0.57
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	144	3.25
2003***	8	0.31

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to 15, 2002

Table 1: Monthly Temperature Summary for Station TM-19

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	14.1	9.6	7.0	12.2
May-02	13.3	10.3	7.4	12.8
Jun-02	16.0	12.0	9.4	14.3
Jul-02	15.6	12.8	11.0	14.6
Aug-02	18.3	15.8	11.0	17.8
Sep-02	17.1	12.9	9.4	16.2
Oct-02*	12.2	10.3	8.2	11.7
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	2	0.28
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	4	0.24
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	98	1.91
2003***	0	--

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to 15, 2002

Table 1: Monthly Temperature Summary for Station TM-20

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	14.9	10.5	8.2	12.9
May-02	15.2	11.9	8.6	14.6
Jun-02	17.1	14.1	11.0	16.5
Jul-02	17.9	14.9	12.9	17.1
Aug-02	16.0	14.0	12.6	15.6
Sep-02	14.9	12.8	11.0	14.2
Oct-02*	13.3	11.3	9.0	12.8
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	133	1.92
2003***	0	--

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to 15, 2002

Table 1: Monthly Temperature Summary for Station TM-21

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	13.7	9.2	6.2	11.7
May-02	14.9	10.6	6.6	14.4
Jun-02	17.9	13.4	9.4	16.8
Jul-02	18.7	15.3	12.6	18.0
Aug-02*	16.0	13.6	12.2	--
Sep-02	--	--	--	--
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	4	0.57
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	7	0.26
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	68	2.80
2003***	0	--

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 20 to August 02, 2002

***No data collection for this site in WY2003

Site initially called Tm-17; updated May2004

Table 1: Monthly Temperature Summary for Station TM-22

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	14.5	11.4	9.8	12.9
May-02	16.0	13.1	9.8	15.9
Jun-02	19.0	15.9	12.2	18.0
Jul-02	19.0	17.1	15.2	18.7
Aug-02	18.3	15.9	14.5	17.7
Sep-02	16.4	14.1	12.6	16.2
Oct-02*	14.1	12.1	9.4	13.8
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	19	0.68
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	32	0.58
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	144	3.22
2003***	9	0.53

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to 15, 2002

Table 1: Monthly Temperature Summary for Station TM-23

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	16.4	11.3	8.6	13.5
May-02	18.3	13.0	8.6	17.6
Jun-02	22.1	16.2	11.0	20.4
Jul-02	20.6	18.1	14.9	20.0
Aug-02*	16.4	16.0	15.6	--
Sep-02*	14.1	12.7	11.0	13.7
Oct-02*	14.5	12.2	9.0	13.6
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	40	1.67
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	55	1.49
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	94	4.47
2003***	3	0.46

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to 10, 2002

Table 1: Monthly Temperature Summary for Station TM-24

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	14.5	10.6	7.8	12.4
May-02	15.6	12.0	8.2	15.0
Jun-02	17.9	14.7	10.2	17.0
Jul-02	17.9	16.3	14.1	17.4
Aug-02	16.8	14.7	12.9	16.2
Sep-02	14.9	12.2	9.8	14.3
Oct-02*	12.2	10.6	7.8	11.6
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	122	2.24
2003***	0	--

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 26 to September 30, 2002

***Data collection for WY2003 is from October 01 to 10, 2002

Table 1: Monthly Temperature Summary for Station TM-25

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	12.9	9.2	6.6	11.0
May-02	12.9	10.1	6.2	12.5
Jun-02*	15.6	11.5	5.4	13.9
Jul-02*	16.8	13.8	11.0	15.7
Aug-02	15.6	13.0	10.2	14.9
Sep-02	13.7	11.7	9.4	13.5
Oct-02*	11.8	9.8	7.0	11.5
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	65	1.06
2003***	0	--

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 26 to September 30, 2002

***Data collection for WY2003 is from October 01 to 15, 2002

Table 1: Monthly Temperature Summary for Station TM-26(02)

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	12.9	9.1	7.0	11.2
May-02	13.3	10.0	6.6	13.0
Jun-02	14.9	12.0	8.6	14.4
Jul-02	16.0	13.6	11.4	15.5
Aug-02	16.4	13.4	11.4	15.6
Sep-02	15.2	12.5	9.8	14.4
Oct-02*	12.6	11.2	9.0	11.9
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	0	--
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	107	1.16
2003***	0	--

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 26 to September 30, 2002

***Data collection for WY2003 is from October 01 to 10, 2002

Table 1: Monthly Temperature Summary for Station TM-27

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02*	15.6	10.5	7.8	12.8
May-02	16.4	11.2	7.8	14.7
Jun-02	19.0	13.5	9.8	17.6
Jul-02	17.5	14.3	11.8	16.8
Aug-02	17.1	13.5	11.4	16.3
Sep-02	14.9	12.1	9.0	14.4
Oct-02*	13.3	10.7	7.8	12.5
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class A (18C)		
2001*		
2002**	4	0.47
2003***	0	--
2003 migration/nc rearing (17.5C)		
2001*		
2002**	1	0.13
2003***	0	--
2003 spawning/incubation (13C)		
2001*		
2002**	139	2.17
2003***	0	--

*No data collection for this site in WY2001

**Data collection for WY2002 is from April 26 to September 30, 2002

***Data collection for WY2003 is from October 01 to 15, 2002

Table 1: Monthly Temperature Summary for Station TPU_475

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02	--	--	--	--
Aug-02	--	--	--	--
Sep-02*	11.2	9.7	7.6	11.0
Oct-02	11.1	7.9	3.3	10.5
Nov-02	9.0	6.1	2.6	8.1
Dec-02	6.4	4.3	2.5	5.8
Jan-03	7.1	4.9	3.1	6.6
Feb-03	6.5	4.8	2.4	6.3
Mar-03	8.9	5.3	2.3	7.2
Apr-03	9.0	6.3	3.9	8.9
May-03	12.9	8.3	4.8	12.0
Jun-03	15.1	10.9	8.1	13.7
Jul-03*	15.4	12.0	8.9	14.6
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (16C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	0	--
2002**	0	--
2003***	22	0.54

*No data collection from this site for WY2001

**Data collection for WY2002 is from September 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to July 15, 2003

Table 1: Monthly Temperature Summary for Station TPU_477

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02	--	--	--	--
Aug-02	--	--	--	--
Sep-02*	11.8	9.8	7.9	11.5
Oct-02	11.3	7.6	2.5	10.4
Nov-02	7.2	4.9	2.1	6.7
Dec-02	4.8	3.0	0.4	4.2
Jan-03	4.7	2.6	0.3	4.6
Feb-03	4.9	3.3	1.2	4.5
Mar-03	7.0	3.8	0.7	5.7
Apr-03	7.3	5.0	2.9	7.1
May-03	9.9	6.3	3.5	9.1
Jun-03*	14.5	9.4	5.9	13.9
Jul-03	17.0	12.9	8.5	16.7
Aug-03	16.7	13.6	10.6	16.4
Sep-03	15.4	11.6	9.0	15.0

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	0	--
2002**	0	--
2003***	17	0.49
2003 migration/nc rearing (12C)		
2001*	0	--
2002**	0	--
2003***	86	2.86
2003 spawning/incubation (9C)		
2001*	0	--
2002**	8	1.99
2003***	125	4.52

*No data collection from this site for WY2001

**Data collection for WY2002 is from September 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 30, 2003

Table 1: Monthly Temperature Summary for Station TPU_478

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02	--	--	--	--
Aug-02	--	--	--	--
Sep-02	--	--	--	--
Oct-02	--	--	--	--
Nov-02	--	--	--	--
Dec-02	--	--	--	--
Jan-03	--	--	--	--
Feb-03	--	--	--	--
Mar-03	--	--	--	--
Apr-03	--	--	--	--
May-03	--	--	--	--
Jun-03	--	--	--	--
Jul-03*	18.9	14.9	12.2	17.6
Aug-03	17.5	14.7	12.7	17.3
Sep-03*	16.6	13.3	11.4	16.5

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	0	--
2002**	0	--
2003***	46	0.94
2003 migration/nc rearing (16C)		
2001*	0	--
2002**	0	--
2003***	43	0.80
2003 spawning/incubation (13C)		
2001*	0	--
2002**	0	--
2003***	65	3.05

*No data collection from this site for WY2001

**No data collection from this site for WY2002

***Data collection for WY2003 is from July 18 to September 26, 2003

Table 1: Monthly Temperature Summary for Station TPU_479

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02	--	--	--	--
Aug-02	--	--	--	--
Sep-02*	12.0	9.5	7.2	11.7
Oct-02	11.4	7.5	2.6	10.4
Nov-02	8.1	5.6	2.3	7.4
Dec-02	6.2	4.0	2.1	5.2
Jan-03	6.4	4.3	2.6	5.9
Feb-03	6.9	4.0	1.8	6.4
Mar-03	8.1	4.4	1.4	6.4
Apr-03	8.9	5.6	3.1	8.4
May-03	20.9	8.4	2.9	19.0
Jun-03*	30.1	13.5	4.9	26.6
Jul-03	--	--	--	--
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	0	--
2002**	0	--
2003***	19	6.75
2003 migration/nc rearing (16C)		
2001*	0	--
2002**	0	--
2003***	23	4.27
2003 spawning/incubation (13C)		
2001*	0	--
2002**	0	--
2003***	27	6.35

*No data collection from this site for WY2001

**Data collection for WY2002 is from September 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to June 19, 2003

Table 1: Monthly Temperature Summary for Station TPU_480

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02	--	--	--	--
Aug-02	--	--	--	--
Sep-02*	10.0	8.7	7.2	9.7
Oct-02	9.7	7.0	2.9	9.2
Nov-02	7.7	5.4	2.5	7.2
Dec-02	5.8	3.9	2.1	5.1
Jan-03	6.7	4.4	2.7	6.1
Feb-03	5.8	4.3	2.3	5.7
Mar-03	7.4	4.7	2.3	6.1
Apr-03	7.8	5.4	3.3	7.6
May-03	11.5	7.2	4.3	10.6
Jun-03	13.3	9.8	7.5	12.0
Jul-03	14.2	11.3	8.5	13.9
Aug-03	13.8	11.5	9.5	13.7
Sep-03*	13.1	10.2	8.1	12.6

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (16C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	0	--
2002**	0	--
2003***	19	0.46

*No data collection from this site for WY2001

**Data collection for WY2002 is from September 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 25, 2003

Table 1: Monthly Temperature Summary for Station TPU_481

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02	--	--	--	--
Aug-02	--	--	--	--
Sep-02*	11.5	10.2	8.4	11.2
Oct-02	10.9	8.2	3.5	10.3
Nov-02	8.7	6.1	2.7	8.0
Dec-02	6.6	4.5	2.6	5.7
Jan-03	7.2	5.1	3.5	6.7
Feb-03	6.4	4.6	2.7	6.3
Mar-03	8.3	5.3	2.8	6.8
Apr-03	8.6	6.0	3.8	8.5
May-03	12.1	8.0	4.8	11.4
Jun-03	14.4	11.0	8.5	13.2
Jul-03	16.2	13.0	9.7	15.5
Aug-03	15.3	13.4	11.2	15.4
Sep-03*	15.2	11.7	9.1	14.7

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	0	--
2002**	0	--
2003***	1	0.15
2003 migration/nc rearing (16C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	0	--
2002**	0	--
2003***	69	1.36

*No data collection from this site for WY2001

**Data collection for WY2002 is from September 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 25, 2003

Table 1: Monthly Temperature Summary for Station TPU_482

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02	--	--	--	--
Aug-02	--	--	--	--
Sep-02*	12.6	10.4	8.7	12.3
Oct-02	15.3	7.3	-3.9	13.3
Nov-02	9.7	4.6	-3.8	8.5
Dec-02	4.9	3.3	0.6	4.5
Jan-03	4.7	3.0	1.2	4.6
Feb-03	5.0	3.5	1.6	4.6
Mar-03	7.4	3.8	0.5	5.8
Apr-03	7.8	5.0	3.0	7.3
May-03	10.5	6.3	3.5	9.7
Jun-03	14.5	9.8	6.3	13.8
Jul-03*	15.6	12.0	9.0	14.9
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (12C)		
2001*	0	--
2002**	3	0.22
2003***	26	1.49
2003 spawning/incubation (9C)		
2001*	0	--
2002**	8	2.63
2003***	73	2.79

*No data collection from this site for WY2001

**Data collection for WY2002 is from September 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to July 15, 2003

Table 1: Monthly Temperature Summary for Station TPU_483

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02	--	--	--	--
Aug-02	--	--	--	--
Sep-02*	15.3	12.1	9.3	14.7
Oct-02	13.9	9.5	3.4	12.8
Nov-02	8.8	6.6	3.1	8.4
Dec-02	6.9	4.2	2.1	5.9
Jan-03	5.7	4.2	2.5	5.4
Feb-03	5.8	4.3	2.2	5.5
Mar-03	8.1	4.9	2.4	6.8
Apr-03	9.0	6.1	4.0	8.6
May-03	13.1	8.1	4.8	12.3
Jun-03	18.5	12.4	8.0	17.0
Jul-03	21.6	16.2	11.1	21.0
Aug-03	20.9	16.6	12.7	20.5
Sep-03*	19.5	14.0	10.3	19.0

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	0	--
2002**	0	--
2003***	76	2.79
2003 migration/nc rearing (16C)		
2001*	0	--
2002**	8	1.85
2003***	125	4.75
2003 spawning/incubation (13C)		
2001*	0	--
2002**	8	4.85
2003***	157	6.51

*No data collection from this site for WY2001

**Data collection for WY2002 is from September 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to September 25, 2003

Table 1: Monthly Temperature Summary for Station TPU_484

Month	Max	Mean	Min	7-DADmax
Jul-01	--	--	--	--
Aug-01	--	--	--	--
Sep-01	--	--	--	--
Oct-01	--	--	--	--
Nov-01	--	--	--	--
Dec-01	--	--	--	--
Jan-02	--	--	--	--
Feb-02	--	--	--	--
Mar-02	--	--	--	--
Apr-02	--	--	--	--
May-02	--	--	--	--
Jun-02	--	--	--	--
Jul-02	--	--	--	--
Aug-02	--	--	--	--
Sep-02*	11.4	9.4	7.4	11.1
Oct-02	10.9	7.3	2.5	10.0
Nov-02	7.3	5.0	1.9	6.8
Dec-02	5.0	2.8	0.1	4.3
Jan-03	4.7	2.8	0.1	4.4
Feb-03	4.6	3.1	0.8	4.2
Mar-03	6.8	3.4	0.4	5.1
Apr-03	6.9	4.4	2.0	6.5
May-03	10.6	6.1	3.0	9.7
Jun-03	13.2	9.6	6.2	12.6
Jul-03*	14.5	11.3	8.6	13.5
Aug-03	--	--	--	--
Sep-03	--	--	--	--

*Limited data collection during this month

Table 2: Temperature Criteria Exceedances by Water Year

Water Year/Criteria	Total Days Above Criteria	Average Degrees Above Criteria
1997 Class AA (16C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 migration/nc rearing (16C)		
2001*	0	--
2002**	0	--
2003***	0	--
2003 spawning/incubation (13C)		
2001*	0	--
2002**	0	--
2003***	3	0.31

*No data collection from this site for WY2001

**Data collection for WY2002 is from September 20 to September 30, 2002

***Data collection for WY2003 is from October 01 to July 14, 2003