ASSESSMENT OF THE EFFECTS OF THE PROPOSED SUSITNA HYDROELECTRIC PROJECT ON INSTREAM TEMPERATURE AND FISHERY RESOURCES IN THE WATANA TO TALKEETNA REACH

II. APPENDICES A-H

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II. APPENDICES A-H

Prepared by:

Arctic Environmental Information
and Data Center
University of Alaska
707 A Street
Anchorage, Alaska 99501

Submitted to:

Harza-Ebasco Susitna Joint Venture
711 H Street
Anchorage, Alaska 99501

For:

The Alaska Power Authority
324 W. 5th Avenue, Second Floor
Anchorage, Alaska 99501

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APPENDIX A

Simulated weekly water temperatures at selected middle Susitna River locations for Watana-only, Watana/Devil Canyon and Watana filling scenarios.

Appendix A. Weekly temperatures (C) at selected locations for all simulations

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, summer 1971.

Location	River Mile	Demand	Water Weeks										
			31	32	33	34	35	36	37	38	39	40	41
Watana	184.4	Natural	1.0	2.8	4.4	4.6	4.2	9.6	7.8	10.4	11.3	10.3	12.6
		1996	2.5	2.4	2.4	2.4	2.4	2.4	2.9	3.6	5.3	6.2	7.0
		2001	2.5	2.5	2.5	2.5	2.4	2.4	2.9	3.6	5.3	6.2	7.1
LRX 68	150.2	Natural	0.6	2.7	4.3	4.5	4.3	9.4	7.8	10.4	11.3	10.5	13.0
		1996	2.4	2.8	3.1	3.1	3.0	4.5	4.6	6.2	7.6	7.9	9.4
		2001	2.4	2.8	3.1	3.1	3.0	4.5	4.6	6.2	7.6	7.9	9.5
LRX 33	130.1	Natural	0.9	2.9	4.5	4.6	4.4	9.2	7.7	10.3	11.2	10.5	12.9
		1996	2.3	3.0	3.4	3.5	3.3	5.1	4.9	6.7	7.8	8.0	9.7
		2001	2.4	3.0	3.4	3.5	3.3	5.1	4.9	6.7	7.8	8.1	9.7
LRX 3	98.6	Natural	1.3	3.7	5.3	5.4	4.8	9.7	8.0	10.8	11.7	11.0	13.6
		1996	2.4	3.5	4.2	4.4	3.9	6.7	5.7	8.3	9.5	9.3	11.7
		2001	2.4	3.5	4.2	4.4	3.9	6.7	5.7	8.3	9.5	9.3	11.7
Sunshine	83.8	Natural	2.0	3.7	4.9	5.2	4.8	9.0	7.7	9.9	10.6	9.7	11.5
		1996	2.4	3.6	4.5	4.8	4.5	8.0	7.0	8.9	9.6	8.8	10.4
		2001	2.4	3.6	4.5	4.8	4.5	8.0	7.0	8.9	9.6	8.8	10.4

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, summer 1971.

Location	River Mile	Demand	Water Weeks										
			42	43	44	45	46	47	48	49	50	51	52
Watana	184.4	Natural	9.0	8.2	10.7	10.6	10.7	9.3	8.6	6.3	5.9	4.8	2.8
		1996	7.5	7.5	7.7	7.9	8.1	8.2	8.4	8.2	7.9	7.4	6.8
		2001	7.4	7.5	7.8	8.0	8.1	8.1	8.5	8.2	7.9	7.4	6.9
LRX 68	150.2	Natural	9.5	8.7	11.1	10.9	10.9	9.7	9.0	6.7	6.3	5.2	3.1
		1996	8.6	8.5	9.2	8.9	8.7	8.8	8.8	8.4	8.0	7.3	6.5
		2001	8.5	8.5	9.2	9.0	8.7	8.7	8.9	8.4	8.0	7.3	6.5
LRX 33	130.1	Natural	9.5	8.8	11.1	10.8	10.9	9.7	9.0	6.9	6.4	5.4	3.3
		1996	8.3	8.4	9.3	8.9	8.9	8.9	8.9	8.3	7.9	7.2	6.2
		2001	8.3	8.4	9.3	9.0	8.9	8.9	9.0	8.3	7.9	7.2	6.2
LRX 3	98.6	Natural	9.9	9.2	11.7	11.3	11.3	10.2	9.5	7.1	6.8	5.8	3.5
		1996	9.3	9.2	10.5	9.8	9.5	9.5	9.4	8.5	8.1	7.3	6.0
		2001	9.3	9.2	10.6	9.8	9.5	9.4	9.4	8.5	8.1	7.3	6.0
Sunshine	83.8	Natural	8.8	8.1	10.2	10.4	10.2	9.2	8.5	6.6	6.3	5.4	3.6
		1996	8.2	7.7	9.2	9.7	9.4	8.9	8.5	7.2	6.8	6.1	4.8
		2001	8.2	7.7	9.2	9.7	9.4	8.8	8.5	7.2	6.8	6.1	4.8

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, summer 1974.

Location	River Mile	Demand	Water Weeks										
			31	32	33	34	35	36	37	38	39	40	41
Watana	184.4	Natural	5.1	5.7	6.3	9.9	9.9	8.3	9.6	9.6	10.5	10.4	10.0
		1996	1.6	1.6	1.7	2.0	3.2	3.8	4.3	5.7	7.1	7.7	6.4
		2001	1.4	1.4	1.6	2.0	3.3	3.8	4.4	5.7	7.0	7.7	6.5
LRX 68	150.2	Natural	5.2	5.6	6.1	9.4	9.6	8.3	9.7	9.8	10.9	10.8	10.3
		1996	2.7	2.6	2.6	3.3	4.6	5.2	6.5	7.4	8.9	9.2	8.2
		2001	2.6	2.5	2.6	3.2	4.7	5.3	6.6	7.4	8.8	9.2	8.3
LRX 33	130.1	Natural	5.6	5.7	6.1	9.1	9.4	8.3	9.7	9.8	10.9	10.8	10.3
		1996	3.4	3.2	3.2	3.9	5.2	5.7	7.1	7.8	9.2	9.4	8.5
		2001	3.3	3.1	3.1	3.9	5.2	5.7	7.2	7.8	9.2	9.4	8.5
LRX 3	98.6	Natural	6.6	6.3	6.6	9.7	10.0	8.9	10.5	10.6	11.8	11.6	10.9
		1996	4.6	4.4	4.5	5.6	7.1	7.2	9.1	9.5	11.1	11.0	9.8
		2001	4.5	4.3	4.4	5.6	7.1	7.2	9.1	9.5	11.1	11.0	9.8
Sunshine	83.8	Natural	5.7	5.8	6.2	8.9	9.2	8.0	9.2	9.1	10.1	9.7	9.4
		1996	5.0	5.0	5.5	7.6	8.3	7.3	8.4	8.4	9.3	9.1	8.7
		2001	4.9	5.0	5.5	7.6	8.3	7.3	8.4	8.4	9.3	9.1	8.7

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, summer 1974.

Location	River Mile	Demand	Water Weeks										
			42	43	44	45	46	47	48	49	50	51	52
Watana	184.4	Natural	10.3	9.9	10.1	10.0	9.9	7.2	8.9	8.2	6.3	5.3	3.6
		1996	7.2	8.0	8.8	9.5	10.0	8.6	8.3	10.0	8.7	7.8	7.7
		2001	7.4	8.0	8.7	9.3	10.0	8.8	8.6	9.9	9.1	8.2	7.8
LRX 68	150.2	Natural	10.8	10.4	10.6	10.5	10.3	7.7	9.3	8.5	6.8	5.7	3.9
		1996	9.1	9.5	9.9	10.1	10.4	8.8	8.8	9.8	8.8	7.6	6.3
		2001	9.2	9.5	9.8	10.0	10.5	9.0	9.1	9.8	9.1	7.9	6.4
LRX 33	130.1	Natural	10.8	10.5	10.7	10.6	10.4	7.9	9.4	8.6	7.0	5.8	4.1
		1996	9.3	9.5	10.0	10.2	10.4	8.8	8.9	9.6	8.7	7.4	5.8
		2001	9.3	9.5	9.9	10.1	10.4	9.0	9.1	9.6	9.0	7.7	5.8
LRX 3	98.6	Natural	11.5	11.1	11.5	11.3	11.1	8.5	10.0	9.1	7.6	6.3	4.3
		1996	10.6	10.8	11.1	11.1	11.2	9.2	9.6	10.1	9.0	7.6	5.7
		2001	10.7	10.8	11.1	11.0	11.2	9.4	9.8	10.0	9.3	7.8	5.8
Sunshine	83.8	Natural	9.8	9.5	9.8	9.7	9.5	7.4	8.8	8.1	6.8	5.8	4.4
		1996	9.1	8.9	9.3	9.4	9.4	7.6	8.6	8.2	7.5	6.3	4.7
		2001	9.1	8.9	9.3	9.3	9.4	7.6	8.6	8.2	7.6	6.3	4.7

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, summer 1981.

Location	River Mile	Demand	Water Weeks										
			31	32	33	34	35	36	37	38	39	40	41
Watana	184.4	Natural	4.8	7.6	8.6	8.2	9.2	8.9	11.6	12.2	8.5	8.4	9.2
		1996	3.0	3.2	4.1	5.4	6.9	7.4	8.3	10.2	7.8	6.7	7.1
		2001	3.0	3.2	4.2	5.3	7.0	8.1	8.6	11.1	8.1	7.3	6.9
LRX 68	150.2	Natural	5.0	7.6	8.3	8.1	9.3	8.9	11.6	12.4	9.0	8.9	9.5
		1996	3.6	3.9	4.4	5.7	7.1	7.1	8.9	10.6	8.5	8.0	8.3
		2001	3.6	3.9	4.5	5.7	7.2	7.4	9.0	11.1	8.7	8.4	8.2
LRX 33	130.1	Natural	5.1	7.5	8.2	8.1	9.4	8.8	11.5	12.3	9.1	9.0	9.4
		1996	3.9	4.4	4.8	6.0	7.2	6.9	8.9	10.3	8.5	8.3	8.2
		2001	3.9	4.4	4.8	6.0	7.3	7.1	9.0	10.7	8.6	8.5	8.2
LRX 3	98.6	Natural	5.7	8.0	8.8	8.9	10.1	9.3	12.1	13.1	9.8	9.7	9.9
		1996	4.7	5.9	6.4	7.6	9.2	8.1	10.6	12.1	9.8	9.5	9.1
		2001	4.7	5.9	6.4	7.6	9.2	8.3	10.7	12.3	9.9	9.6	9.1
Sunshine	83.8	Natural	5.2	7.5	8.3	8.2	9.4	8.0	10.0	10.7	9.0	9.1	9.1
		1996	4.8	6.4	7.1	7.5	8.5	7.2	8.9	9.6	8.6	8.7	8.5
		2001	4.8	6.4	7.1	7.5	8.5	7.2	8.9	9.6	8.6	8.8	8.5

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, summer 1981.

Location	River Mile	Demand	Water Weeks										
			42	43	44	45	46	47	48	49	50	51	52
Watana	184.4	Natural	9.5	9.8	9.4	9.4	6.8	7.5	9.9	7.2	7.0	6.2	1.6
		1996	10.2	11.2	10.0	8.3	7.6	7.2	8.2	8.8	8.0	8.6	7.1
		2001	10.2	11.0	10.5	8.3	7.5	7.0	8.3	8.7	7.9	8.5	7.0
LRX 68	150.2	Natural	9.9	10.2	9.9	9.9	7.5	8.0	10.1	7.7	7.2	6.4	2.0
		1996	10.2	11.1	10.3	8.9	8.1	7.7	8.7	9.1	8.0	8.4	6.5
		2001	10.2	11.0	10.5	8.9	8.0	7.6	8.8	9.0	7.9	8.3	6.4
LRX 33	130.1	Natural	9.9	10.3	10.0	10.0	7.6	8.1	10.1	7.9	7.3	6.5	2.2
		1996	9.8	10.7	10.1	9.1	8.1	7.9	8.9	9.1	8.0	8.2	6.1
		2001	9.8	10.7	10.3	9.1	8.0	7.8	9.0	9.0	7.9	8.1	6.0
LRX 3	98.6	Natural	10.4	10.9	10.6	10.5	8.0	8.6	10.7	8.4	7.6	6.8	2.2
		1996	10.6	11.5	10.9	9.7	8.5	8.4	9.5	9.5	8.2	8.3	5.7
		2001	10.6	11.4	11.0	9.7	8.4	8.3	9.6	9.4	8.1	8.2	5.5
Sunshine	83.8	Natural	9.5	9.9	9.8	9.6	7.7	8.3	9.4	7.8	7.1	6.1	2.3
		1996	9.1	9.5	9.6	9.3	7.9	8.2	9.0	8.2	7.3	6.8	4.0
		2001	9.1	9.5	9.6	9.3	7.8	8.2	9.0	8.2	7.3	6.8	3.9

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, summer 1982.

Location	River Mile	Demand	Water Weeks										
			31	32	33	34	35	36	37	38	39	40	41
Watana	184.4	Natural	5.5	4.9	7.2	7.1	8.8	9.2	8.0	9.6	11.9	10.2	10.6
		1996	3.0	3.1	3.2	3.5	4.0	5.7	6.6	5.8	7.8	11.3	10.0
		2001	3.2	3.2	3.4	3.6	4.0	5.7	6.5	5.7	6.0	10.9	10.0
LRX 68	150.2	Natural	5.4	4.7	6.8	6.8	8.6	9.0	8.1	9.7	11.9	10.5	11.0
		1996	3.7	3.3	3.6	3.7	4.7	5.7	6.5	7.1	8.9	10.9	10.5
		2001	3.8	3.4	3.7	3.7	4.7	5.7	6.4	7.1	8.2	10.7	10.5
LRX 33	130.1	Natural	5.5	4.7	6.7	6.6	8.4	8.9	8.0	9.6	11.8	10.6	11.1
		1996	4.1	3.5	3.9	4.0	5.0	5.8	6.4	7.3	9.0	10.5	10.2
		2001	4.3	3.6	4.0	4.0	5.0	5.8	6.3	7.3	8.5	10.3	10.2
LRX 3	98.6	Natural	6.6	5.3	7.3	7.2	9.0	9.3	8.5	10.2	12.5	11.4	11.7
		1996	5.2	4.4	5.2	5.2	6.6	7.1	7.4	8.7	10.8	11.7	11.5
		2001	5.3	4.4	5.3	5.3	6.6	7.1	7.4	8.7	10.4	11.6	11.4
Sunshine	83.8	Natural	6.1	5.2	7.0	6.9	8.4	8.6	7.6	9.0	11.0	9.8	10.1
		1996	5.4	4.7	5.9	5.9	7.3	7.7	6.9	7.9	9.9	9.3	9.2
		2001	5.5	4.7	5.9	6.0	7.3	7.7	6.9	7.9	9.8	9.2	9.2

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, summer 1982.

Location	River Mile	Demand	Water Weeks										
			42	43	44	45	46	47	48	49	50	51	52
Watana	184.4	Natural	10.6	9.7	10.5	10.5	10.5	10.5	9.0	7.6	6.1	6.4	4.1
		1996	8.8	8.7	8.7	8.9	9.1	9.6	8.5	9.1	9.2	8.1	8.0
		2001	8.6	8.6	8.7	8.7	9.0	9.7	8.4	9.0	9.1	8.5	8.1
LRX 68	150.2	Natural	11.1	10.1	10.9	11.1	11.0	10.9	9.4	7.9	6.5	6.6	4.3
		1996	10.1	9.4	9.7	9.8	9.8	10.2	9.0	9.0	8.8	7.8	7.5
		2001	10.0	9.3	9.6	9.7	9.7	10.3	8.9	9.0	8.7	7.9	7.6
LRX 33	130.1	Natural	11.2	10.0	11.0	11.2	11.0	11.0	9.5	8.0	6.7	6.6	4.4
		1996	10.2	9.3	9.8	10.1	10.0	10.4	9.1	8.9	8.5	7.5	7.2
		2001	10.1	9.2	9.7	10.0	9.9	10.5	9.0	8.9	8.5	7.6	7.2
LRX 3	98.6	Natural	12.0	10.6	11.7	12.0	11.6	11.8	10.1	8.4	7.1	6.8	4.6
		1996	11.6	10.1	10.9	11.2	10.8	11.3	9.8	9.2	8.7	7.7	7.1
		2001	11.5	10.1	10.8	11.1	10.8	11.4	9.8	9.2	8.7	7.7	7.1
Sunshine	83.8	Natural	10.5	9.3	10.2	10.1	9.7	9.9	8.5	7.6	6.6	5.8	4.5
		1996	9.7	8.8	9.7	9.7	9.3	9.7	8.3	7.8	7.0	6.0	5.5
		2001	9.7	8.9	9.7	9.6	9.3	9.7	8.3	7.8	7.0	5.9	5.5

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1971-1972.

Location	River Mile	Demand	Water Weeks											
			49	50	51	52	1	2	3	4	5	6	7	8
Watana	184.4	Natural	6.3	5.9	4.8	2.8	1.2	0	0	0	0	0	0	0
		1996	8.2	7.9	7.4	6.9	5.6	5.0	4.6	3.7	2.6	1.0	1.0	1.1
		2001	8.2	7.9	7.4	6.9	5.5	5.0	4.6	3.6	2.5	1.1	1.0	1.1
LRX 68	150.2	Natural	6.8	6.3	5.3	3.1	1.5	0.3	0	0	0	0	0	0
		1996	8.4	8.0	7.3	6.5	5.1	4.5	3.7	2.3	1.3	0.1	0.4	0.3
		2001	8.4	8.0	7.3	6.5	5.1	4.5	3.6	2.2	1.2	0.1	0.5	0.3
LRX 33	130.1	Natural	6.9	6.4	5.4	3.3	1.7	0.5	0	0	0	0	0	0
		1996	8.3	7.9	7.2	6.2	4.8	4.2	3.2	1.5	0.4	0	0	0
		2001	8.3	7.9	7.2	6.2	4.8	4.2	3.2	1.4	0.3	0	0	0
LRX 3	98.6	Natural	7.2	6.8	5.8	3.5	1.8	0.6	0	0	0	0	0	0
		1996	8.5	8.1	7.3	6.0	4.5	3.8	2.5	0	0	0	0	0
		2001	8.5	8.1	7.3	6.0	4.5	3.8	2.4	0	0	0	0	0
Sunshine	83.8	Natural	6.7	6.3	5.4	3.6	2.4	1.8	0.5	0	0	0	0	0
		1996	7.2	6.8	6.1	4.9	3.7	3.1	1.6	0	0	0	0	0
		2001	7.2	6.8	6.1	4.8	3.7	3.1	1.6	0	0	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1971-1972.

Location	River Mile	Demand	Water Weeks										
			9	10	11	12	13	14	15	16	17	18	19
Watana	184.4	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	2.1	2.1	2.1	2.1	1.6	1.8	0.5	0.5	0.5	1.2	2.1
		2001	1.7	1.7	1.1	0.8	0.8	0.7	0.7	0.6	0.6	1.2	2.1
LRX 68	150.2	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0.9	1.0	0.9	0.9	1.0	0.9	0	0	0	0.4	0.4
		2001	0.5	0.6	0	0	0.3	0	0	0	0	0.5	0.3
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0	0.2	0	0	0.6	0.2	0	0	0	0	0
		2001	0	0	0	0	0	0	0	0	0	0	0
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0	0	0	0	0	0	0	0	0	0	0
		2001	0	0	0	0	0	0	0	0	0	0	0
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0	0	0	0	0	0	0	0	0	0	0
		2001	0	0	0	0	0	0	0	0	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1971-1972.

Location	River Mile	Demand	Water Weeks										
			20	21	22	23	24	25	26	27	28	29	30
Watana	184.4	Natural	0	0	0	0	0	0	0	0	0	0.4	2.8
		1996	2.1	2.1	2.1	2.1	2.0	1.9	1.0	0.3	0.8	2.1	2.1
		2001	2.0	2.0	1.8	1.8	1.7	1.8	0.8	0.3	1.1	2.2	2.2
LRX 68	150.2	Natural	0	0	0	0	0	0	0	0	0	0	1.9
		1996	0.3	0.6	0.6	0.1	0.9	1.5	0.7	0	0.4	1.5	2.2
		2001	0.1	0.5	0.3	0	0.6	1.4	0.5	0	0.6	1.6	2.2
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0.1	2.2
		1996	0	0	0	0	0.2	1.3	0.5	0	0.2	1.4	2.4
		2001	0	0	0	0	0	1.2	0.3	0	0.4	1.4	2.4
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0.1	3.0
		1996	0	0	0	0	0	0.7	0.1	0	0	1.2	2.9
		2001	0	0	0	0	0	0.6	0	0	0	1.2	2.9
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0.1	0.9	3.3
		1996	0	0	0	0	0	0.4	0	0	0	1.3	3.1
		2001	0	0	0	0	0	0.3	0	0	0	1.3	3.1

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1974-1975.

Location	River Mile	Demand	Water Weeks											
			49	50	51	52	1	2	3	4	5	6	7	8
Watana	184.4	Natural	8.1	6.4	5.3	3.4	0	0	0	0	0.6	0	0	0
		1996	10.0	8.7	7.8	7.8	6.7	5.9	5.2	4.7	4.2	3.2	2.1	1.8
		2001	9.9	9.1	8.2	8.0	6.8	6.0	5.3	4.7	4.3	3.2	2.0	2.2
LRX 68	150.2	Natural	8.5	6.9	5.8	3.8	0	0.1	0	0	0.1	0	0	0
		1996	9.8	8.8	7.7	6.3	4.5	4.3	3.8	3.6	3.1	1.4	0	0
		2001	9.8	9.1	7.9	6.4	4.6	4.4	3.8	3.6	3.1	1.4	0	0
LRX 33	130.1	Natural	8.6	7.1	5.9	3.9	0.1	0.2	0	0.1	0	0	0	0
		1996	9.6	8.8	7.5	5.7	3.6	3.7	3.1	3.1	2.6	0.5	0	0
		2001	9.6	9.0	7.7	5.8	3.7	3.7	3.1	3.1	2.6	0.5	0	0
LRX 3	98.6	Natural	9.1	7.7	6.4	4.2	0	0.1	0	0	0	0	0	0
		1996	10.1	9.1	7.7	5.6	2.5	2.9	2.2	2.4	1.8	0	0	0
		2001	10.0	9.3	7.9	5.7	2.5	2.9	2.2	2.4	1.8	0	0	0
Sunshine	83.8	Natural	8.1	6.8	5.9	4.3	0.9	1.3	0.7	1.1	0.9	0	0	0
		1996	8.2	7.6	6.3	4.6	1.7	2.2	1.5	2.0	1.5	0	0	0
		2001	8.2	7.7	6.4	4.6	1.7	2.2	1.5	2.0	1.5	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1974-1975.

Location	River Mile	Demand	Water Weeks										
			9	10	11	12	13	14	15	16	17	18	19
Watana	184.4	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	1.8	1.7	1.6	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.2
		2001	2.0	2.0	2.2	1.8	1.9	1.8	1.7	1.6	1.5	1.5	1.4
LRX 68	150.2	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0.5	0.2	0.4	0.5	0.2	0	0	0.4	0.6	0	0
		2001	0.7	0.5	0.8	0.7	0.6	0	0	0.7	0.9	0	0
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0	0	0	0	0	0	0	0	0.1	0	0
		2001	0	0	0	0	0	0	0	0.1	0.4	0	0
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0	0	0	0	0	0	0	0	0	0	0
		2001	0	0	0	0	0	0	0	0	0	0	0
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0	0	0	0	0	0	0	0	0	0	0
		2001	0	0	0	0	0	0	0	0	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1974-1975.

Location	River Mile	Demand	Water Weeks										
			20	21	22	23	24	25	26	27	28	29	30
Watana	184.4	Natural	0	0	0	0	0	0	0	0	1.6	2.8	4.0
		1996	2.3	2.3	2.3	2.3	2.2	2.1	1.3	0.6	0.6	0.6	0.6
		2001	2.4	2.4	2.4	2.4	2.4	2.4	2.2	1.7	1.5	1.4	1.6
LRX 68	150.2	Natural	0	0	0	0	0	0	0	0	1.0	2.0	3.6
		1996	0.1	1.0	1.4	1.2	1.4	1.4	1.1	0.4	0.9	1.0	1.4
		2001	0.2	1.1	1.5	1.3	1.6	1.6	1.9	1.4	1.7	1.7	2.2
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	1.2	2.3	3.9
		1996	0	0.2	0.9	0.6	1.0	0.9	1.0	0.3	1.1	1.4	2.0
		2001	0	0.3	0.9	0.6	1.1	1.1	1.7	1.2	1.8	1.9	2.7
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	1.8	3.1	4.9
		1996	0	0	0	0	0.1	0	0.7	0.1	1.5	2.1	3.0
		2001	0	0	0	0	0.2	0	1.2	0.8	2.0	2.5	3.6
Sunshine	83.8	Natural	0	0	0	0	0	0	0.4	0.5	2.3	3.3	4.5
		1996	0	0	0	0	0	0	0.6	0.2	1.8	2.6	3.5
		2001	0	0	0	0	0	0	1.0	0.8	2.2	2.9	3.9

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1976-1977.

Location	River Mile	Demand	Water Weeks											
			49	50	51	52	1	2	3	4	5	6	7	8
Watana	184.4	Natural	5.9	5.5	4.8	3.9	1.2	0	1.2	0	0	0	0	0
		1996	10.0	9.4	8.7	8.0	6.9	6.1	5.1	4.6	3.6	2.8	1.8	1.0
		2001	DID NOT RUN											
LRX 68	150.2	Natural	6.4	6.0	5.3	4.2	1.5	0	1.2	0	0	0	0	0
		1996	9.9	9.4	8.4	7.1	5.7	4.5	4.1	2.5	1.4	1.6	0.8	0
		2001												
LRX 33	130.1	Natural	6.6	6.2	5.5	4.4	1.7	0.1	1.3	0	0	0	0	0
		1996	9.7	9.2	8.1	6.7	5.2	3.8	3.7	1.5	0.3	1.0	0.2	0
		2001												
LRX 3	98.6	Natural	7.2	6.8	6.1	4.7	2.0	0	1.2	0	0	0	0	0
		1996	9.7	9.3	8.1	6.6	4.8	2.9	3.2	0	0	0.1	0	0
		2001												
Sunshine	83.8	Natural	6.3	6.0	5.5	4.7	2.8	1.0	2.0	0	0	0.2	0	0
		1996	7.5	7.4	6.3	5.2	3.7	1.9	2.7	0	0	0.1	0	0
		2001												

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1976-1977.

Location	River Mile	Demand	Water Weeks										
			9	10	11	12	13	14	15	16	17	18	19
Watana	184.4	Natural	0.5	0	0	0	0	0.6	0	0	1.4	1.3	0
		1996	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6
		2001											
LRX 68	150.2	Natural	0.2	0	0	0	0	0	0	0	0.8	0.9	0
		1996	0.5	0	0.2	0.2	0	0.4	0	0.1	0.5	0.5	0.4
		2001											
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0.3	0.5	0
		1996	0.3	0	0	0	0	0.2	0	0	0.3	0.4	0.2
		2001											
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0	0	0	0	0	0	0	0	0	0.2	0
		2001											
Sunshine	83.8	Natural	0.5	0	0	0	0	0	0	0	0.4	0.4	0.2
		1996	0.3	0	0	0	0	0	0	0	0.1	0.2	0
		2001											

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1976-1977.

Location	River Mile	Demand	Water Weeks										
			20	21	22	23	24	25	26	27	28	29	30
Watana	184.4	Natural	0	0	0	0	0	0	0	1.2	0	2.3	4.9
		1996	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7
		2001											
LRX 68	150.2	Natural	0	0	0	0	0	0	0	0.6	0	1.6	4.6
		1996	0	0.3	0	0	0	0.1	0.3	0.9	0.5	1.0	1.7
		2001											
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0.8	0	1.9	5.0
		1996	0	0.2	0	0	0	0	0.1	1.0	0.5	1.3	2.4
		2001											
LRX 3	98.6	Natural	0	0	0	0	0	0	0	1.3	0	2.6	6.1
		1996	0	0	0	0	0	0	0	1.3	0.5	1.8	3.6
		2001											
Sunshine	83.8	Natural	0	0.3	0	0	0	0	0	2.0	0.8	2.9	5.4
		1996	0	0	0	0	0	0	0	1.6	0.7	2.3	4.2
		2001											

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1981-1982.

Location	River Mile	Demand	Water Weeks											
			49	50	51	52	1	2	3	4	5	6	7	8
Watana	184.4	Natural	7.2	7.0	6.2	1.6	0.3	0.3	1.2	0.5	0	0	0	0
		1996	8.8	8.0	8.6	7.1	6.5	5.5	5.1	4.5	3.9	3.3	2.9	2.4
		2001	8.7	7.9	8.5	7.1	6.5	5.4	5.0	4.5	4.0	3.2	3.2	3.2
LRX 68	150.2	Natural	7.7	7.2	6.4	2.0	0.7	0.6	1.3	0.5	0	0	0	0
		1996	9.1	8.0	8.4	6.5	5.6	5.0	4.4	3.8	2.7	2.3	1.8	1.6
		2001	9.0	8.0	8.3	6.5	5.6	5.0	4.4	3.8	2.8	2.2	2.0	2.2
LRX 33	130.1	Natural	7.9	7.3	6.5	2.2	1.0	0.9	1.4	0.5	0	0	0	0
		1996	9.1	8.0	8.2	6.1	5.2	4.7	4.1	3.4	2.0	1.7	1.0	0.8
		2001	9.0	7.9	8.1	6.1	5.1	4.7	4.0	3.4	2.0	1.6	1.3	1.4
LRX 3	98.6	Natural	8.4	7.6	6.8	2.2	1.0	1.0	1.4	0.5	0	0	0	0
		1996	9.5	8.2	8.3	5.7	4.7	4.5	3.8	3.1	0.8	0.7	0	0
		2001	9.4	8.1	8.2	5.6	4.6	4.4	3.7	3.1	0.9	0.6	0	0
Sunshine	83.8	Natural	7.8	7.1	6.1	2.3	1.7	1.8	1.9	1.1	0	0	0	0
		1996	8.2	7.3	6.8	4.0	3.5	3.6	3.2	2.5	0.1	0.1	0	0
		2001	8.2	7.0	6.7	4.8	3.2	3.4	2.7	2.4	0.5	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1981-1982.

Location	River Mile	Demand	Water Weeks										
			9	10	11	12	13	14	15	16	17	18	19
Watana	184.4	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	2.7	2.7	2.7	2.6	2.6	0.8	0.7	2.5	2.8	2.8	2.8
		2001	3.2	3.2	3.2	3.0	2.6	2.5	3.1	3.2	3.2	3.2	3.2
LRX 68	150.2	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	2.1	1.6	1.8	2.0	1.3	0	0	0.8	0.8	1.7	2.3
		2001	2.5	2.0	2.2	2.4	1.3	0.9	1.3	1.4	1.1	2.0	2.6
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	1.7	0.7	1.1	1.5	0.3	0	0	0	0	1.1	1.9
		2001	2.0	1.1	1.4	1.9	0.3	0	0.1	0	0	1.3	2.1
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0.8	0	0	0.5	0	0	0	0	0	0.1	1.0
		2001	1.1	0	0	0.8	0	0	0	0	0	0.3	1.3
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0.3	0	0	0	0	0	0	0	0	0	0.5
		2001	0.5	0	0	0.2	0	0	0	0	0	0	0.7

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1981-1982.

Location	River Mile	Demand	Water Weeks										
			20	21	22	23	24	25	26	27	28	29	30
Watana	184.4	Natural	0	0	0	0	0	0.9	0	0	1.2	4.6	5.8
		1996	2.8	2.8	2.6	2.7	1.9	1.7	2.8	2.8	2.8	2.8	2.9
		2001	3.2	2.8	2.9	1.7	1.4	3.2	3.2	3.2	3.2	3.2	3.2
LRX 68	150.2	Natural	0	0	0	0	0	0.3	0	0	0.1	4.1	5.5
		1996	0.7	0.4	1.1	1.9	1.0	1.8	2.1	2.3	2.6	3.4	3.8
		2001	1.0	0.4	1.3	1.1	0.6	3.1	2.4	2.5	2.9	3.7	4.0
LRX 33	130.1	Natural	0	0	0	0	0	0.5	0	0	0.5	4.6	5.8
		1996	0	0	0.2	1.5	0.5	1.8	1.7	1.9	2.5	3.9	4.4
		2001	0	0	0.4	0.7	0.2	3.0	1.9	2.2	2.8	4.1	4.6
LRX 3	98.6	Natural	0	0	0	0	0	0.8	0	0	1.1	6.0	7.4
		1996	0	0	0	0.6	0	1.8	1.1	1.4	2.5	4.9	5.7
		2001	0	0	0	0	0	2.8	1.3	1.6	2.7	5.0	5.9
Sunshine	83.8	Natural	0	0	0	0	0	1.4	0.1	0.4	1.8	5.5	6.7
		1996	0	0	0	0.3	0	1.9	0.8	1.2	2.5	5.0	5.9
		2001	0	0	0	0	0	2.5	1.0	1.4	2.7	4.9	5.8

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1982-1983.

Location	River Mile	Demand	Water Weeks											
			49	50	51	52	1	2	3	4	5	6	7	8
Watana	184.4	Natural	7.6	6.1	6.4	4.1	2.0	0	0	0	0	0	0	0
		1996	9.1	9.2	8.1	8.0	7.4	6.5	5.5	4.6	3.8	2.8	2.0	2.4
		2001	9.0	9.1	8.5	8.2	7.6	6.7	5.7	4.6	3.9	2.9	2.2	2.5
LRX 68	150.2	Natural	7.9	6.5	6.6	4.3	2.2	0.2	0	0	0	0	0	0
		1996	9.0	8.8	7.8	7.5	6.5	5.5	4.2	2.2	2.2	1.5	0.9	1.5
		2001	9.0	8.8	7.9	7.7	6.7	5.7	4.3	2.3	2.3	1.6	1.0	1.6
LRX 33	130.1	Natural	8.0	6.7	6.6	4.4	2.3	0.3	0	0	0	0	0	0
		1996	8.9	8.5	7.5	7.2	6.0	5.0	3.4	1.1	1.3	0.7	0.2	0.9
		2001	8.8	8.4	7.5	7.3	6.2	5.1	3.6	1.2	1.4	0.8	0.3	0.9
LRX 3	98.6	Natural	8.4	7.1	6.8	4.6	2.3	0.1	0	0	0	0	0	0
		1996	9.2	8.7	7.7	7.1	5.7	4.3	2.5	0	0	0	0	0
		2001	9.2	8.7	7.7	7.2	5.8	4.4	2.6	0	0	0	0	0
Sunshine	83.8	Natural	7.6	6.6	5.8	4.5	2.6	0.8	0	0	0	0	0	0
		1996	7.8	7.0	6.0	5.5	4.1	2.9	1.3	0	0	0	0	0
		2001	8.0	7.0	6.1	5.5	3.6	3.1	1.6	0	0	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1982-1983.

Location	River Mile	Demand	Water Weeks										
			9	10	11	12	13	14	15	16	17	18	19
Watana	184.4	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	2.0	1.6	1.3	1.2	2.3	2.5	2.5	2.5	2.5	2.5	2.3
		2001	2.6	1.6	1.5	2.4	2.8	2.8	2.8	2.8	2.7	2.6	2.0
LRX 68	150.2	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	1.3	0.6	0.6	0.1	1.8	1.4	0.3	1.6	1.4	1.8	1.5
		2001	1.8	0.6	0.8	1.1	2.2	1.6	0.5	1.8	1.6	1.9	1.3
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0.6	0	0.1	0	1.4	0.7	0	1.0	0.5	1.2	0.9
		2001	1.1	0	0.3	0.2	1.8	0.9	0	1.2	0.6	1.3	0.7
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0	0	0	0	0.7	0	0	0	0	0.2	0
		2001	0	0	0	0	1.0	0	0	0	0	0.3	0
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0	0	0
		1996	0	0	0	0	0.3	0	0	0	0	0	0
		2001	0	0	0	0	0.5	0	0	0	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana-only configuration, winter 1982-1983.

Location	River Mile	Demand	Water Weeks										
			20	21	22	23	24	25	26	27	28	29	30
Watana	184.4	Natural	0	0	0	0	1.2	0	1.3	2.2	0.9	2.9	6.4
		1996	2.0	1.1	1.3	2.4	2.5	2.5	2.5	2.5	2.6	2.8	3.1
		2001	1.1	1.2	2.8	2.8	2.8	2.8	2.8	2.6	2.7	2.9	3.1
LRX 68	150.2	Natural	0	0	0	0	0.3	0	0.4	1.5	0.2	2.5	6.3
		1996	0.5	0.4	0.7	1.4	2.3	2.4	2.5	2.7	2.5	3.0	3.9
		2001	0	0.5	2.0	1.7	2.5	2.6	2.7	2.8	2.6	3.0	4.0
LRX 33	130.1	Natural	0	0	0	0	0.3	0	0.6	1.8	0.4	2.7	6.5
		1996	0	0	0.3	0.9	2.2	2.2	2.5	2.8	2.5	3.1	4.5
		2001	0	0	1.5	1.2	2.4	2.4	2.7	2.9	2.5	3.2	4.6
LRX 3	98.6	Natural	0	0	0	0	0.2	0	1.0	2.4	0.7	3.4	7.8
		1996	0	0	0	0	2.0	1.9	2.5	3.0	2.4	3.5	5.8
		2001	0	0	0.5	0.2	2.1	2.1	2.6	3.1	2.5	3.6	5.8
Sunshine	83.8	Natural	0	0	0	0	1.0	0.6	1.7	2.8	1.5	3.6	6.7
		1996	0	0	0	0	1.8	1.7	2.4	3.1	2.4	3.6	6.0
		2001	0	0	0	0	1.7	1.7	2.4	2.9	2.5	3.6	5.6

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, summer 1971.

Location	River Mile	Demand	Water Weeks										
			31	32	33	34	35	36	37	38	39	40	41
Devil Canyon	150.2	Natural	0.6	2.7	4.3	4.5	4.3	9.4	7.8	10.4	11.3	10.5	13.0
		2002	2.2	2.2	2.2	2.3	2.5	3.2	3.9	4.3	6.3	6.5	7.4
		2020	2.0	2.2	2.3	2.1	2.4	3.0	3.7	4.5	6.5	6.6	7.5
LRX 33	130.1	Natural	0.9	2.9	4.5	4.6	4.4	9.2	7.7	10.3	11.2	10.5	12.9
		2002	2.2	2.5	2.8	2.9	3.0	4.2	4.4	5.4	7.0	7.1	8.3
		2020	2.1	2.5	2.8	2.8	2.9	4.2	4.4	5.6	7.2	7.2	8.5
LRX 3	98.6	Natural	1.3	3.7	5.3	5.4	4.8	9.7	8.0	10.8	11.7	11.0	13.6
		2002	2.2	3.1	3.7	4.0	3.7	6.0	5.4	7.3	9.0	8.6	10.6
		2020	2.1	3.1	3.7	3.9	3.6	6.2	5.4	7.6	9.3	8.9	10.9
Sunshine	83.8	Natural	2.0	3.7	4.9	5.2	4.8	9.0	7.7	9.9	10.6	9.7	11.5
		2002	2.3	3.4	4.3	4.7	4.5	7.8	7.0	8.8	9.5	8.7	10.3
		2020	2.3	3.4	4.3	4.6	4.5	7.9	7.0	8.8	9.6	8.8	10.3

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, summer 1971.

Location	River Mile	Demand	Water Weeks										
			42	43	44	45	46	47	48	49	50	51	52
Devil Canyon	150.2	Natural	9.5	8.7	11.1	10.9	10.9	9.7	9.0	6.7	6.3	5.2	3.1
		2002	8.0	8.0	8.1	6.4	6.3	8.3	8.4	8.4	8.2	7.7	7.3
		2020	8.1	8.1	7.0	6.4	8.3	6.9	8.5	8.4	8.2	7.8	7.3
LRX 33	130.1	Natural	9.5	8.8	11.1	10.8	10.9	9.7	9.0	6.9	6.4	5.4	3.3
		2002	8.0	8.1	8.5	7.0	6.8	8.5	8.6	8.4	8.1	7.6	7.0
		2020	8.0	8.1	7.6	7.0	8.5	7.2	8.6	8.3	8.1	7.6	7.0
LRX 3	98.6	Natural	9.9	9.2	11.7	11.3	11.3	10.2	9.5	7.1	6.8	5.8	3.5
		2002	8.9	8.9	9.9	8.4	7.9	9.1	9.1	8.5	8.3	7.7	6.7
		2020	9.1	9.0	9.1	8.3	9.6	8.0	9.1	8.5	8.3	7.7	6.7
Sunshine	83.8	Natural	8.8	8.1	10.2	10.4	10.2	9.2	8.5	6.6	6.3	5.4	3.6
		2002	8.1	7.6	9.1	9.4	8.8	8.7	8.3	7.2	6.9	6.2	5.9
		2020	8.1	7.6	9.0	9.4	9.2	8.2	8.4	7.2	6.9	6.2	5.2

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, summer 1974.

Location	River Mile	Demand	Water Weeks										
			31	32	33	34	35	36	37	38	39	40	41
Devil Canyon	150.2	Natural	5.2	5.6	6.1	9.4	9.6	8.3	9.7	9.8	10.9	10.8	10.3
		2002	1.8	1.5	1.9	2.3	3.4	3.9	4.8	6.0	7.2	8.1	7.3
		2020	1.8	1.8	1.9	2.2	3.3	3.8	4.7	5.8	7.2	8.0	7.4
LRX 33	130.1	Natural	5.6	5.7	6.1	9.1	9.4	8.3	9.7	9.8	10.9	10.8	10.3
		2002	2.6	2.4	2.8	3.5	4.6	4.9	6.0	6.9	8.2	8.7	7.8
		2020	2.7	2.7	2.8	3.6	4.6	4.9	6.1	6.8	8.2	8.7	7.9
LRX 3	98.6	Natural	6.6	6.3	6.6	9.7	10.0	8.9	10.5	10.6	11.8	11.6	10.9
		2002	4.1	3.8	4.1	5.4	6.7	6.5	8.2	8.7	10.3	10.5	9.4
		2020	4.1	4.0	4.3	5.7	6.9	6.7	8.4	8.8	10.5	10.6	9.6
Sunshine	83.8	Natural	5.7	5.8	6.2	8.9	9.2	8.0	9.2	9.1	10.1	9.7	9.4
		2002	4.7	4.8	5.4	7.6	8.2	7.2	8.2	8.3	9.1	9.0	8.6
		2020	4.7	4.9	5.5	7.7	8.3	7.3	8.2	8.2	9.1	9.0	8.6

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, summer 1974.

Location	River Mile	Demand	Water Weeks										
			42	43	44	45	46	47	48	49	50	51	52
Devil Canyon	150.2	Natural	10.8	10.4	10.6	10.5	10.3	7.7	9.3	8.5	6.8	5.7	3.9
		2002	8.1	8.8	9.6	8.2	9.0	9.1	9.0	9.4	9.3	9.3	8.8
		2020	8.3	8.9	9.7	9.9	10.2	10.2	9.5	10.0	9.6	9.2	8.4
LRX 33	130.1	Natural	10.8	10.5	10.7	10.6	10.4	7.9	9.4	8.6	7.0	5.8	4.1
		20028.7	8.7	9.1	9.9	8.6	9.3	9.0	9.1	9.4	9.2	9.0	8.0
		2020	8.7	9.2	9.9	10.1	10.3	10.0	9.5	9.9	9.5	8.9	7.5
LRX 3	98.6	Natural	11.5	11.1	11.5	11.3	11.1	8.5	10.0	9.1	7.6	6.3	4.3
		2002	10.3	10.5	11.1	9.8	10.2	9.5	9.8	9.9	9.5	8.9	7.5
		2020	10.5	10.7	11.2	11.0	11.1	10.2	10.2	10.3	9.7	8.8	7.1
Sunshine	83.8	Natural	9.8	9.5	9.8	9.7	9.5	7.4	8.8	8.1	6.8	5.8	4.4
		2002	9.0	8.8	9.2	9.0	9.1	7.6	8.6	8.1	7.7	6.7	5.3
		2020	9.0	8.8	9.3	9.3	9.3	7.9	8.7	8.3	7.8	6.6	5.0

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, summer 1981.

Location	River Mile	Demand	Water Weeks										
			31	32	33	34	35	36	37	38	39	40	41
Devil Canyon	150.2	Natural	5.0	7.6	8.3	8.1	9.3	8.9	11.6	12.4	9.0	8.9	9.5
		2002	2.5	3.2	3.9	4.5	4.9	6.1	7.3	7.9	7.3	7.0	6.1
		2020	2.6	3.2	4.0	4.5	5.1	6.1	7.3	8.8	7.7	7.2	6.4
LRX 33	130.1	Natural	5.1	7.5	8.2	8.1	9.4	8.8	11.5	12.3	9.1	9.0	9.4
		2002	3.0	4.0	4.7	5.4	6.0	6.5	8.0	8.7	7.8	7.6	6.7
		2020	3.1	4.1	4.9	5.5	6.2	6.5	8.1	9.4	8.1	7.8	6.9
LRX 3	98.6	Natural	5.7	8.0	8.8	8.9	10.1	9.3	12.1	13.1	9.8	9.7	9.9
		2002	4.0	5.6	6.4	7.1	8.1	7.7	9.9	10.8	9.3	9.0	8.0
		2020	4.0	5.8	6.7	7.3	8.5	7.8	10.0	11.3	9.7	9.3	8.3
Sunshine	83.8	Natural	5.2	7.5	8.3	8.2	9.4	8.0	10.0	10.7	9.0	9.1	9.1
		2002	4.5	6.3	7.1	7.3	8.3	7.2	8.8	9.4	8.5	8.6	8.3
		2020	4.5	6.4	7.2	7.3	8.4	7.2	8.8	9.5	8.5	8.6	8.3

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, summer 1981.

Location	River Mile	Demand	Water Weeks										
			42	43	44	45	46	47	48	49	50	51	52
Devil Canyon	150.2	Natural	9.9	10.2	9.9	9.9	7.5	8.0	10.1	7.7	7.2	6.4	2.0
		2002	4.5	5.5	7.1	7.4	7.5	7.3	7.6	8.0	8.2	8.3	8.2
		2020	8.6	10.7	11.2	6.1	5.1	6.9	8.0	8.4	8.4	8.6	8.4
LRX 33	130.1	Natural	9.9	10.3	10.0	10.0	7.6	8.1	10.1	7.9	7.3	6.5	2.2
		2002	5.1	6.0	7.6	7.8	7.6	7.5	7.9	8.2	8.2	8.2	7.6
		2020	8.5	10.4	10.8	6.6	5.5	7.2	8.3	8.5	8.4	8.5	7.8
LRX 3	98.6	Natural	10.4	10.9	10.6	10.5	8.0	8.6	10.7	8.4	7.6	6.8	2.2
		2002	6.1	7.0	8.4	8.5	8.0	8.1	8.6	8.6	8.4	8.3	6.9
		2020	9.9	11.4	11.6	7.6	6.0	7.7	9.0	9.0	8.5	8.5	7.1
Sunshine	83.8	Natural	9.5	9.9	9.8	9.6	7.7	8.3	9.4	7.8	7.1	6.1	2.3
		2002	7.8	8.3	8.9	8.8	7.6	8.0	8.6	8.1	7.4	6.8	4.5
		2020	8.8	9.3	9.5	8.5	6.9	7.9	8.8	8.0	7.5	6.9	4.6

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, summer 1982.

Location	River Mile	Demand	Water Weeks										
			31	32	33	34	35	36	37	38	39	40	41
Devil Canyon	150.2	Natural	5.4	4.7	6.8	6.8	8.6	9.0	8.1	9.7	11.9	10.5	11.0
		2002	3.7	3.8	4.1	4.3	4.5	4.7	5.3	6.2	6.9	7.9	10.2
		2020	3.6	3.8	4.0	4.4	4.6	4.7	5.0	5.8	6.8	7.3	7.8
LRX 33	130.1	Natural	5.5	4.7	6.7	6.6	8.4	8.9	8.0	9.6	11.8	10.6	11.1
		2002	4.2	4.2	4.6	4.8	5.2	5.3	5.7	6.8	7.8	8.5	10.2
		2020	4.2	4.1	4.6	4.9	5.3	5.3	5.6	6.6	7.8	8.2	8.4
LRX 3	98.6	Natural	6.6	5.3	7.3	7.2	9.0	9.3	8.5	10.2	12.5	11.4	11.7
		2002	5.3	4.9	5.8	6.0	6.7	6.7	6.9	8.5	9.9	10.2	11.5
		2020	5.3	4.9	5.9	6.1	7.0	6.8	6.9	8.4	10.1	10.2	10.3
Sunshine	83.8	Natural	6.1	5.2	7.0	6.9	8.4	8.6	7.6	9.0	11.0	9.8	10.1
		2002	5.5	4.9	6.1	6.2	7.3	7.7	6.8	7.8	9.7	8.9	9.1
		2020	5.5	4.9	6.1	6.2	7.4	7.7	6.7	7.7	9.7	8.9	8.9

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, summer 1982.

Location	River Mile	Demand	Water Weeks										
			42	43	44	45	46	47	48	49	50	51	52
Devil Canyon	150.2	Natural	11.1	10.1	10.9	11.1	11.0	10.9	9.4	7.9	6.5	6.6	4.3
		2002	6.0	5.1	5.5	6.7	7.9	8.5	8.5	8.6	8.6	8.4	8.4
		2020	8.9	8.7	7.6	7.8	10.2	7.3	7.4	9.1	9.0	8.1	7.2
LRX 33	130.1	Natural	11.2	10.0	11.0	11.2	11.0	11.0	9.5	8.0	6.7	6.6	4.4
		2002	6.9	5.6	6.2	7.4	8.3	9.0	8.7	8.6	8.5	8.3	8.0
		2020	9.4	8.6	8.2	8.4	10.3	7.8	7.8	9.0	8.8	7.6	6.9
LRX 3	98.6	Natural	12.0	10.6	11.7	12.0	11.6	11.8	10.1	8.4	7.1	6.8	4.6
		2002	8.5	6.7	7.4	8.7	9.3	10.0	9.4	8.9	8.7	8.4	7.7
		2020	11.3	10.1	10.0	9.8	11.1	9.1	8.7	9.3	8.9	7.7	6.7
Sunshine	83.8	Natural	10.5	9.3	10.2	10.1	9.7	9.9	8.5	7.6	6.6	5.8	4.5
		2002	9.1	8.0	8.8	9.0	8.9	9.3	8.2	7.8	7.2	6.3	5.6
		2020	9.5	8.6	9.3	9.3	9.4	9.0	7.9	7.8	7.0	5.7	5.1

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1971-1972.

Location	River Mile	Demand	Water Weeks											
			49	50	51	52	1	2	3	4	5	6	7	8
Devil Canyon	150.2	Natural	6.8	6.3	5.3	3.1	1.5	0.3	0	0	0	0	0	0
		2002	8.4	8.2	7.7	7.3	6.4	5.4	4.7	3.1	2.0	1.1	1.3	1.3
		2020	8.4	8.2	7.8	7.3	6.4	5.4	4.7	3.1	2.1	1.1	1.4	1.4
LRX 33	130.1	Natural	6.9	6.4	5.4	3.3	1.7	0.5	0	0	0	0	0	0
		2002	8.4	8.1	7.6	7.0	5.9	4.9	4.0	2.0	0.9	0.3	0.6	0.3
		2020	8.3	8.1	7.6	7.0	6.0	5.1	4.2	2.4	1.4	0.6	0.9	0.7
LRX 3	98.6	Natural	7.2	6.8	5.8	3.5	1.8	0.6	0	0	0	0	0	0
		2002	8.5	8.2	7.6	6.8	5.6	4.5	3.3	0.9	0	0	0	0
		2020	8.5	8.3	7.7	6.7	5.6	4.6	3.5	1.1	0	0	0	0
Sunshine	83.8	Natural	6.7	6.3	5.4	3.6	2.4	1.8	0.5	0	0	0	0	0
		2002	7.2	6.9	6.2	5.2	3.9	3.1	1.8	0	0	0	0	0
		2020	7.2	6.9	6.2	5.2	4.2	3.4	2.2	0.2	0	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1971-1972.

Location	River Mile	Demand	Water Weeks										
			9	10	11	12	13	14	15	16	17	18	19
Devil Canyon	150.2	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	1.3	1.3	1.2	1.2	1.2	1.1	1.1	1.0	1.0	1.0	0.9
		2020	1.3	1.3	1.2	1.2	1.1	1.1	0.9	1.3	1.3	1.6	1.8
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	0	0.2	0	0	0.5	0.2	0	0	0	0.4	0
		2020	0.4	0.5	0.4	0.4	0.7	0.5	0	0	0	1.1	0.7
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	0	0	0	0	0	0	0	0	0	0	0
		2020	0	0	0	0	0	0	0	0	0	0.2	0
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	0	0	0	0	0	0	0	0	0	0	0
		2020	0	0	0	0	0	0	0	0	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1971-1972.

Location	River Mile	Demand	Water Weeks										
			20	21	22	23	24	25	26	27	28	29	30
Devil Canyon	150.2	Natural	0	0	0	0	0	0	0	0	0	0	1.9
		2002	0.9	0.9	0.9	0.8	0.8	0.7	0.8	1.2	1.3	0.7	0.8
		2020	1.7	1.2	0.7	0.6	0.6	1.8	1.9	1.9	2.0	1.9	1.9
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0.1	2.2
		2002	0	0	0	0	0	0.4	0.5	0.7	0.9	0.7	1.1
		2020	0.8	0.4	0	0	0	1.5	1.6	1.5	1.7	1.7	2.2
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0.1	3.0
		2002	0	0	0	0	0	0	0	0	0.4	0.7	1.8
		2020	0	0	0	0	0	0.8	1.1	0.9	1.2	1.5	2.7
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0	0.9	3.3
		2002	0	0	0	0	0	0	0	0	0.3	0.9	2.3
		2020	0	0	0	0	0	0.5	0.8	0.5	0.9	1.6	3.0

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1974-1975.

Location	River Mile	Demand	Water Weeks											
			49	50	51	52	1	2	3	4	5	6	7	8
Devil Canyon	150.2	Natural	8.5	6.9	5.8	3.8	0	0.1	0	0	0.1	0	0	0
		2002	9.4	9.3	9.3	8.7	7.3	6.3	5.1	4.1	3.3	2.2	1.2	1.2
		2020	10.0	9.6	9.2	8.4	6.8	5.9	4.7	3.7	3.0	2.0	1.3	1.3
LRX 33	130.1	Natural	8.6	7.1	5.9	3.9	0.1	0.2	0	0.1	0	0	0	0
		2002	9.4	9.2	9.0	8.0	6.1	5.6	4.5	3.7	2.9	1.4	0.2	0.1
		2020	9.9	9.5	8.9	7.5	5.4	5.0	4.0	3.2	2.4	1.0	0	0
LRX 3	98.6	Natural	9.1	7.7	6.4	4.2	0	0.1	0	0	0	0	0	0
		2002	9.9	9.5	8.9	7.4	4.5	4.5	3.4	3.0	2.2	0	0	0
		2020	10.3	9.7	8.9	7.0	3.7	3.8	2.8	2.5	1.7	0	0	0
Sunshine	83.8	Natural	8.1	6.8	5.9	4.3	0.9	1.3	0.7	1.1	0.9	0	0	0
		2002	8.1	7.7	6.7	5.2	2.5	2.9	2.2	2.4	1.8	0	0	0
		2020	8.3	7.8	6.7	4.9	2.1	2.5	1.8	2.0	1.4	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1974-1975.

Location	River Mile	Demand	Water Weeks										
			9	10	11	12	13	14	15	16	17	18	19
Devil Canyon	150.2	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	1.2	1.2	1.3	1.3	1.3	1.2	1.2	1.3	1.3	1.2	1.3
		2020	1.4	1.1	0.9	0.9	0.8	0.8	1.0	1.3	1.6	1.7	2.0
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	0.7	0.6	0.3	0.3	0.1	0	0	0.5	0.7	0	0
		2020	0.6	0.3	0	0.1	0	0	0	0.7	1.1	0.1	1.1
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	0	0	0	0	0	0	0	0	0	0	0
		2020	0	0	0	0	0	0	0	0	0.2	0	0
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	0	0	0	0	0	0	0	0	0	0	0
		2020	0	0	0	0	0	0	0	0	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1974-1975.

Location	River Mile	Demand	Water Weeks										
			20	21	22	23	24	25	26	27	28	29	30
Devil Canyon	150.2	Natural	0	0	0	0	0	0	0	0	1.0	2.0	3.6
		2002	1.3	1.3	1.5	1.8	1.9	2.1	2.2	2.2	2.3	2.3	2.3
		2020	2.1	1.8	1.9	0.9	0.5	2.0	2.2	2.3	2.3	2.4	2.5
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	1.2	2.3	3.9
		2002	0	0.3	0.8	0.9	1.2	1.2	1.8	1.8	2.4	2.5	2.7
		2020	0.9	1.0	1.3	0.3	0.1	1.3	1.9	2.0	2.4	2.6	2.9
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	1.8	3.1	4.9
		2002	0	0	0	0	0.2	0	1.2	1.2	2.5	3.0	3.5
		2020	0	0	0.2	0	0	0.1	1.4	1.6	2.6	3.0	3.8
Sunshine	83.8	Natural	0	0	0	0	0	0	0.4	0.5	2.3	3.3	4.5
		2002	0	0	0	0	0	0	1.0	1.0	2.6	3.2	3.9
		2020	0	0	0	0	0	0	1.2	1.4	2.6	3.1	4.0

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1976-1977.

Location	River Mile	Demand	Water Weeks											
			49	50	51	52	1	2	3	4	5	6	7	8
Devil Canyon	150.2	Natural	6.4	6.0	5.3	4.2	1.5	0	1.2	0	0	0	0	0
		2002	9.8	9.4	9.0	8.3	7.5	6.4	5.5	4.5	2.5	1.4	0.5	0.5
		2020	10.0	9.2	8.6	7.9	7.1	6.1	5.2	4.3	2.4	1.2	0.3	0.3
LRX 33	130.1	Natural	6.6	6.2	5.5	4.4	1.7	0.1	1.3	0	0	0	0	0
		2002	9.7	9.3	8.7	7.7	7.0	5.7	5.0	3.4	1.5	1.0	0.1	0
		2020	9.8	9.1	8.4	7.4	6.4	5.2	4.7	3.0	1.2	0.7	0	0
LRX 3	98.6	Natural	7.2	6.8	6.1	4.7	2.0	0	1.2	0	0	0	0	0
		2002	9.7	9.4	8.6	7.5	6.4	4.7	4.3	1.7	0	0.3	0	0
		2020	9.8	9.2	8.3	7.2	5.7	3.9	4.0	1.1	0	0	0	0
Sunshine	83.8	Natural	6.3	6.0	5.5	4.7	2.8	1.0	2.0	0	0	0.2	0	0
		2002	7.5	7.4	6.5	5.4	4.5	2.8	3.2	0.4	0	0.2	0	0
		2020	7.6	7.3	6.4	5.4	4.0	2.3	3.0	0.1	0	0.1	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1976-1977.

Location	River Mile	Demand	Water Weeks										
			9	10	11	12	13	14	15	16	17	18	19
Devil Canyon	150.2	Natural	0.2	0	0	0	0	0	0	0	0.8	0.9	0
		2002	0.7	0.7	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8
		2020	0.4	0.5	0.6	0.6	0.5	0.4	0.5	0.6	0.6	0.6	0.6
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0.3	0.5	0
		2002	0.5	0	0.2	0.2	0	0.5	0.2	0.3	0.7	0.7	0.6
		2020	0.3	0	0.1	0.1	0	0.2	0	0.2	0.3	0.6	0.5
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	0.1	0	0	0	0	0	0	0	0.2	0.4	0.1
		2020	0.1	0	0	0	0	0	0	0	0	0.4	0.2
Sunshine	83.8	Natural	0.5	0	0	0	0	0	0	0	0.4	0.4	0.2
		2002	0.3	0	0	0	0	0	0	0	0.3	0.4	0.1
		2020	0.3	0	0	0	0	0	0	0	0.1	0.4	0.2

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1976-1977.

Location	River Mile	Demand	Water Weeks										
			20	21	22	23	24	25	26	27	28	29	30
Devil Canyon	150.2	Natural	0	0	0	0	0	0	0	0.6	0	1.6	4.6
		2002	0.9	0.8	0.7	0.4	0.6	0.8	0.9	0.9	0.9	0.9	1.0
		2020	0.6	0.6	0.6	0.4	0.2	0.6	0.6	0.6	0.6	0.6	0.6
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0.8	0	1.9	5.0
		2002	0.3	0.6	0.2	0	0	0.3	0.5	1.1	0.8	1.2	1.7
		2020	0.2	0.4	0.2	0	0	0.1	0.4	0.8	0.6	1.0	1.4
LRX 3	98.6	Natural	0	0	0	0	0	0	0	1.3	0	2.6	6.1
		2002	0	0.2	0	0	0	0	0	1.4	0.7	1.8	2.9
		2020	0	0.1	0	0	0	0	0	1.1	0.6	1.6	2.8
Sunshine	83.8	Natural	0	0.3	0	0	0	0	0	2.0	0.8	2.9	5.4
		2002	0	0.2	0	0	0	0	0	1.7	0.9	2.2	3.7
		2020	0	0.1	0	0	0	0	0	1.4	0.7	2.1	3.7

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1981-1982.

Location	River Mile	Demand	Water Weeks											
			49	50	51	52	1	2	3	4	5	6	7	8
Devil Canyon	150.2	Natural	7.7	7.2	6.4	2.0	0.7	0.6	1.3	0.5	0	0	0	0
		2002	8.0	8.2	8.3	8.2	7.6	7.2	6.8	6.3	5.6	4.9	3.8	1.8
		2020	8.4	8.4	8.6	8.4	7.6	7.2	6.8	6.3	5.5	4.6	3.1	1.8
LRX 33	130.1	Natural	7.9	7.3	6.5	2.2	1.0	0.9	1.4	0.5	0	0	0	0
		2002	8.2	8.2	8.2	7.6	6.8	6.5	6.1	5.4	4.4	3.8	2.6	0.6
		2020	8.5	8.4	8.5	7.8	7.0	6.8	6.3	5.7	4.6	3.9	2.3	1.0
LRX 3	98.6	Natural	8.4	7.6	6.8	2.2	1.0	1.0	1.4	0.5	0	0	0	0
		2002	8.6	8.4	8.3	6.9	5.8	5.8	5.2	4.5	2.5	2.2	0.6	0
		2020	9.0	8.5	8.5	7.1	6.2	6.2	5.7	5.0	3.2	2.8	0.9	0
Sunshine	83.8	Natural	7.8	7.1	6.1	2.3	1.7	1.8	1.9	1.1	0	0	0	0
		2002	8.1	7.4	6.8	4.5	3.9	4.0	3.7	3.0	0.9	1.0	0	0
		2020	8.0	7.5	6.9	4.6	4.3	4.6	4.2	3.5	1.7	1.5	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1981-1982.

Location	River Mile	Demand	Water Weeks										
			9	10	11	12	13	14	15	16	17	18	19
Devil Canyon	150.2	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	1.8	2.5	2.6	2.6	2.7	2.7	2.7	2.7	2.7	2.8	2.8
		2020	2.0	2.7	2.7	2.7	2.4	0.8	2.6	2.7	2.6	2.8	2.8
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	1.2	1.2	1.5	1.8	1.2	0.9	1.1	0.9	0.7	2.0	2.2
		2020	1.6	1.9	2.0	2.2	1.4	0	1.5	1.5	0.2	2.2	2.4
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	0.1	0	0	0.5	0	0	0	0	0	0.7	1.0
		2020	0.8	0.1	0.7	1.2	0	0	0	0	0	1.2	1.6
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	0	0	0	0	0	0	0	0	0	0.2	0.5
		2020	0.3	0	0	0.6	0	0	0	0	0	0.6	1.1

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1982-1983.

Location	River Mile	Demand	Water Weeks											
			49	50	51	52	1	2	3	4	5	6	7	8
Devil Canyon	150.2	Natural	7.9	6.5	6.6	4.3	2.2	0.2	0	0	0	0	0	0
		2002	8.6	8.6	8.4	8.4	8.3	8.0	7.3	6.3	5.3	4.4	3.9	0.9
		2020	9.1	9.0	8.1	7.2	7.7	7.0	6.1	4.6	2.9	1.1	0.6	1.1
LRX 33	130.1	Natural	8.0	6.7	6.6	4.4	2.3	0.3	0	0	0	0	0	0
		2002	8.6	8.5	8.3	8.0	7.6	6.9	5.9	4.3	3.8	3.2	1.8	0
		2020	9.0	8.7	7.6	6.9	7.2	6.3	5.3	3.4	2.1	0.6	0	0.5
LRX 3	98.6	Natural	8.4	7.1	6.8	4.6	2.3	0.1	0	0	0	0	0	0
		2002	8.9	8.7	8.4	7.7	6.9	5.6	4.1	1.5	1.5	1.2	0	0
		2020	9.3	8.9	7.7	6.7	6.6	5.4	4.0	1.4	0.7	0	0	0
Sunshine	83.8	Natural	7.6	6.6	5.8	4.5	2.6	0.8	0	0	0	0	0	0
		2002	7.9	7.2	6.5	5.6	3.8	3.4	2.2	0.8	0.8	0.1	0	0
		2020	8.0	7.0	5.8	5.1	3.7	3.5	2.4	0.7	0.3	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1982-1983.

Location	River Mile	Demand	Water Weeks										
			9	10	11	12	13	14	15	16	17	18	19
Devil Canyon	150.2	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	1.0	1.4	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
		2020	1.3	1.4	1.4	1.4	1.4	1.3	1.6	2.0	3.5	1.9	1.9
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	0	0.4	1.0	0.6	1.4	0.8	0	1.1	0.7	1.2	1.1
		2020	0.7	0.7	0.9	0.5	1.1	0.6	0.3	1.5	1.9	1.5	1.4
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	0	0	0	0	0.5	0	0	0	0	0	0
		2020	0	0	0	0	0.5	0	0	0.4	0	0.7	0.4
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0	0	0
		2002	0	0	0	0	0.1	0	0	0	0	0	0
		2020	0	0	0	0	0.1	0	0	0	0	0.2	0

Appendix A. Weekly temperatures (C) at selected locations for Watana/Devil Canyon configuration, winter 1982-1983.

Location	River Mile	Demand	Water Weeks										
			20	21	22	23	24	25	26	27	28	29	30
Devil Canyon	150.2	Natural	0	0	0	0	0.3	0	0.4	1.5	0.2	2.5	6.3
		2002	1.9	1.8	1.4	1.4	1.6	1.9	2.2	2.4	2.6	2.8	3.1
		2020	2.2	2.6	1.4	1.4	1.6	1.9	2.1	2.3	2.5	2.6	2.9
LRX 33	130.1	Natural	0	0	0	0	0.3	0	0.6	1.8	0.4	2.7	6.5
		2002	0.8	1.1	0.7	0.7	1.5	1.7	2.2	2.6	2.6	3.0	3.8
		2020	1.4	2.1	0.9	0.9	1.6	1.8	2.2	2.5	2.5	2.9	3.7
LRX 3	98.6	Natural	0	0	0	0	0.2	0	1.0	2.4	0.7	3.4	7.8
		2002	0	0	0	0	1.3	1.3	2.1	2.8	2.4	3.4	5.1
		2020	0	1.1	0	0	1.5	1.4	2.2	2.7	2.5	3.3	5.1
Sunshine	83.8	Natural	0	0	0	0	1.0	0.6	1.7	2.8	1.5	3.6	6.7
		2002	0	0	0	0	1.1	0.9	2.0	2.7	2.5	3.5	5.2
		2020	0	0.5	0	0	1.2	1.1	2.1	2.7	2.5	3.5	5.2

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, summer 1971.

Location	River Mile	Demand	Water Weeks										
			31	32	33	34	35	36	37	38	39	40	41
Watana	184.4	Natural	1.0	2.8	4.4	4.6	4.2	9.6	7.8	10.4	11.3	10.3	12.6
		1992 Filling	1.8	1.8	1.8	1.8	1.8	2.1	3.3	3.4	4.1	4.1	4.1
LRX 68	150.2	Natural	0.6	2.7	4.3	4.5	4.3	9.4	7.8	10.4	11.3	10.5	13.0
		1992 Filling	1.5	2.2	2.5	2.7	2.6	4.7	5.1	6.6	8.4	7.4	8.1
LRX 33	130.1	Natural	0.9	2.9	4.5	4.6	4.4	9.2	7.7	10.3	11.2	10.5	12.9
		1992 Filling	1.5	2.5	3.0	3.1	3.0	5.2	5.1	6.9	8.1	7.7	8.8
LRX 3	98.6	Natural	1.3	3.7	5.3	5.4	4.8	9.7	8.0	10.8	11.7	11.0	13.6
		1992 Filling	1.7	3.1	3.9	4.2	3.7	6.9	6.0	8.6	9.9	9.2	11.1
Sunshine	83.8	Natural	2.0	3.7	4.9	5.2	4.8	9.0	7.7	9.9	10.6	9.7	11.5
		1992 Filling	2.1	3.4	4.4	4.8	4.5	8.0	7.1	9.0	9.6	8.8	10.3

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, summer 1971.

Location	River Mile	Demand	Water Weeks										
			42	43	44	45	46	47	48	49	50	51	52
Watana	184.4	Natural	9.0	8.2	10.7	10.6	10.7	9.3	8.6	6.3	5.9	4.8	2.8
		1992 Filling	4.2	4.2	4.2	4.2	4.2	5.6	9.0	8.7	8.4	7.9	7.4
LRX 68	150.2	Natural	9.5	8.7	11.1	10.9	10.9	9.7	9.0	6.7	6.3	5.2	3.1
		1992 Filling	6.7	6.3	6.0	7.1	6.3	6.8	9.3	8.5	8.3	7.4	6.1
LRX 33	130.1	Natural	9.5	8.8	11.1	10.8	10.9	9.7	9.0	6.9	6.4	5.4	3.3
		1992 Filling	7.1	6.9	6.8	7.6	7.0	7.3	9.2	8.2	8.1	7.1	5.6
LRX 3	98.6	Natural	9.9	9.2	11.7	11.3	11.3	10.2	9.5	7.1	6.8	5.8	3.5
		1992 Filling	8.3	7.9	8.1	8.8	8.1	8.2	9.7	8.3	8.2	7.2	5.2
Sunshine	83.8	Natural	8.8	8.1	10.2	10.4	10.2	9.2	8.5	6.6	6.3	5.4	3.6
		1992 Filling	8.0	7.5	8.8	9.5	8.9	8.2	8.4	6.8	6.7	5.9	4.3

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, summer 1981.

Location	River Mile	Demand	Water Weeks										
			31	32	33	34	35	36	37	38	39	40	41
Watana	184.4	Natural	4.8	7.6	8.6	8.2	9.2	8.9	11.6	12.2	8.5	8.4	9.2
		1992 Filling	3.3	3.4	3.8	3.7	4.0	4.1	4.1	4.1	4.1	4.1	4.1
LRX 68	150.2	Natural	5.0	7.6	8.3	8.1	9.3	8.9	11.6	12.4	9.0	8.9	9.5
		1992 Filling	3.8	4.0	4.2	4.8	5.7	5.4	6.5	7.0	7.0	6.9	7.4
LRX 33	130.1	Natural	5.1	7.5	8.2	8.1	9.4	8.8	11.5	12.3	9.1	9.0	9.4
		1992 Filling	4.2	4.5	4.6	5.3	6.3	5.8	7.3	7.9	7.5	7.5	7.7
LRX 3	98.6	Natural	5.7	8.0	8.8	8.9	10.1	9.3	12.1	13.1	9.8	9.7	9.8
		1992 Filling	5.0	6.0	6.4	7.1	8.4	7.2	9.3	10.1	9.1	9.0	8.6
Sunshine	83.8	Natural	5.2	7.5	8.3	8.2	9.4	8.0	10.0	10.7	9.0	9.1	9.1
		1992 Filling	4.9	6.4	7.1	7.3	8.4	7.1	8.7	9.3	8.5	8.6	8.4

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, summer 1981.

Location	River Mile	Demand	Water Weeks										
			42	43	44	45	46	47	48	49	50	51	52
Watana	184.4	Natural	9.5	9.8	9.4	9.4	6.8	7.5	9.9	7.2	7.0	6.2	1.6
		1992 Filling	4.1	4.1	4.1	8.2	10.9	10.4	10.4	10.6	10.0	9.1	8.3
LRX 68	150.2	Natural	9.9	10.2	9.9	9.9	7.5	8.0	10.1	7.7	7.2	6.4	2.0
		1992 Filling	6.2	6.7	6.3	8.9	10.6	10.3	10.5	10.4	9.5	8.4	6.2
LRX 33	130.1	Natural	9.9	10.3	10.0	10.0	7.6	8.1	10.1	7.9	7.3	6.5	2.2
		1992 Filling	6.9	7.4	7.0	9.1	10.1	10.1	10.4	10.2	9.2	8.0	5.5
LRX 3	98.6	Natural	10.4	10.9	10.6	10.5	8.0	8.6	10.7	8.4	7.6	6.8	2.2
		1992 Filling	7.9	8.7	8.1	9.8	10.3	10.4	11.0	10.5	9.3	8.1	4.8
Sunshine	83.8	Natural	9.5	9.9	9.8	9.6	7.7	8.3	9.4	7.8	7.1	6.1	2.3
		1992 Filling	8.5	8.9	8.8	9.2	8.4	9.0	9.4	8.5	7.8	6.5	3.2

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, summer 1982.

Location	River Mile	Demand	Water Weeks										
			31	32	33	34	35	36	37	38	39	40	41
Watana	184.4	Natural	5.5	4.9	7.2	7.1	8.8	9.2	8.0	9.6	11.9	10.2	10.6
		1993 Filling	2.3	2.4	2.7	3.1	3.6	4.1	4.7	5.3	5.7	5.6	6.9
LRX 68	150.2	Natural	5.4	4.7	6.8	6.8	8.6	9.0	8.1	9.7	11.9	10.5	11.0
		1993 Filling	3.3	2.8	3.3	3.4	4.5	5.0	5.5	6.4	7.0	7.0	8.1
LRX 33	130.1	Natural	5.5	4.7	6.7	6.6	8.4	8.9	8.0	9.6	11.8	10.6	11.1
		1993 Filling	3.9	3.2	3.7	3.8	4.9	5.3	5.7	6.8	7.6	7.6	8.5
LRX 3	98.6	Natural	6.6	5.3	7.3	7.2	9.0	9.3	8.5	10.2	12.5	11.4	11.7
		1993 Filling	5.4	4.1	5.1	5.2	6.5	6.5	6.6	8.0	9.0	8.8	9.6
Sunshine	83.8	Natural	6.1	5.2	7.0	6.9	8.4	8.6	7.6	9.0	11.0	9.8	10.1
		1993 Filling	5.5	4.6	5.9	6.0	7.3	7.6	6.7	7.8	9.6	8.8	9.1

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, summer 1982.

Location	River Mile	Demand	Water Weeks										
			42	43	44	45	46	47	48	49	50	51	52
Watana	184.4	Natural	10.6	9.7	10.5	10.5	10.5	10.5	9.0	7.6	6.1	6.4	4.1
		1993 Filling	8.7	8.6	8.8	8.9	8.5	8.9	9.0	9.4	9.6	8.7	7.7
LRX 68	150.2	Natural	11.1	10.1	10.9	11.1	11.0	10.9	9.4	7.9	6.5	6.6	4.3
		1993 Filling	9.6	9.3	9.6	9.8	9.2	9.6	9.4	9.2	9.0	6.4	5.4
LRX 33	130.1	Natural	11.2	10.0	11.0	11.2	11.0	11.0	9.5	8.0	6.7	6.6	4.4
		1993 Filling	9.9	9.3	9.7	10.1	9.5	9.9	9.5	9.0	8.7	6.1	5.0
LRX 3	98.6	Natural	12.0	10.6	11.7	12.0	11.6	11.8	10.1	8.4	7.1	6.8	4.6
		1993 Filling	10.9	10.0	10.7	11.1	10.3	10.7	10.1	9.3	8.9	6.5	5.0
Sunshine	83.8	Natural	10.5	9.3	10.2	10.1	9.7	9.9	8.5	7.6	6.6	5.8	4.5
		1993 Filling	9.9	8.9	9.8	9.7	9.3	9.7	8.4	7.9	7.0	5.4	4.5

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, winter 1971-1972.

Location	River Mile	Demand	Water Weeks											
			49	50	51	52	1	2	3	4	5	6	7	8
Watana	184.4	Natural	6.3	5.9	4.8	2.8	1.2	0	0	0	0	0	0	0
		1992-93 Filling	8.7	8.4	7.9	7.4	6.2	5.6	5.1	4.3	3.1	1.6	1.4	1.3
LRX 68	150.2	Natural	6.8	6.3	5.3	3.1	1.5	0.3	0	0	0	0	0	0
		1992-93 Filling	8.5	8.3	7.4	6.1	2.5	1.7	0.3	0	0	0	0	0
LRX 33	130.1	Natural	6.9	6.4	5.4	3.3	1.7	0.5	0	0	0	0	0	0
		1992-93 Filling	8.2	8.1	7.1	5.6	2.4	1.5	0	0	0	0	0	0
LRX 3	98.6	Natural	7.2	6.8	5.8	3.5	1.8	0.6	0	0	0	0	0	0
		1992-93 Filling	8.3	8.2	7.2	5.3	2.2	1.1	0	0	0	0	0	0
Sunshine	83.8	Natural	6.7	6.3	5.4	3.6	2.4	1.8	0.5	0	0	0	0	0
		1992-93 Filling	6.8	6.7	5.9	4.3	2.7	2.3	0.8	0	0	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, winter 1971-1972.

Location	River Mile	Demand	Water Weeks										
			9	10	11	12	13	14	15	16	17	18	19
Watana	184.4	Natural	0	0	0	0	0	0	0	0	0	0	0
		1992-93 Filling	1.2	1.2	1.1	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.7
LRX 68	150.2	Natural	0	0	0	0	0	0	0	0	0	0	0
		1992-93 Filling	0	0	0	0	0	0	0	0	0	0	0
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0	0
		1992-93 Filling	0	0	0	0	0	0	0	0	0	0	0
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0	0
		1992-93 Filling	0	0	0	0	0	0	0	0	0	0	0
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0	0	0
		1992-93 Filling	0	0	0	0	0	0	0	0	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, winter 1971-1972.

Location	River Mile	Demand	Water Weeks										
			20	21	22	23	24	25	26	27	28	29	30
Watana	184.4	Natural	0	0	0	0	0	0	0	0	0	0.4	2.8
		1992-93 Filling	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5
LRX 68	150.2	Natural	0	0	0	0	0	0	0	0	0	0	1.9
		1992-93 Filling	0	0	0	0	0	0	0	0	0	0	0.8
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0.1	2.2
		1992-93 Filling	0	0	0	0	0	0	0	0	0	0.1	1.4
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0.1	3.0
		1992-93 Filling	0	0	0	0	0	0	0	0	0	0.1	2.6
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0.1	0.9	3.3
		1992-93 Filling	0	0	0	0	0	0	0	0	0.1	0.9	3.1

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, winter 1981-1982.

Location	River Mile	Demand	Water Weeks											
			49	50	51	52	1	2	3	4	5	6	7	8
Watana	184.4	Natural	7.2	7.0	6.2	1.6	0.3	0.3	1.2	0.5	0	0	0	0
		1992-93 Filling	10.6	10.0	9.1	8.3	6.9	6.1	5.6	5.0	4.5	3.9	3.3	2.2
LRX 68	150.2	Natural	7.7	7.2	6.4	2.0	0.7	0.6	1.3	0.5	0	0	0	0
		1992-93 Filling	10.4	9.5	8.4	6.4	1.4	1.6	0	0	0.2	0.8	0	0
LRX 33	130.1	Natural	7.9	7.3	6.5	2.2	1.0	0.9	1.4	0.5	0	0	0	0
		1992-93 Filling	10.2	9.2	8.0	5.6	1.6	1.6	0.4	0.1	0	0	0	0
LRX 3	98.6	Natural	8.4	7.6	6.8	2.2	1.0	1.0	1.4	0.5	0	0	0	0
		1992-93 Filling	10.5	9.3	8.1	4.9	1.3	1.5	0.5	0	0	0	0	0
Sunshine	83.8	Natural	7.8	7.1	6.1	2.3	1.7	1.8	1.9	1.1	0	0	0	0
		1992-93 Filling	8.5	7.8	6.5	3.3	2.1	2.3	1.9	1.3	0	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, winter 1981-1982.

Location	River Mile	Demand	Water Weeks										
			9	10	11	12	13	14	15	16	17	18	19
Watana	184.4	Natural	0	0	0	0	0	0	0	0	0	0	0
		1992-93 Filling	1.6	1.5	1.5	1.7	1.8	1.8	1.8	1.8	1.5	1.3	1.4
LRX 68	150.2	Natural	0	0	0	0	0	0	0	0	0	0	0
		1992-93 Filling	0	0	0	0	0	0	0	0	0	0	0
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0	0
		1992-93 Filling	0	0	0	0	0	0	0	0	0	0	0
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0	0
		1992-93 Filling	0	0	0	0	0	0	0	0	0	0	0
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0	0	0
		1992-93 Filling	0	0	0	0	0	0	0	0	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, winter 1981-1982.

Location	River Mile	Demand	Water Weeks										
			20	21	22	23	24	25	26	27	28	29	30
Watana	184.4	Natural	0	0	0	0	0	0.9	0	0	1.2	4.6	5.8
		1992-93 Filling	1.4	1.4	1.4	1.4	1.6	1.6	1.6	1.7	1.8	2.0	2.1
LRX 68	150.2	Natural	0	0	0	0	0	0.3	0	0	0.1	4.1	5.5
		1992-93 Filling	0	0	0	0	0	0.4	0	0	0.3	3.2	3.9
LRX 33	130.1	Natural	0	0	0	0	0	0.5	0	0	0.5	4.6	5.8
		1992-93 Filling	0	0	0	0	0	0.5	0	0	0.6	4.0	4.7
LRX 3	98.6	Natural	0	0	0	0	0	0.8	0	0	1.1	6.0	7.4
		1992-93 Filling	0	0	0	0	0	0.8	0	0	1.2	5.7	6.7
Sunshine	83.8	Natural	0	0	0	0	0	1.4	0.1	0.4	1.8	5.5	6.7
		1992-93 Filling	0	0	0	0	0	1.4	0.1	0.4	1.9	5.3	6.4

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, winter 1982-1983.

Location	River Mile	Demand	Water Weeks											
			49	50	51	52	1	2	3	4	5	6	7	8
Watana	184.4	Natural	7.6	6.1	6.4	4.1	2.0	0	0	0	0	0	0	0
		1991-92 Filling	9.3	8.8	7.9	6.4	5.0	4.9	4.9	4.8	3.8	3.7	3.7	3.7
LRX 68	150.2	Natural	7.9	6.5	6.6	4.3	2.2	0.2	0	0	0	0	0	0
		1991-92 Filling	9.3	8.5	6.2	4.9	2.2	0.9	0	0	0	0	0	0
LRX 33	130.1	Natural	8.0	6.7	6.6	4.4	2.3	0.3	0	0	0	0	0	0
		1991-92 Filling	9.1	8.2	5.9	4.6	2.4	0.8	0	0	0	0	0	0
LRX 3	98.6	Natural	8.4	7.1	6.8	4.6	2.3	0.1	0	0	0	0	0	0
		1991-92 Filling	9.4	8.5	6.3	4.7	2.2	0.2	0	0	0	0	0	0
Sunshine	83.8	Natural	7.6	6.6	5.8	4.5	2.6	0.8	0	0	0	0	0	0
		1991-92 Filling	8.1	6.9	5.6	4.4	1.8	1.5	0.6	0.3	0.2	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, winter 1982-1983.

Location	River Mile	Demand	Water Weeks										
			9	10	11	12	13	14	15	16	17	18	19
Watana	184.4	Natural	0	0	0	0	0	0	0	0	0	0	0
		1991-92 Filling	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
LRX 68	150.2	Natural	0	0	0	0	0	0	0	0	0	0	0
		1991-92 Filling	0	0	0	0	0.3	0	0	0	0	0	0
LRX 33	130.1	Natural	0	0	0	0	0	0	0	0	0	0	0
		1991-92 Filling	0	0	0	0	0	0	0	0	0	0	0
LRX 3	98.6	Natural	0	0	0	0	0	0	0	0	0	0	0
		1991-92 Filling	0	0	0	0	0	0	0	0	0	0	0
Sunshine	83.8	Natural	0	0	0	0	0	0	0	0	0	0	0
		1991-92 Filling	0	0	0	0	0	0	0	0	0	0	0

Appendix A. Weekly temperatures (C) at selected locations for Watana filling, winter 1982-1983.

Location	River Mile	Demand	Water Weeks										
			20	21	22	23	24	25	26	27	28	29	30
Watana	184.4	Natural	0	0	0	0	1.2	0	1.3	2.2	0.9	2.9	6.4
		1991-92 Filling	3.7	3.6	3.5	3.5	3.5	3.5	3.5	3.4	3.1	3.0	2.9
LRX 68	150.2	Natural	0	0	0	0	0.3	0	0.4	1.5	0.2	2.5	6.3
		1991-92 Filling	0	0	0	0	0.9	0.7	1.2	2.1	1.3	2.6	4.1
LRX 33	130.1	Natural	0	0	0	0	0.3	0	0.6	1.8	0.4	2.7	6.5
		1991-92 Filling	0	0	0	0	0.5	0.2	1.0	2.3	1.2	2.8	4.9
LRX 3	98.6	Natural	0	0	0	0	0.2	0	1.0	2.4	0.7	3.4	7.8
		1991-92 Filling	0	0	0	0	0.3	0	1.3	2.8	1.2	3.5	6.6
Sunshine	83.8	Natural	0	0	0	0	1.0	0.6	1.7	2.8	1.5	3.6	6.7
		1991-92 Filling	0	0	0	0	0.2	0	1.3	2.2	2.0	3.6	5.7

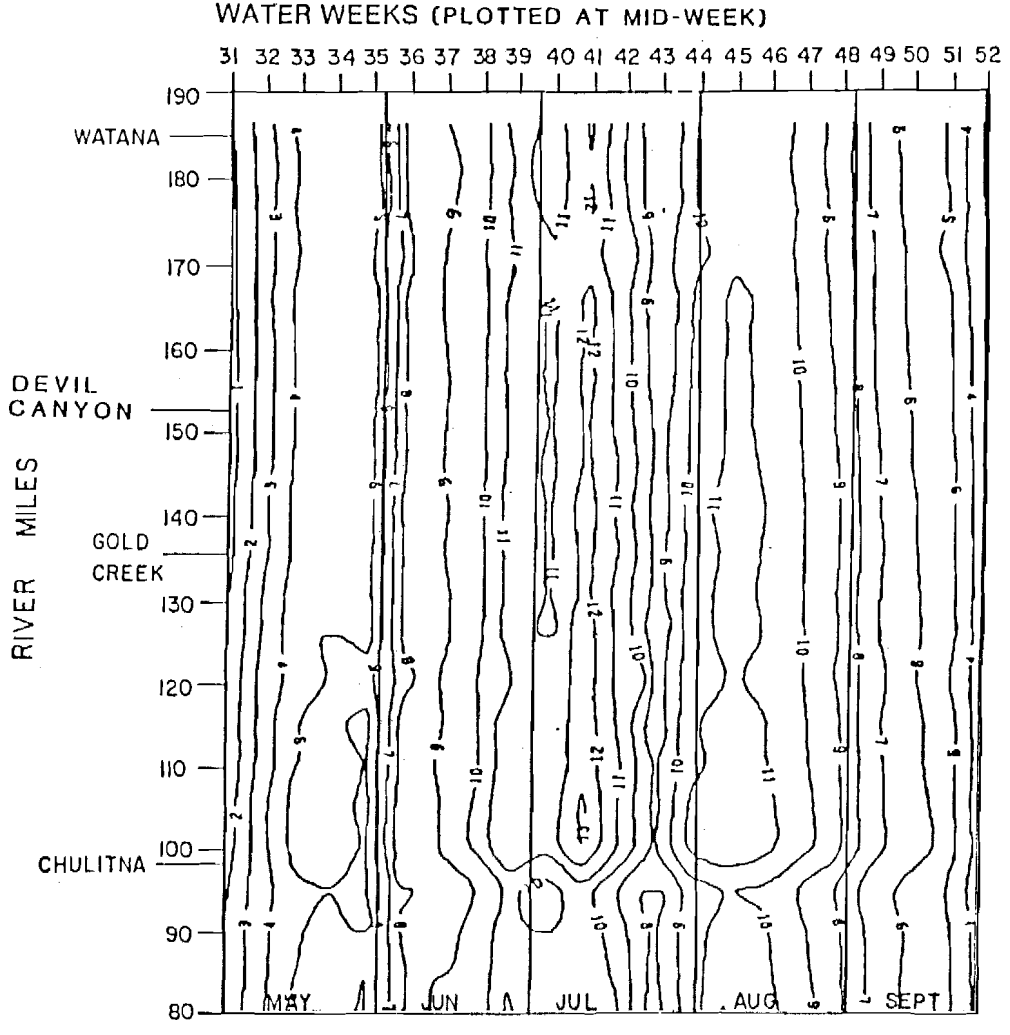
APPENDIX B

Isotherm plots of temperature simulation results for the middle Susitna River for Watana only, Watana/Devil Canyon and Watana filling scenarios. Ice front locations calculated by Harza-Ebasco's ICECAL model are included on the plots.

Note that plotting was done using a resolution of five miles in the y-dimension. Additionally, smoothing techniques used in the plotting program mask sharp temperature discontinuities. This is most notable in the area where the Chulitna and Talkeetna rivers coverge with the Susitna River (river miles 97-99).

Appendix B. Isotherm plots for all simulations

MIDDLE SUSITNA RIVER - ISOTHERMS



NOTES :

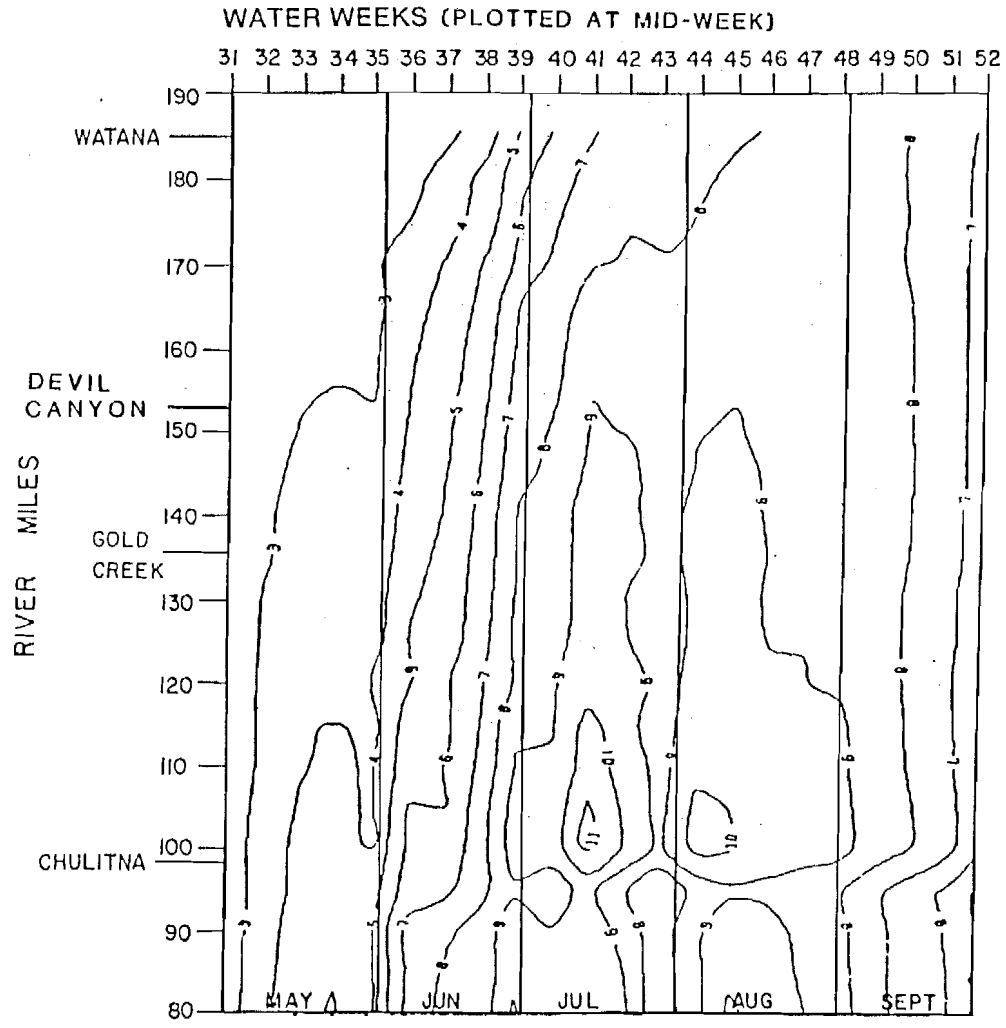
1. TEMPERATURES IN °C.

NATURAL CONDITIONS

SUMMER 1971 CLIMATE DATA

ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT	
ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER	HARZA-EBASCO SUSITNA J[illegible]T VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



TIME

WATANA ONLY, 1996 ENERGY DEMAND

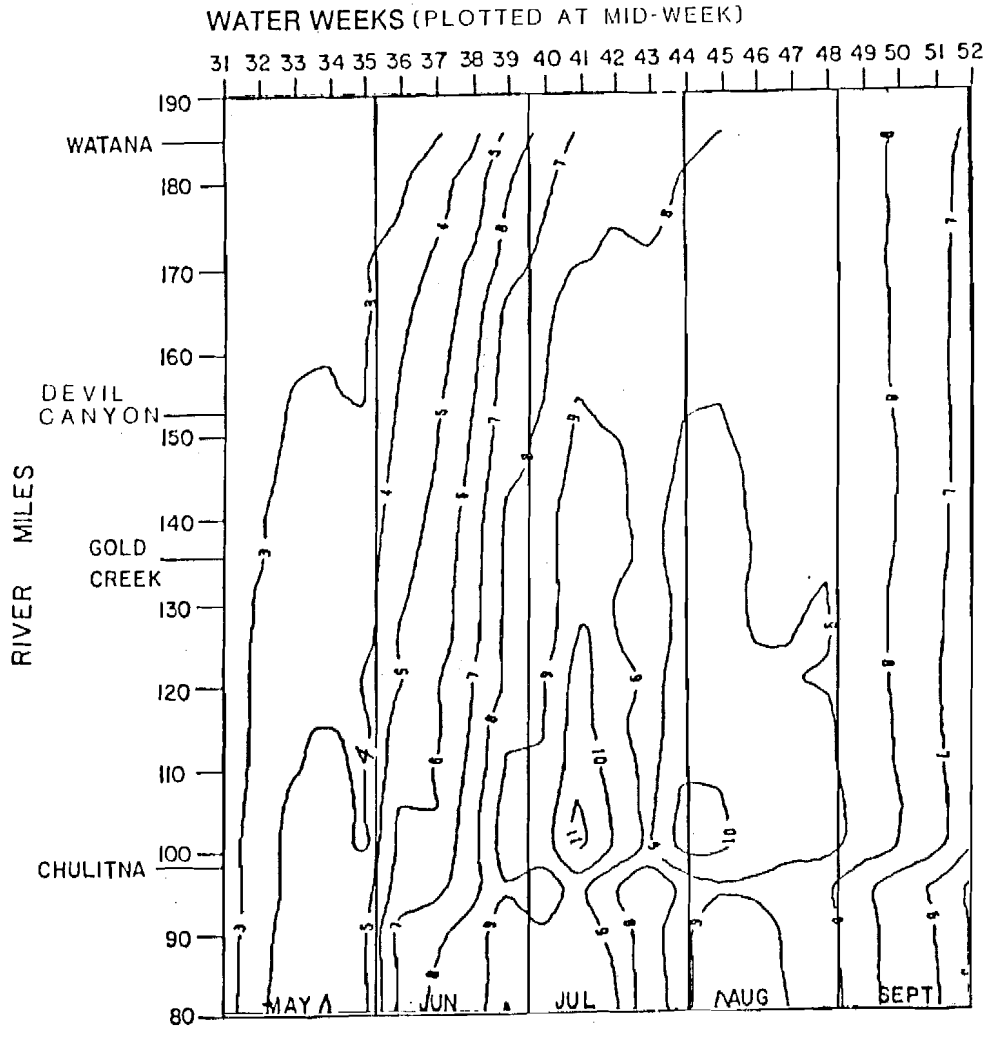
SUMMER 1971 CLIMATE DATA

NOTES :

1. TEMPERATURES IN °C.

ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT	
ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER	HARZA-EBASCO SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



TIME

WATANA ONLY, 2001 ENERGY DEMAND

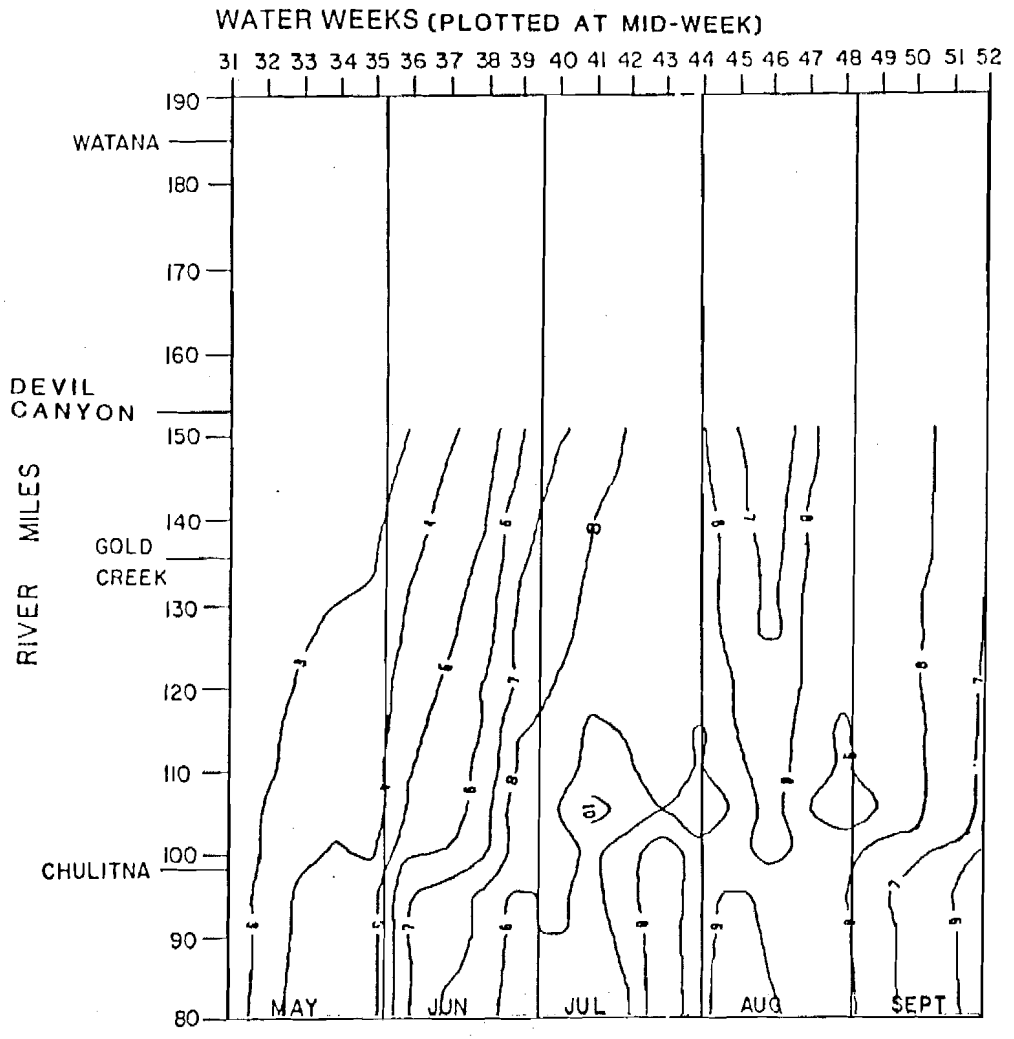
SUMMER 1971 CLIMATE DATA

NOTES :

1. TEMPERATURES IN °C.

ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT	
ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER	HARZA-EBASCO SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



TIME

WATANA/DEVIL CANYON, 2002 ENERGY DEMAND

SUMMER 1971 CLIMATE DATA

NOTES :

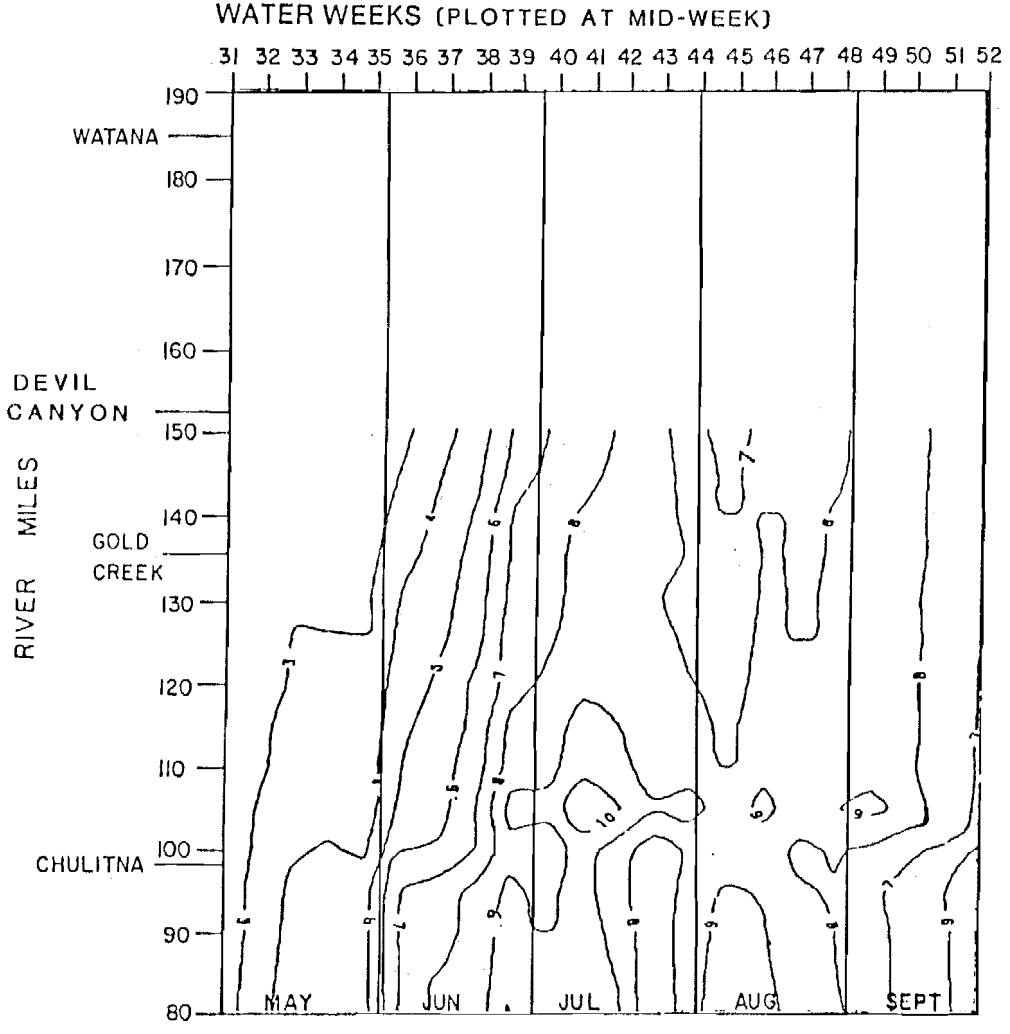
1. TEMPERATURES IN °C.

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



TIME

WATANA/DEVIL CANYON, 2020 ENERGY DEMAND

SUMMER 1971 CLIMATE DATA

NOTES :

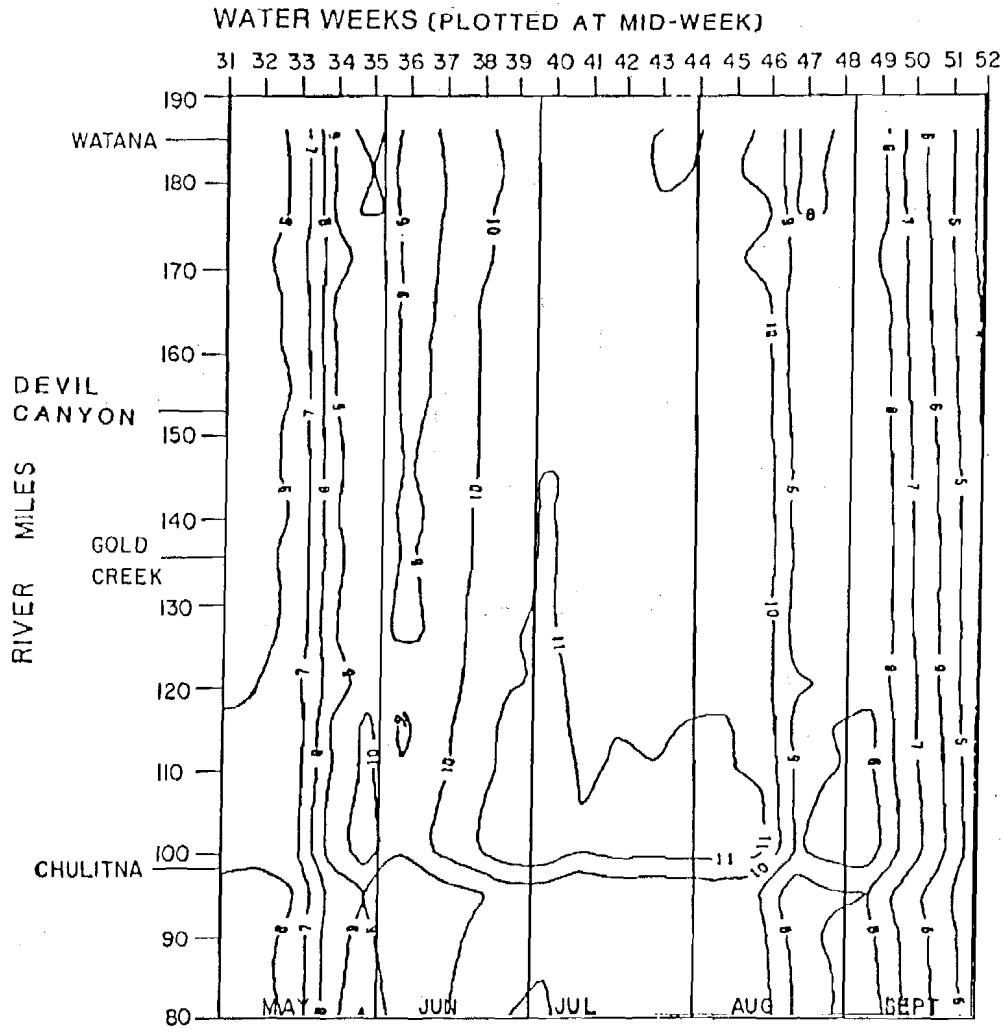
1. TEMPERATURES IN °C.

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



TIME

NATURAL CONDITIONS

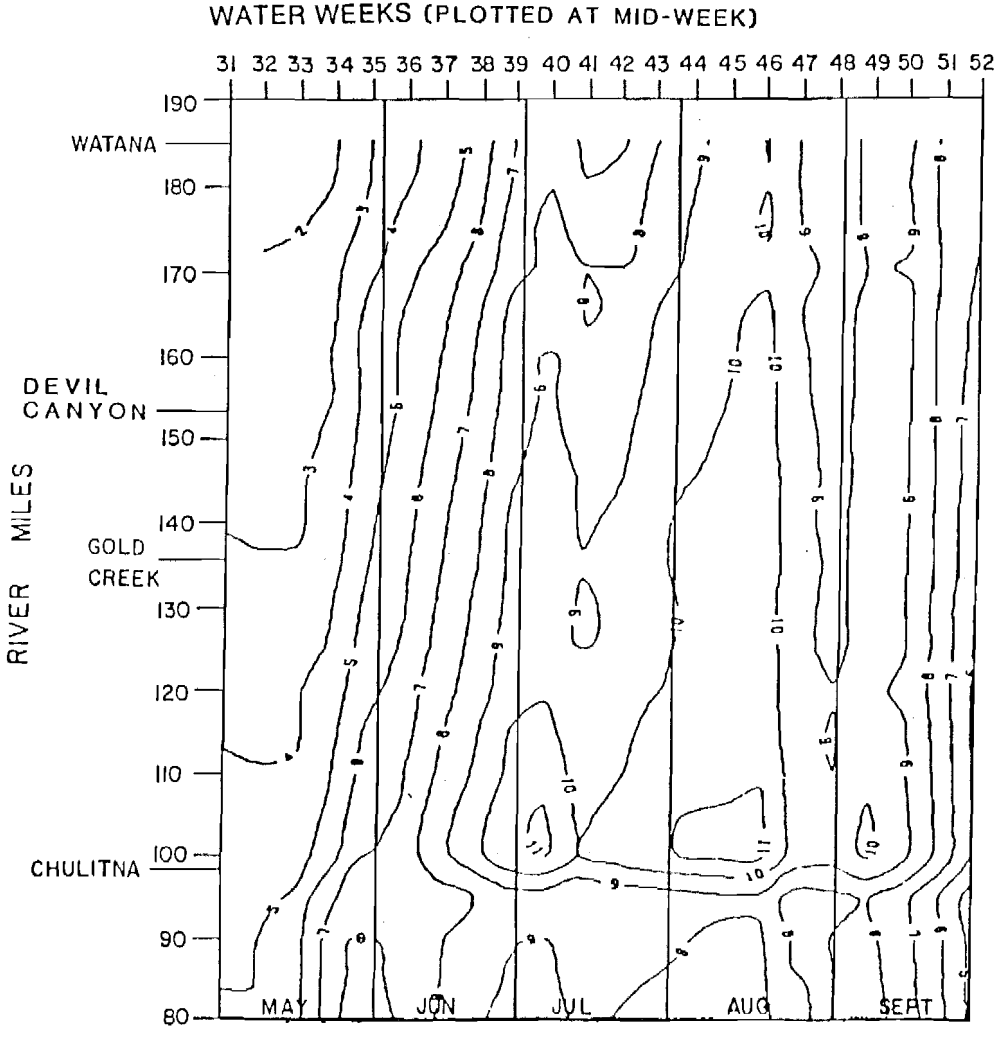
SUMMER 1974 CLIMATE DATA

NOTES :

1. TEMPERATURES IN °C.

ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT	
ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER	HARZA-EBASCO SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



TIME

WATANA ONLY, 1996 ENERGY DEMAND

SUMMER 1974 CLIMATE D[illegible]A

NOTES :

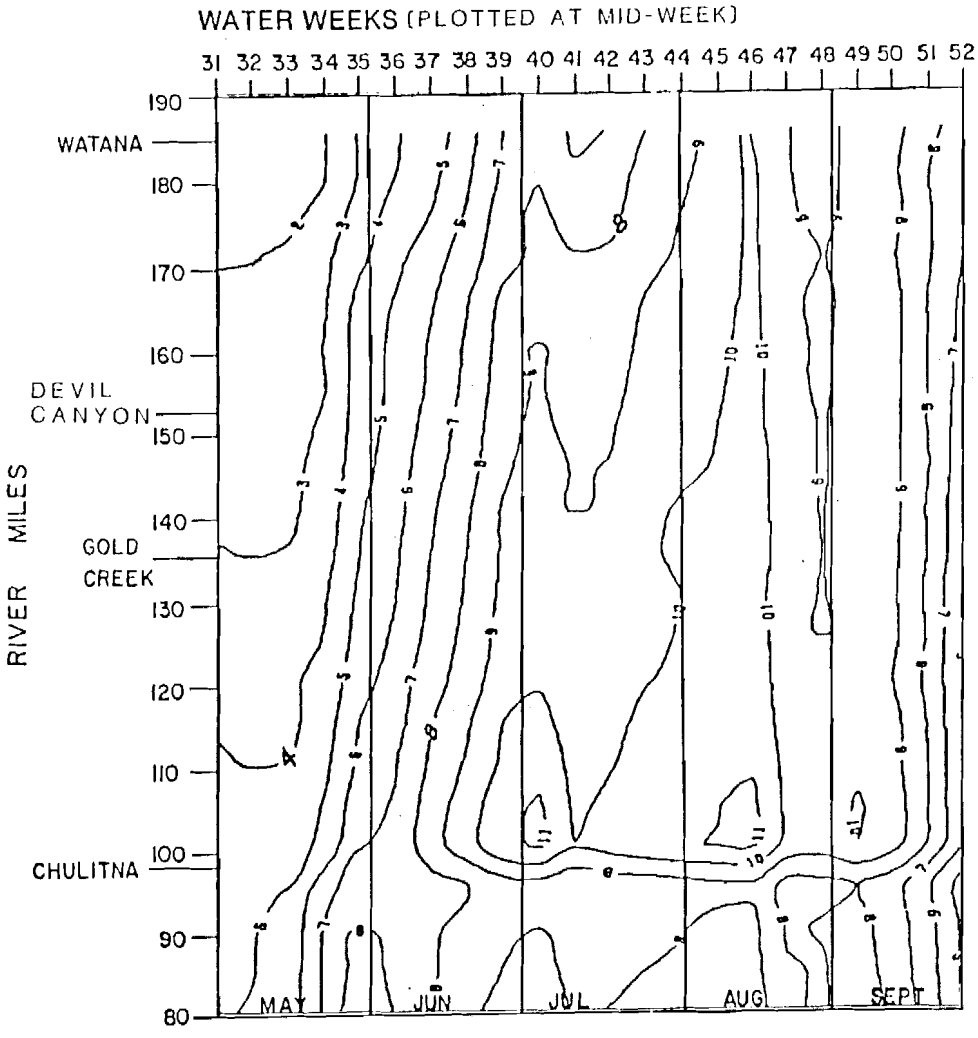
1. TEMPERATURES IN °C.

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



TIME

WATANA ONLY, 2001 ENERGY DEMAND

SUMMER 1974 CLIMATE DATA

NOTES :

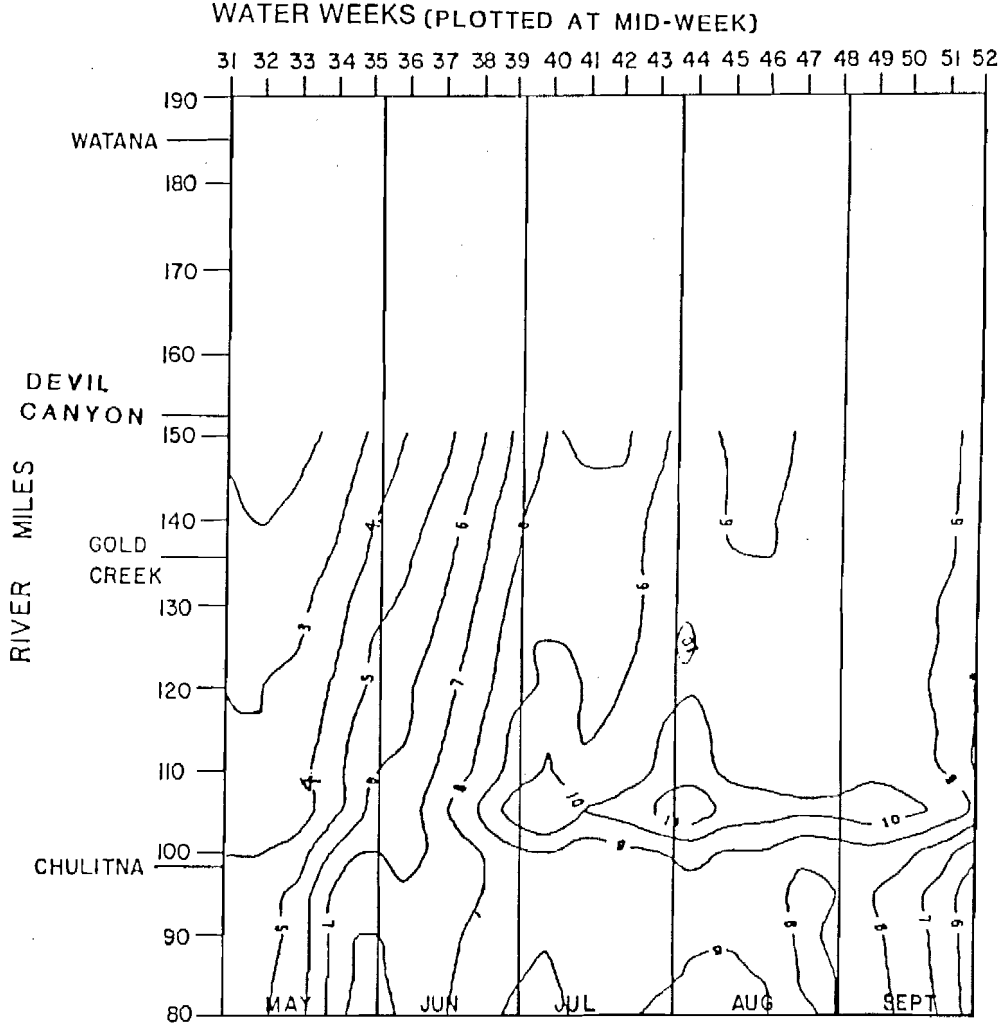
1. TEMPERATURES, IN °C.

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.

WATANA/DEVIL CANYON, 2002 ENERGY DEMAND

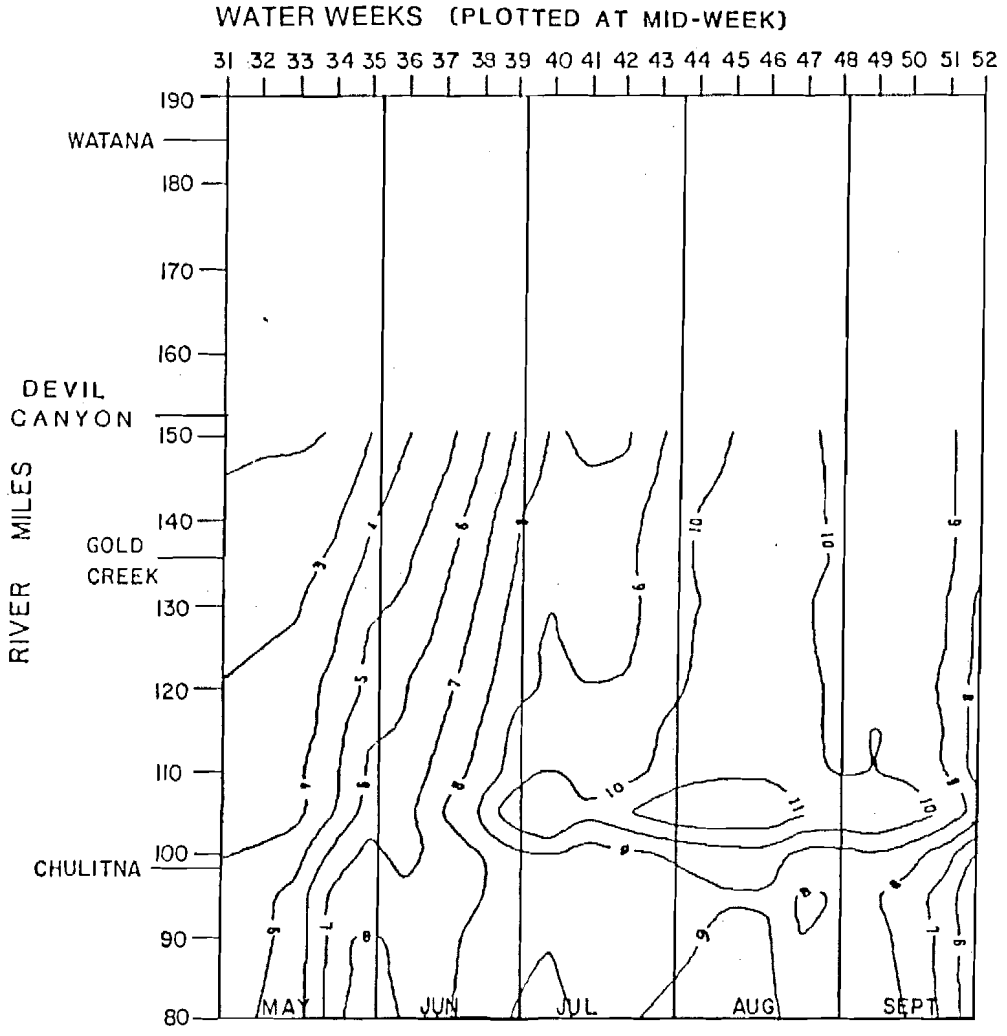
SUMMER 1974 CLIMATE D

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.

WATANA/DEVIL CANYON, 2020 ENERGY DEMAND

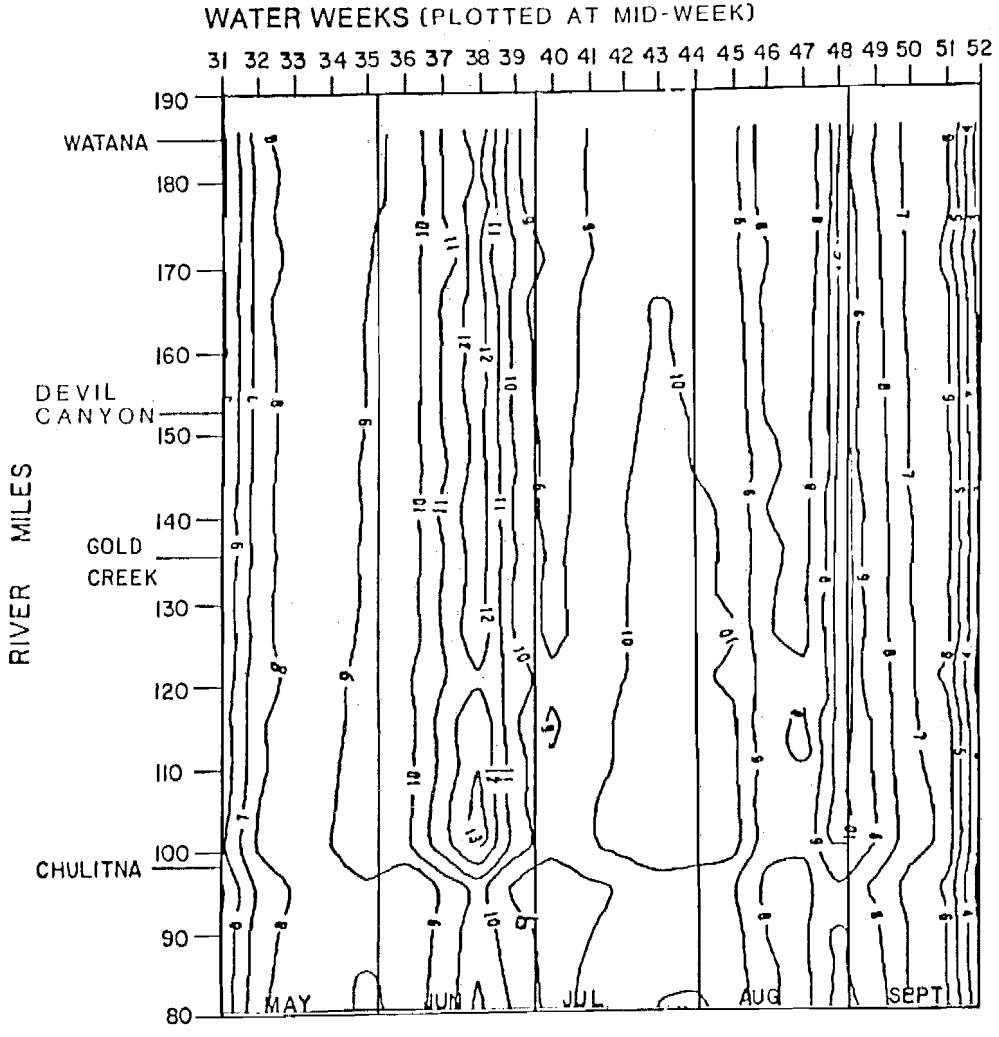
SUMMER 1974 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



TIME

NATURAL CONDITIONS

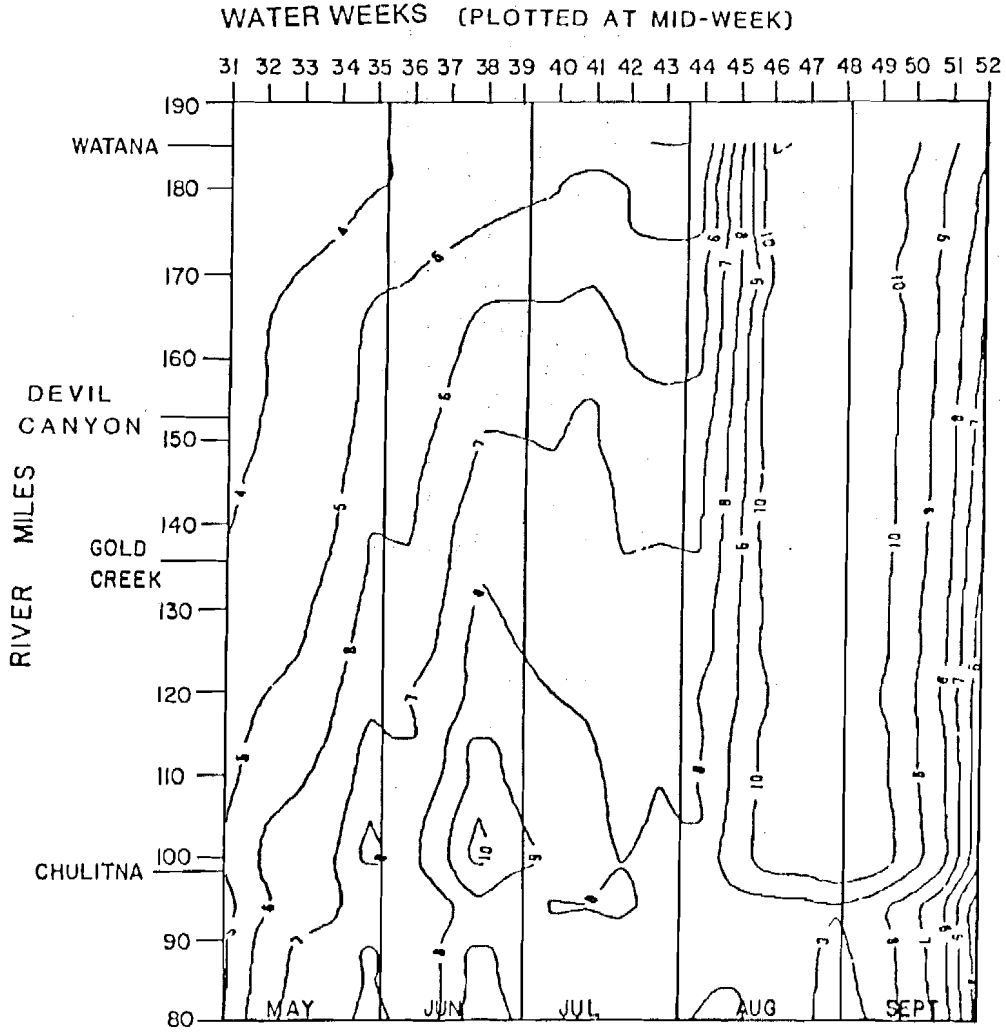
SUMMER 1981 CLIMATE DATA

NOTES :

1. TEMPERATURES IN °C.

ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT	
ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER	HARZA-EBASCO SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.

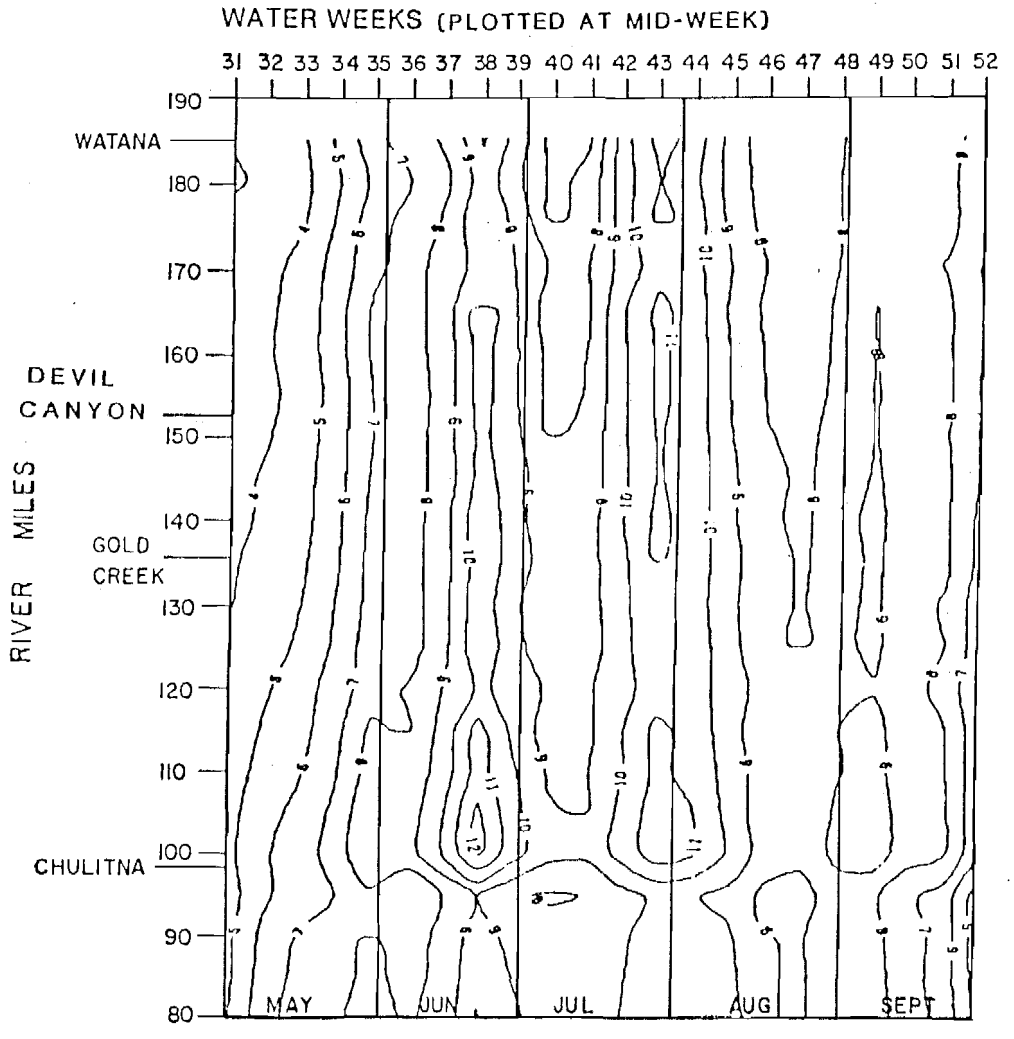
WATANA FILLING, 1992
2nd SUMMER
SUMMER 1981 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



WATANA ONLY, 1996 ENERGY DEMAND

SUMMER 1981 CLIMATE DATA

NOTES :

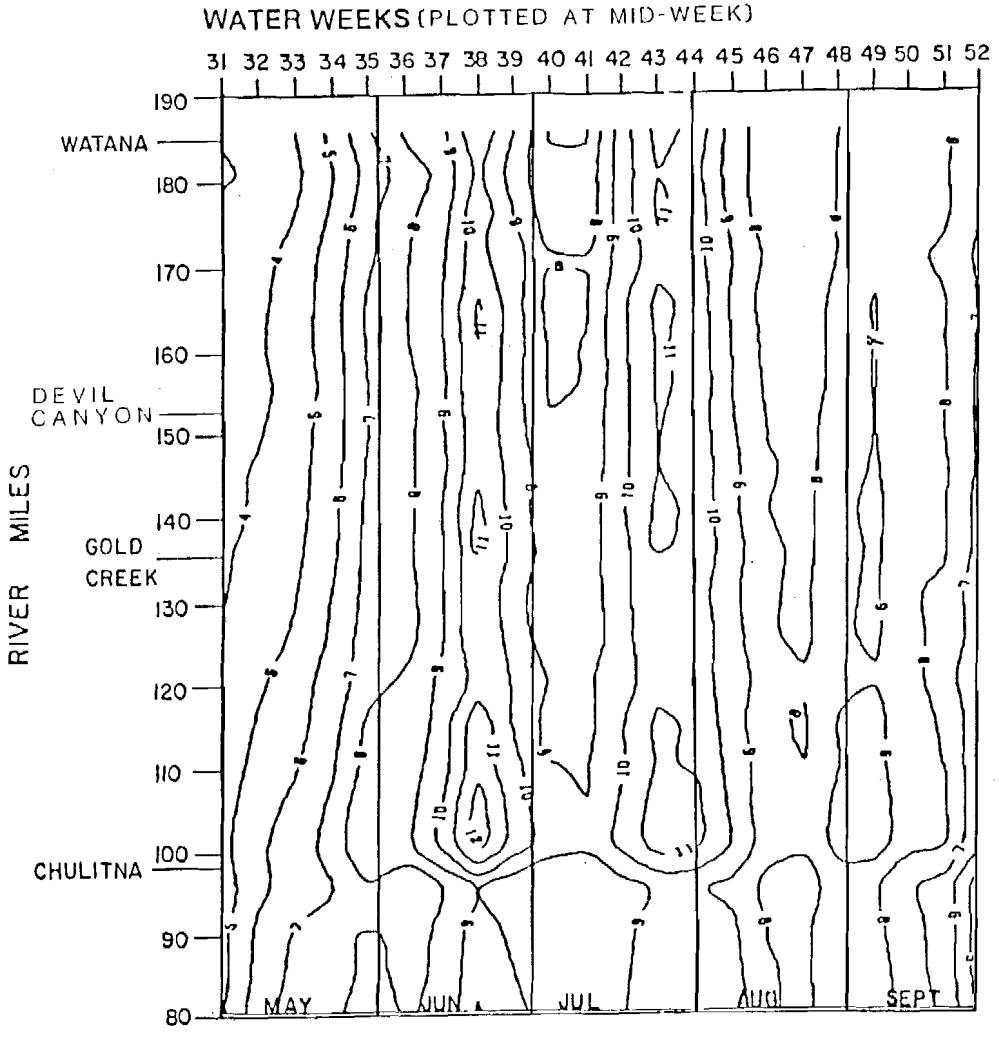
1. TEMPERATURES IN °C.

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



WATANA ONLY, 2001 ENERGY DEMAND

SUMMER 1981 CLIMATE DATA

NOTES :

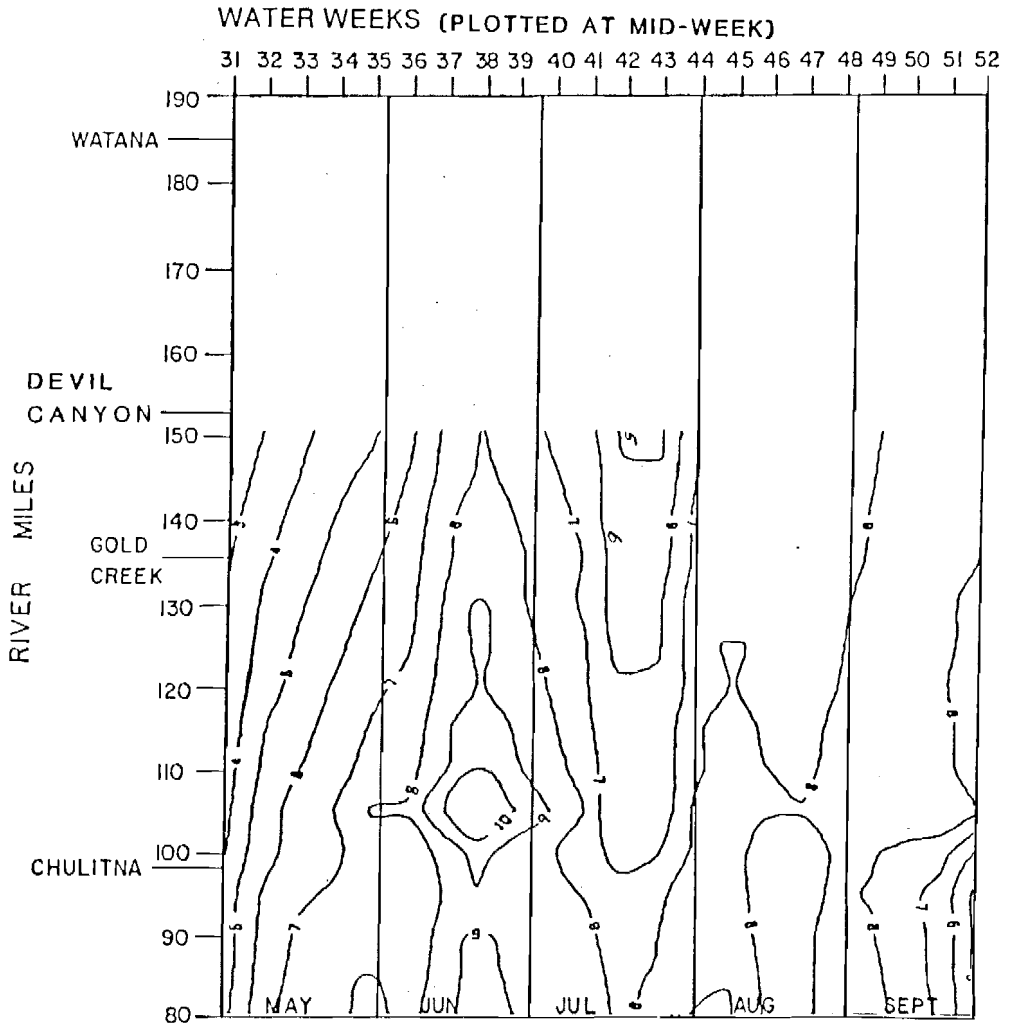
1. TEMPERATURES IN °C.

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.

WATANA/DEVIL CANYON, 2002 ENERGY DEMAND

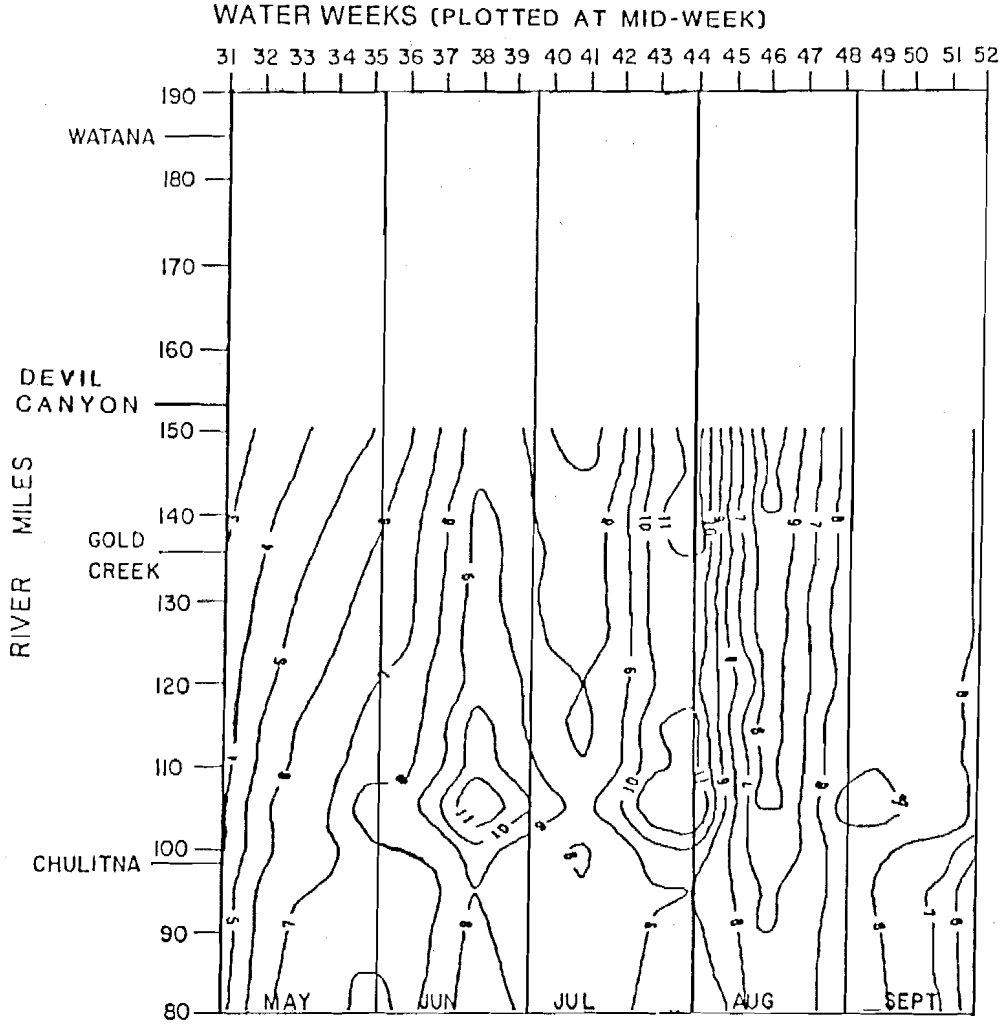
SUMMER 1981 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



TIME

WATANA/DEVIL CANYON, 2020 ENERGY DEMAND

SUMMER 1981 CLIMATE DATA

NOTES :

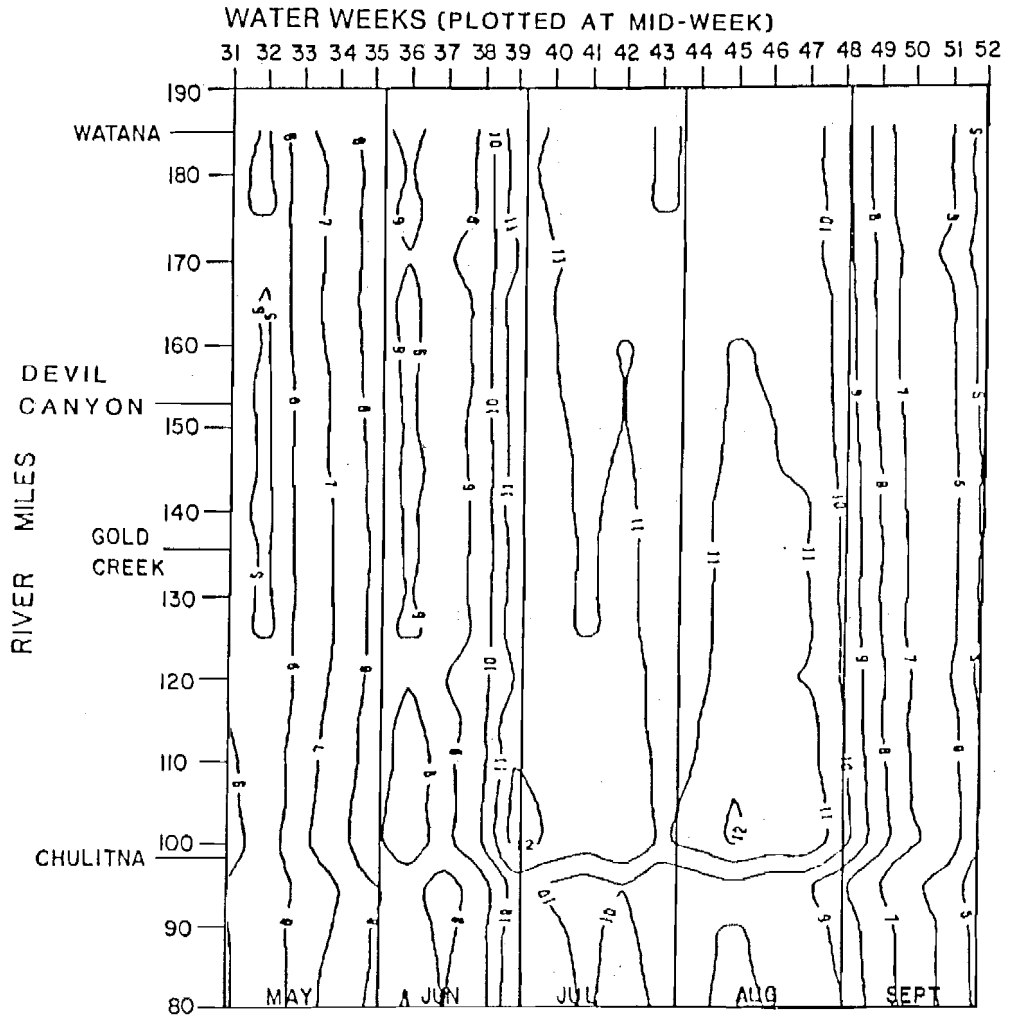
1. TEMPERATURES IN °C.

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



TIME

NATURAL CONDITIONS

SUMMER 1982 CLIMATE DATA

NOTES :

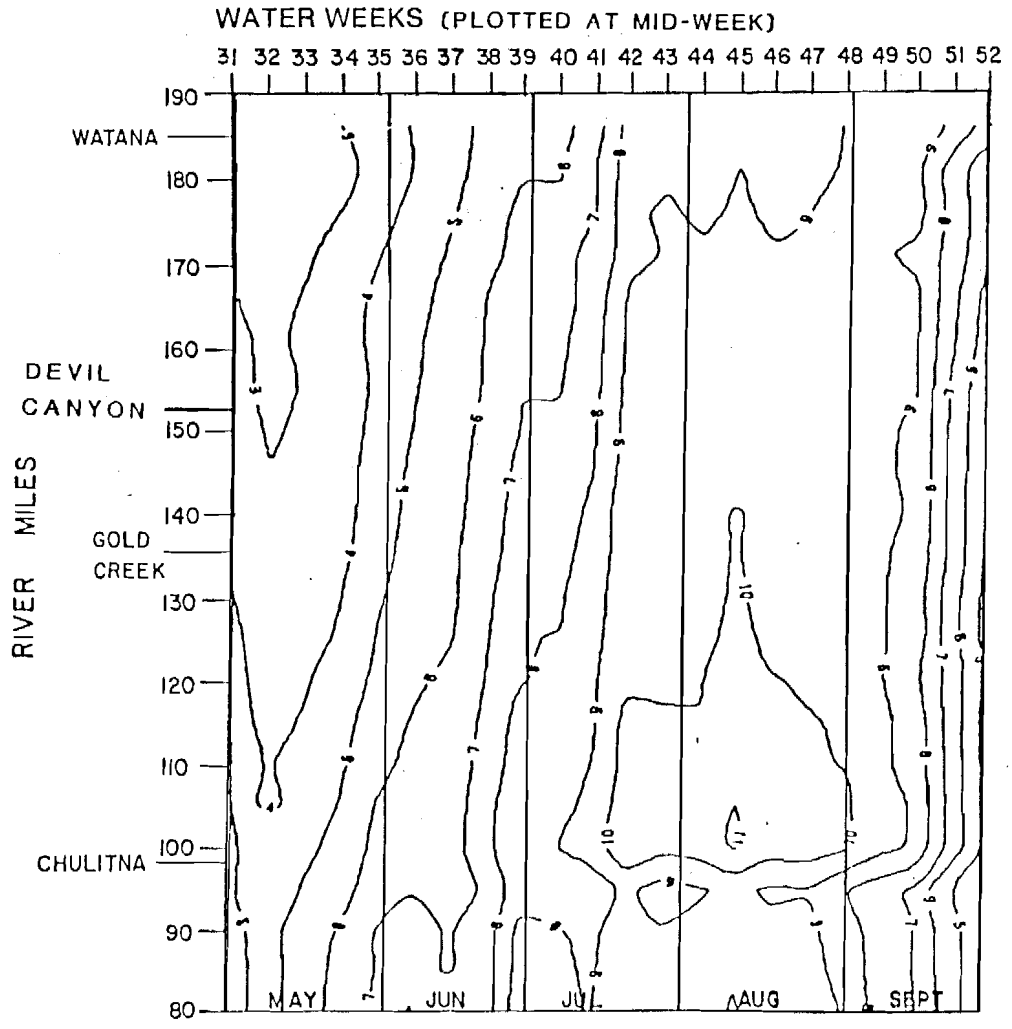
1. TEMPERATURES IN °C.

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



TIME

WATANA FILLING, 1993
3rd SUMMER
SUMMER 1982 CLIMATE DATA

NOTES :

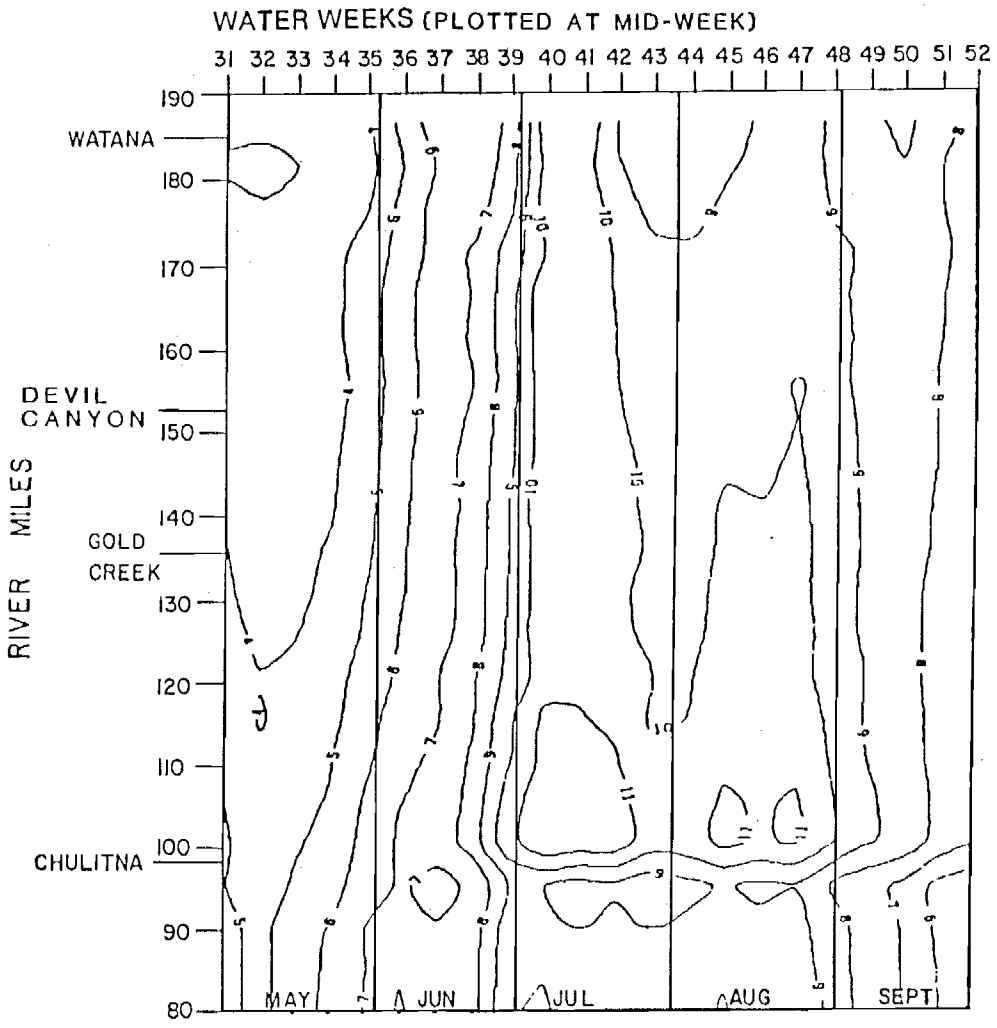
1. TEMPERATURES IN °C.

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.

WATANA ONLY, 1996 ENERGY DEMAND

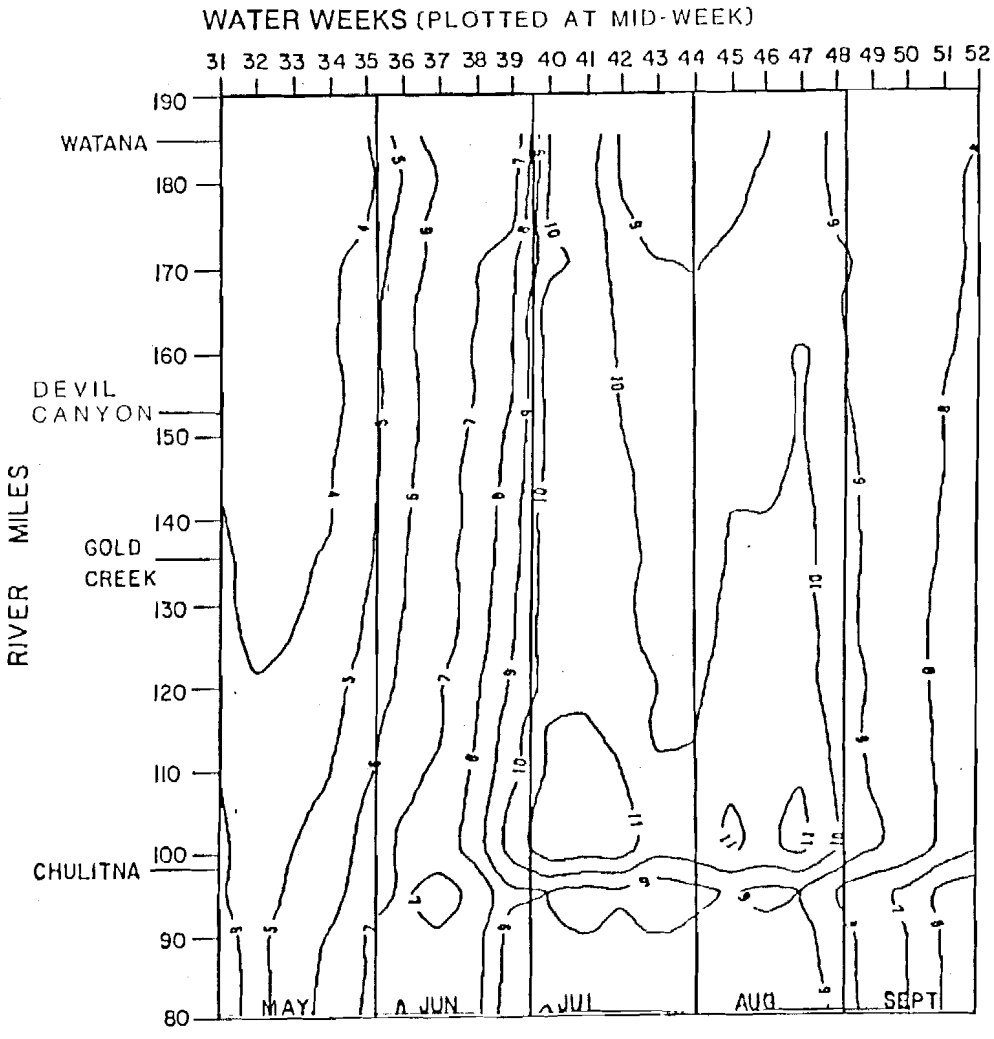
SUMMER 1982 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



TIME

WATANA ONLY, 2001 ENERGY DEMAND

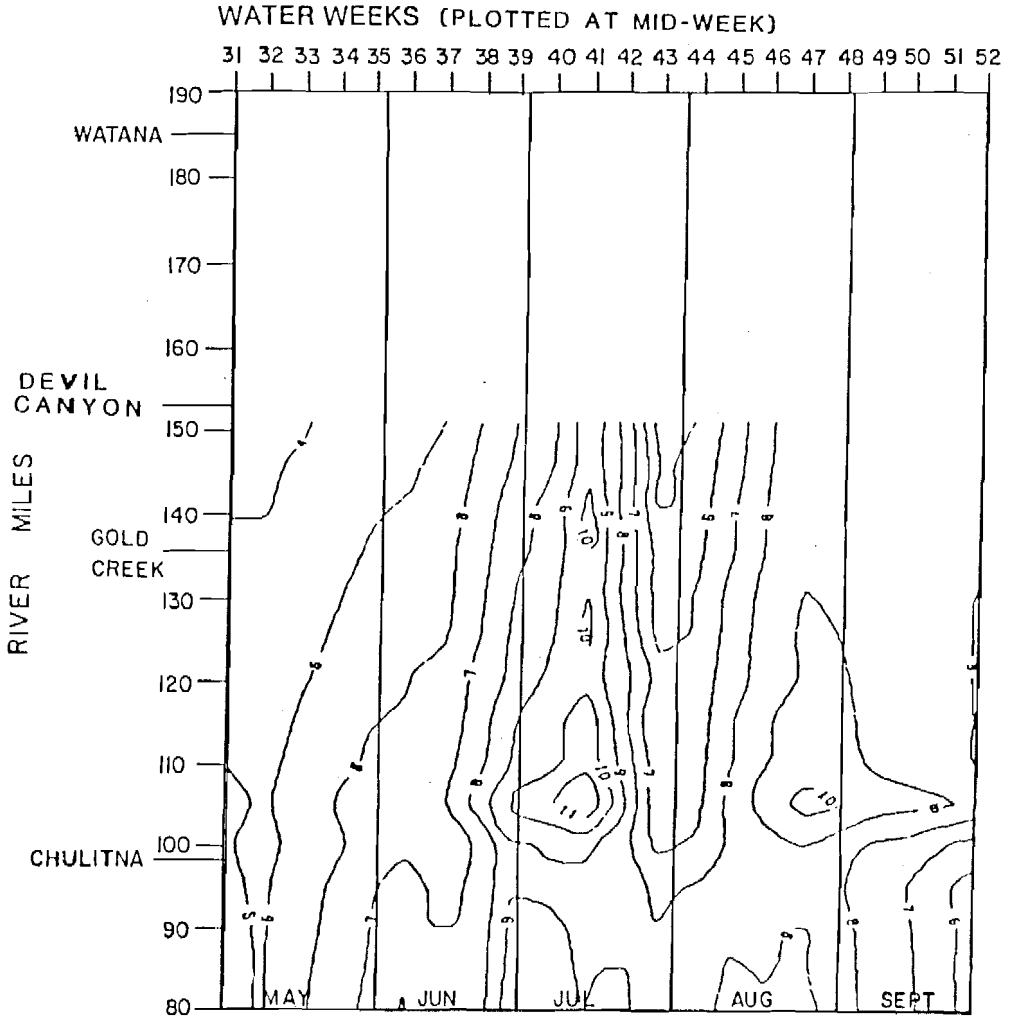
SUMMER 1982 CLIMATE DATA

NOTES :

1. TEMPERATURES IN °C.

ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT	
ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER	HARZA-EBASCO SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.

WATANA/DEVIL CANYON, 2002 ENERGY DEMAND

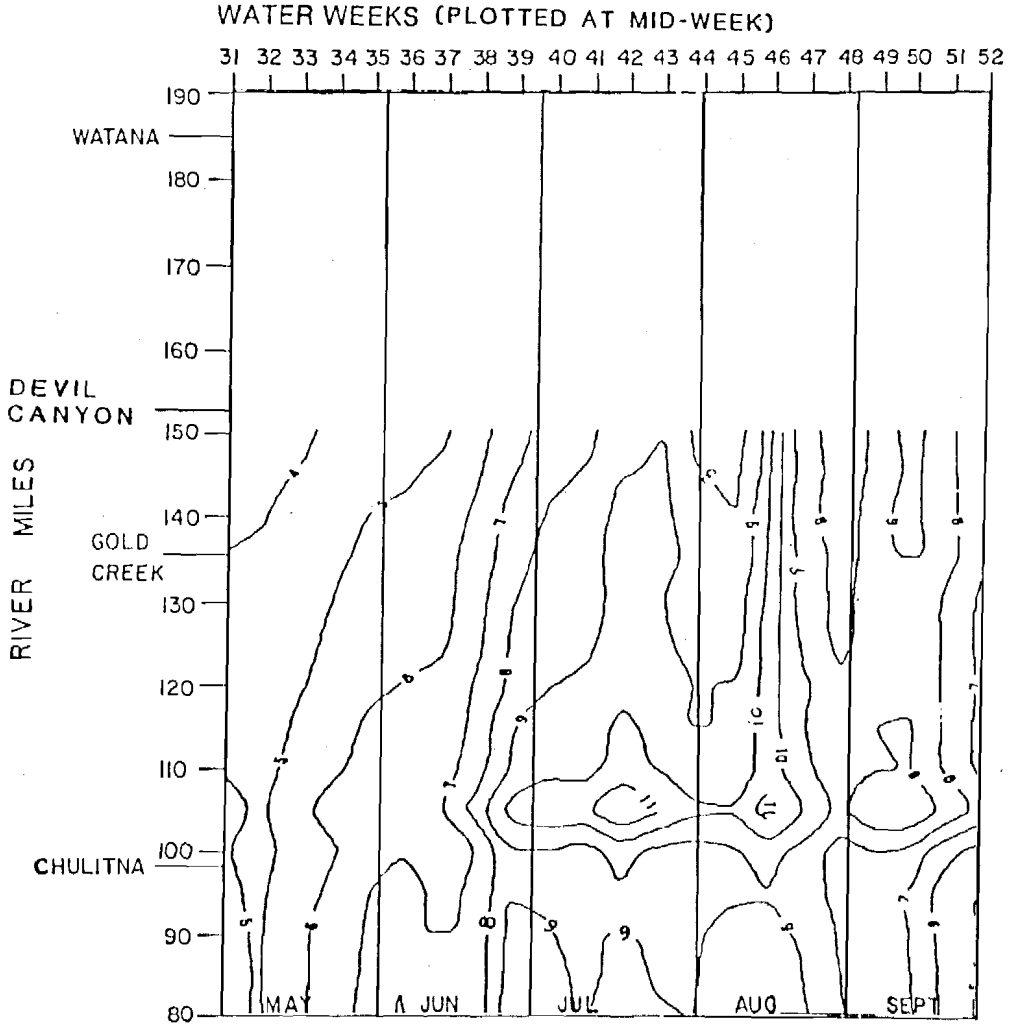
SUMMER 1982 CLIMATE DA[illegible]

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



NOTES :

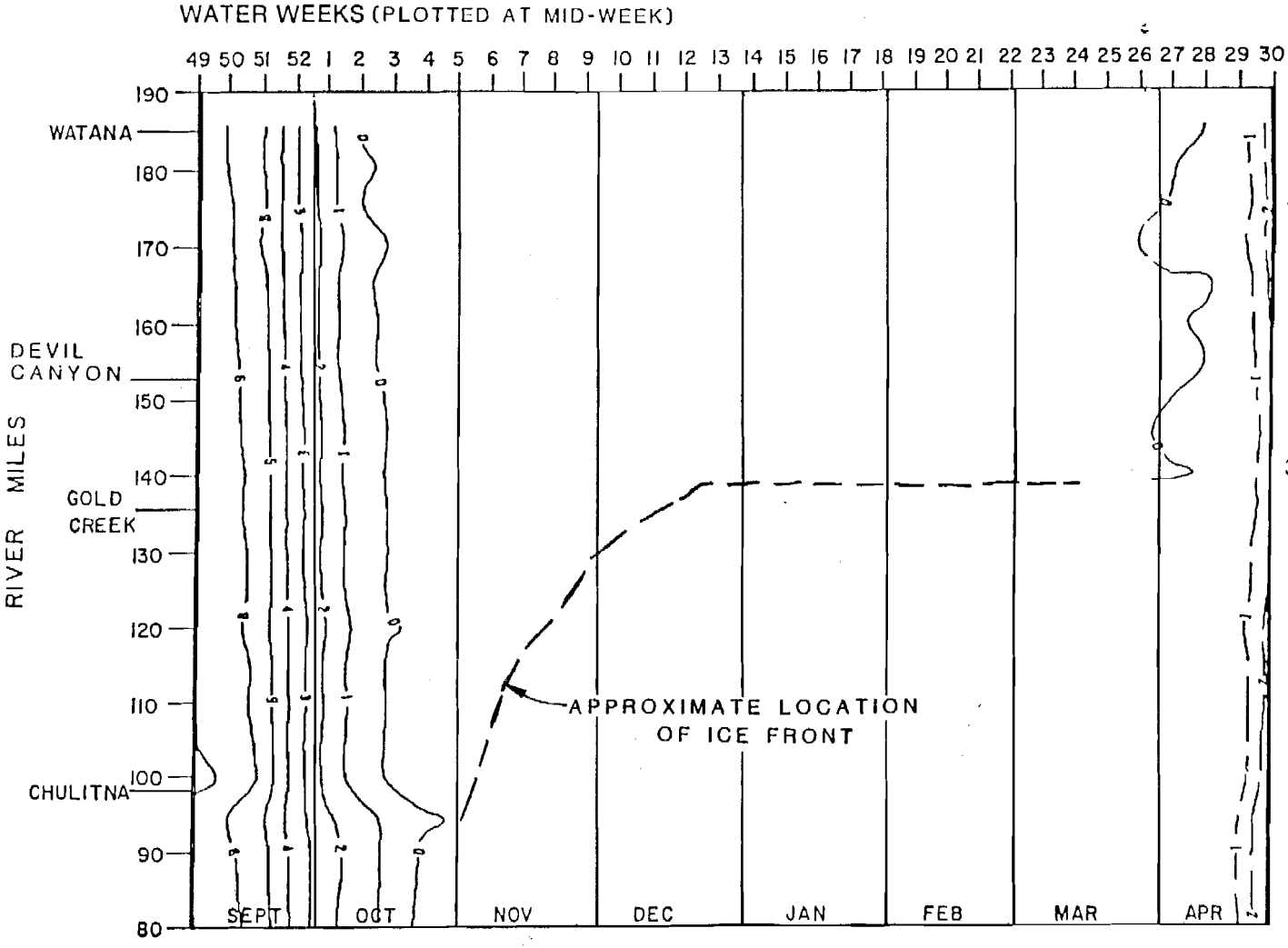
1. TEMPERATURES IN °C

WATANA/DEVIL CANYON, 2020 ENERGY DEMAND

SUMMER 1982 CLIMATE DATA

ALASKA POWER AUTHORITY SUSITNA HYDROELECTRIC PROJECT	
ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER	HARZA-EBASCO SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS. SIMULATED TEMPERATURES FOR MARCH AND APRIL SHOULD NOT BE USED.
3. ICE FRONT PROGRESSION UPSTREAM OF RIVER MILE 139 NOT MODELED FOR NATURAL CONDITIONS

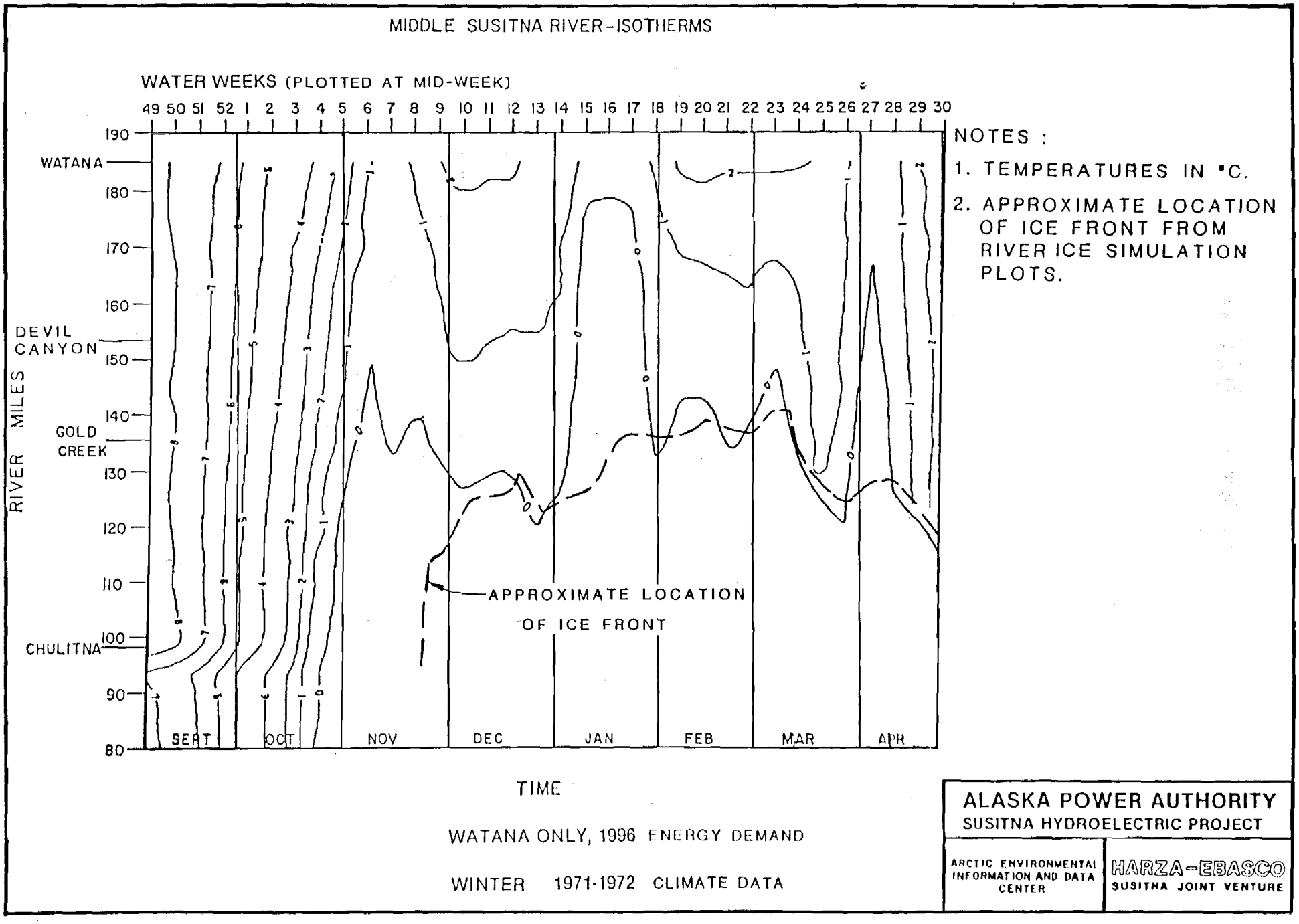
NATURAL CONDITIONS

WINTER 1971-1972 CLIMATE DATA

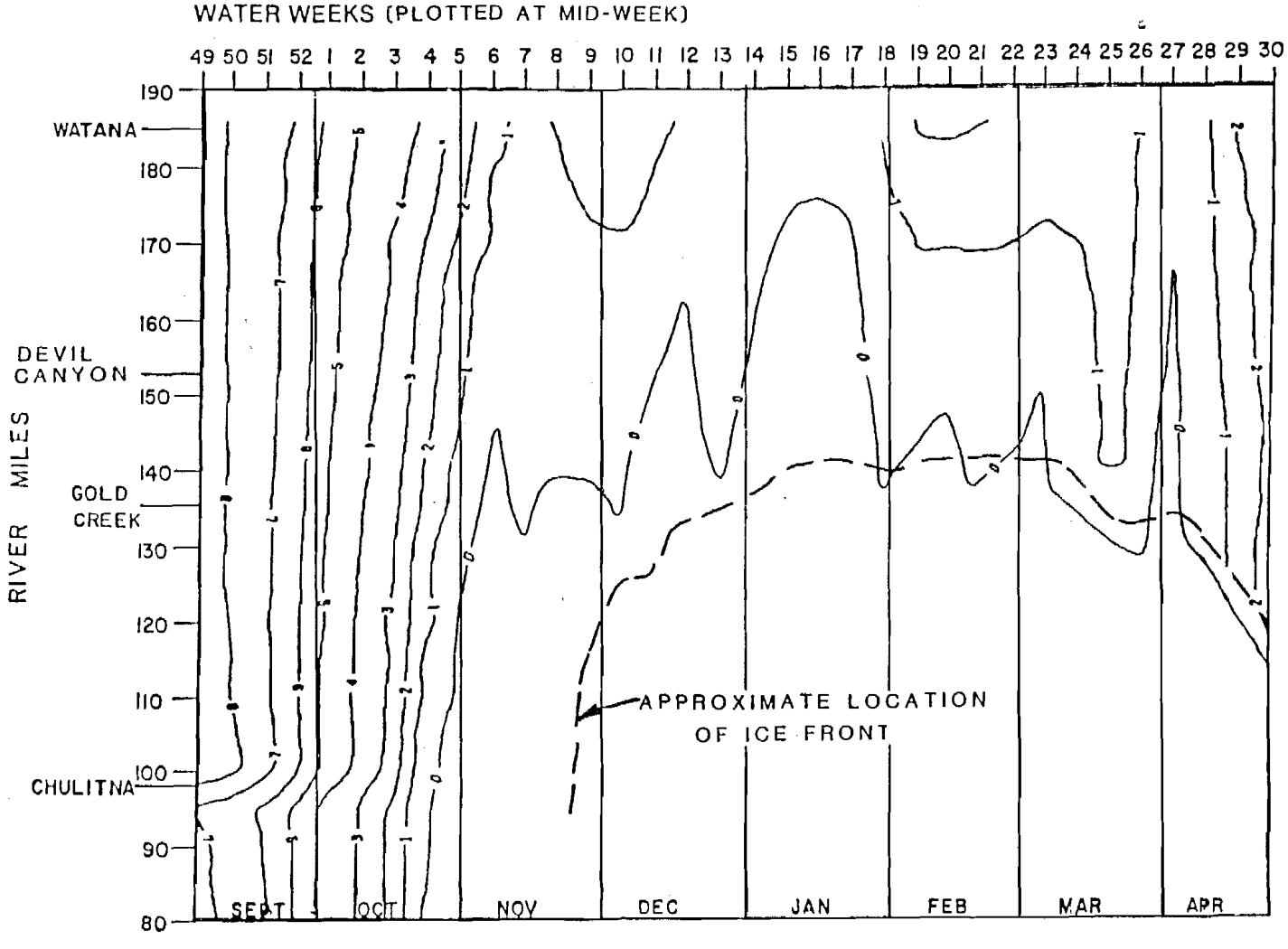
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO SUSITNA JOINT VENTURE


MIDDLE SUSITNA RIVER-ISOTHERMS
WATER WEEKS (PLOTTED AT MID-WEEK)
49 50 51 52 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
190
180
170
160
150
140
130
120
110
100
90
80
WATANA
DEVIL CANYON
GOLD CREEK
CHULITNA
RIVER MILES
SEPT
OCT
NOV
DEC
JAN
FEB
MAR
APR
APPROXIMATE LOCATION OF ICE FRONT
TIME
NOTES :
1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.
WATANA ONLY, 1996 ENERGY DEMAND
WINTER 1971-1972 CLIMATE DATA
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER
HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.

TIME

WATANA ONLY, 2001 ENERGY DEMAND

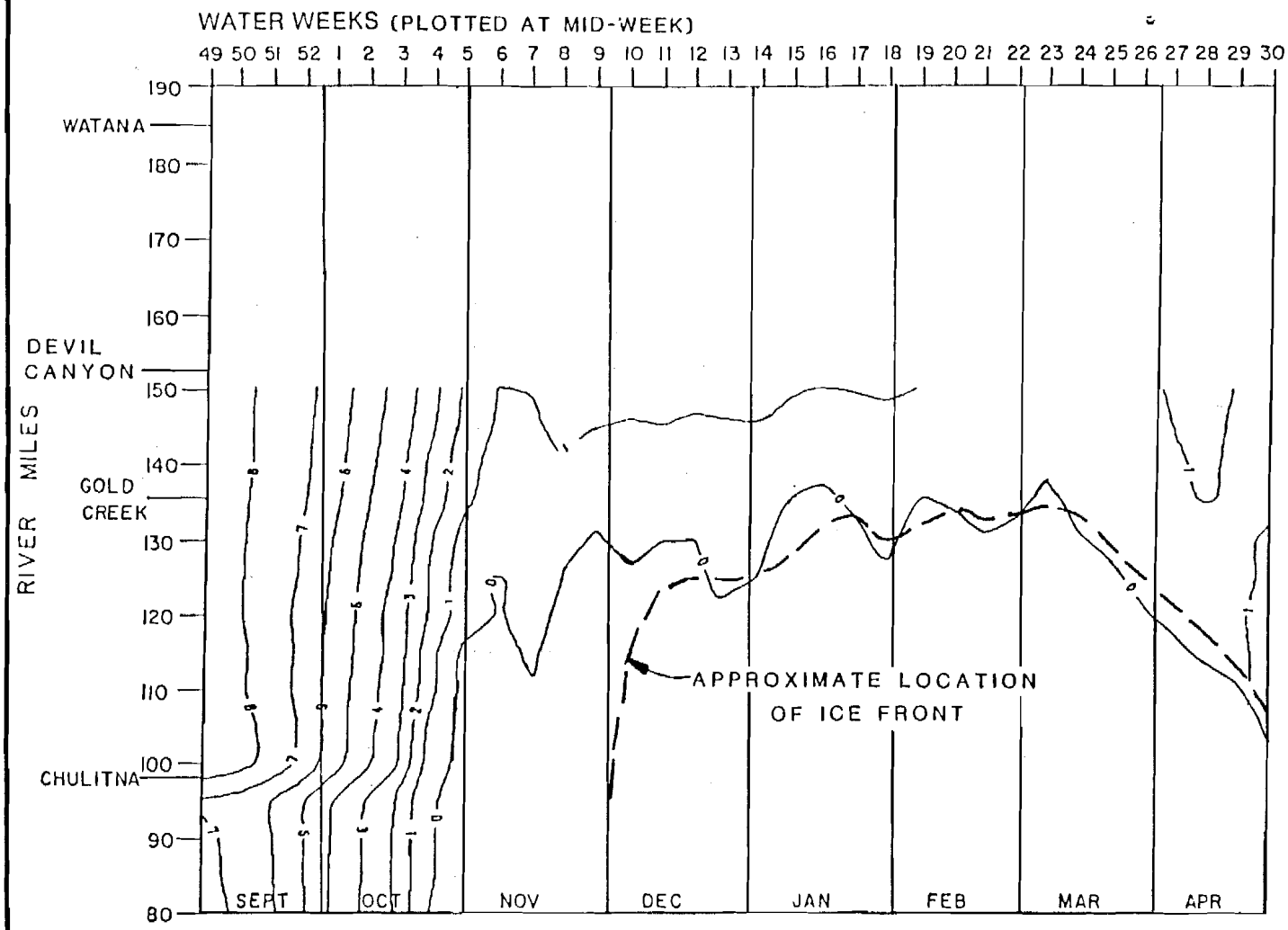
WINTER 1971-1972 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.

TIME

WATANA/DEVIL CANYON, 2002 ENERGY DEMAND

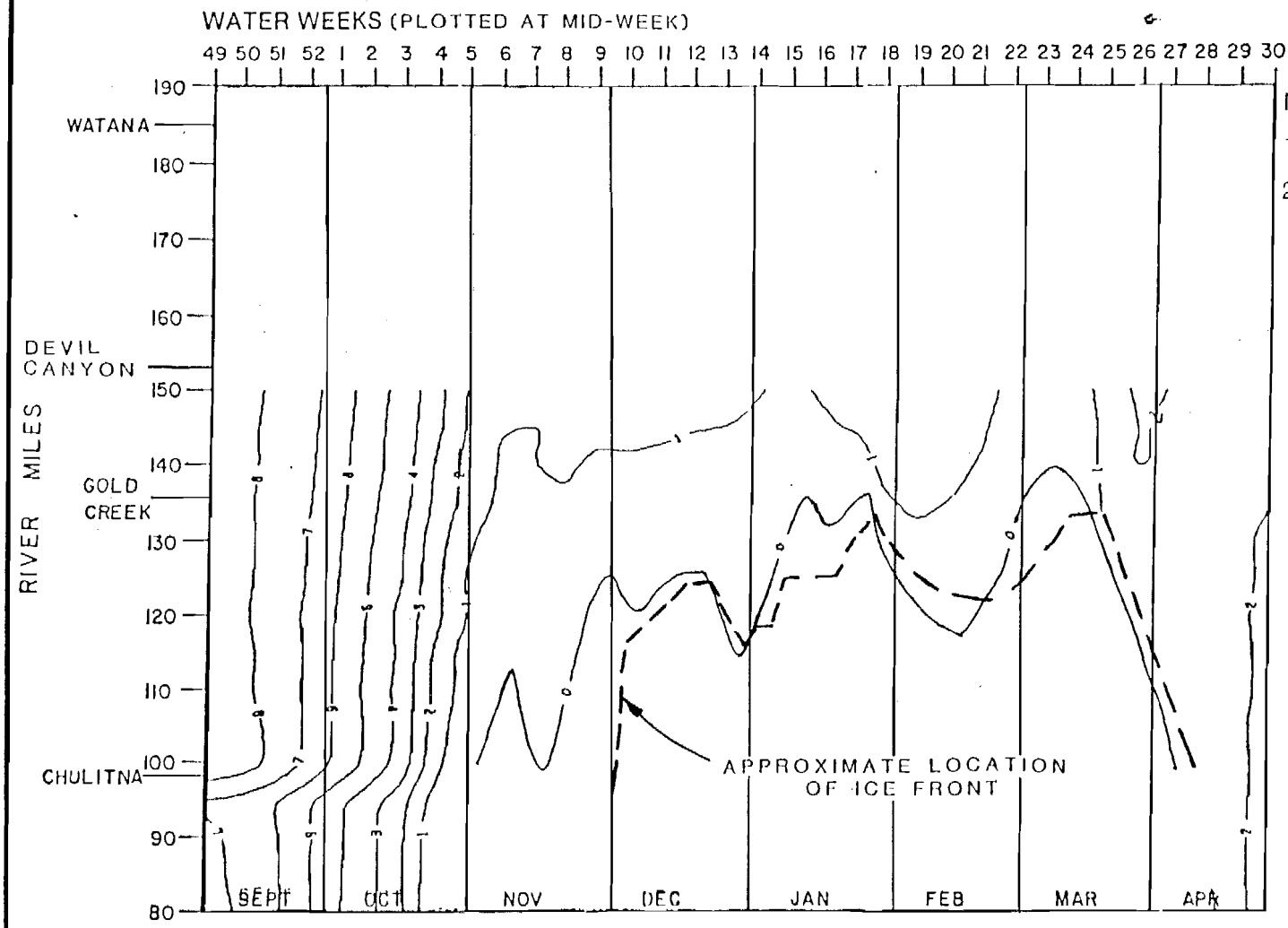
WINTER 1971-1972 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.

TIME

WATANA/DEVIL CANYON, 2020 ENERGY DEMAND

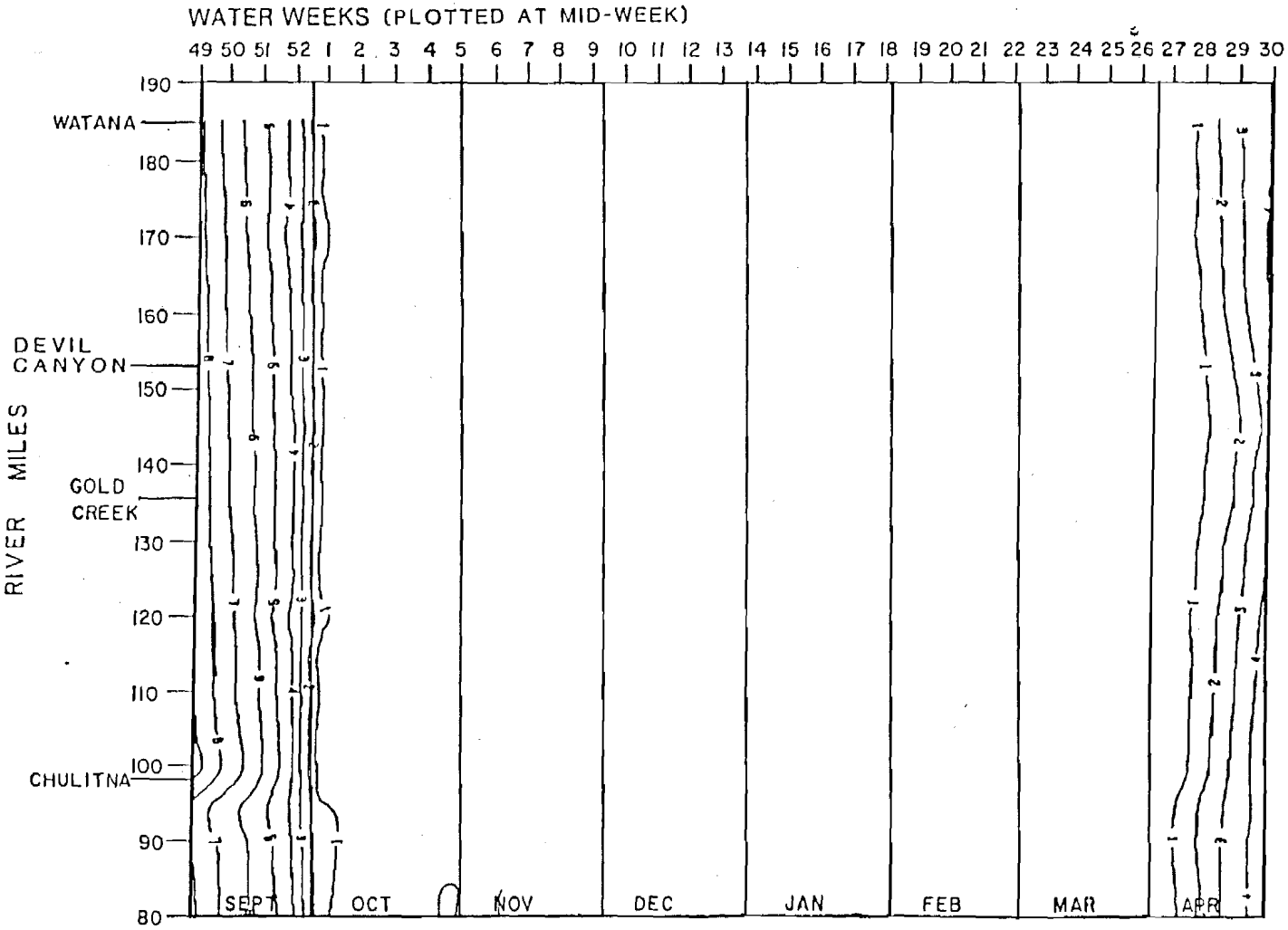
WINTER 1971-1972 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



TIME

NOTES :

1. TEMPERATURES IN °C.
2. ICE SIMULATION NOT MADE FOR THIS CASE. TEMPERATURES FROM NOVEMBER THROUGH APRIL SHOULD NOT BE USED. NOTE SIMILARITY TO NATURAL CONDITIONS FOR 1971-1972 WINTER.

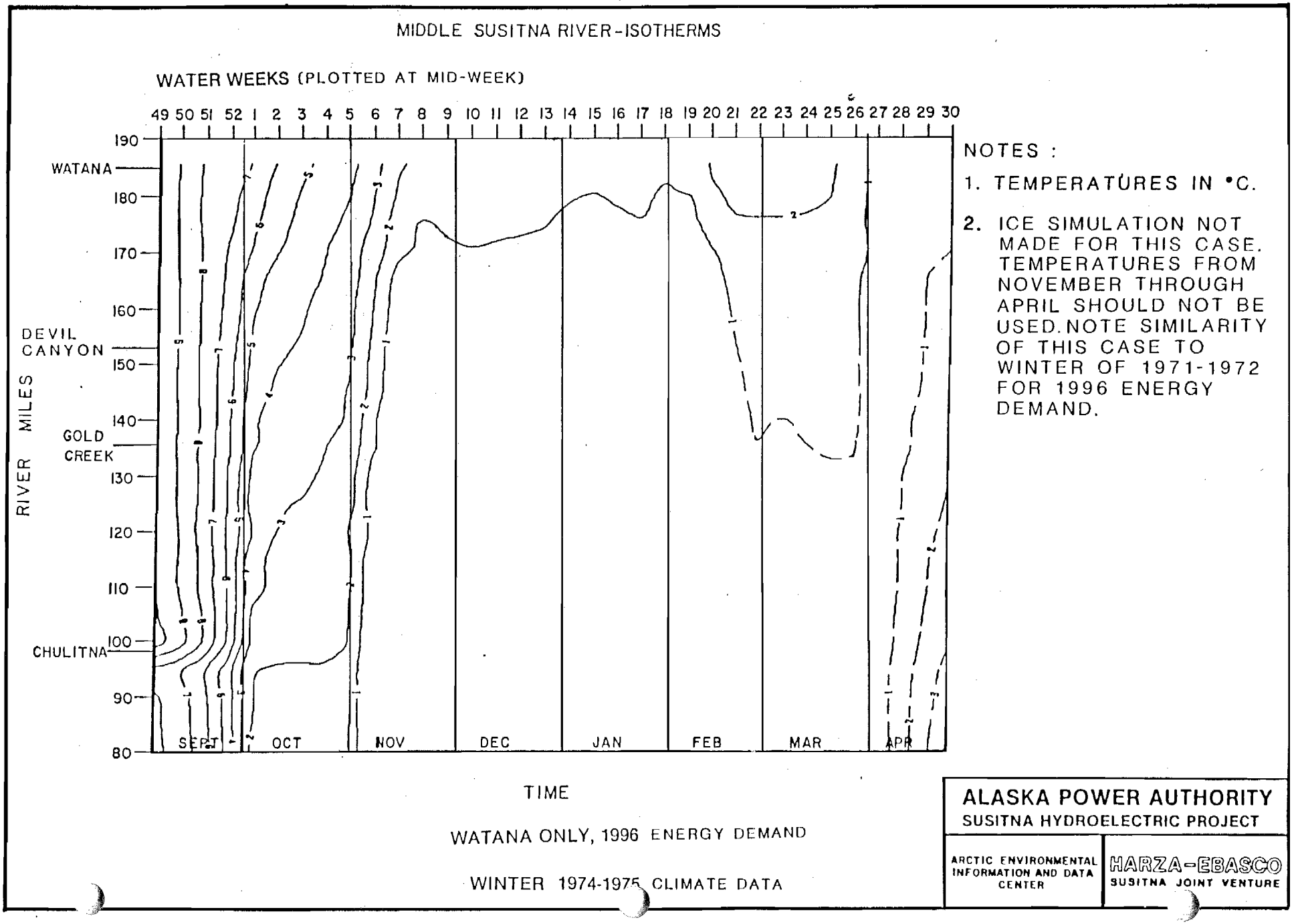
NATURAL CONDITIONS

WINTER 1974-1975 CLIMATE DATA

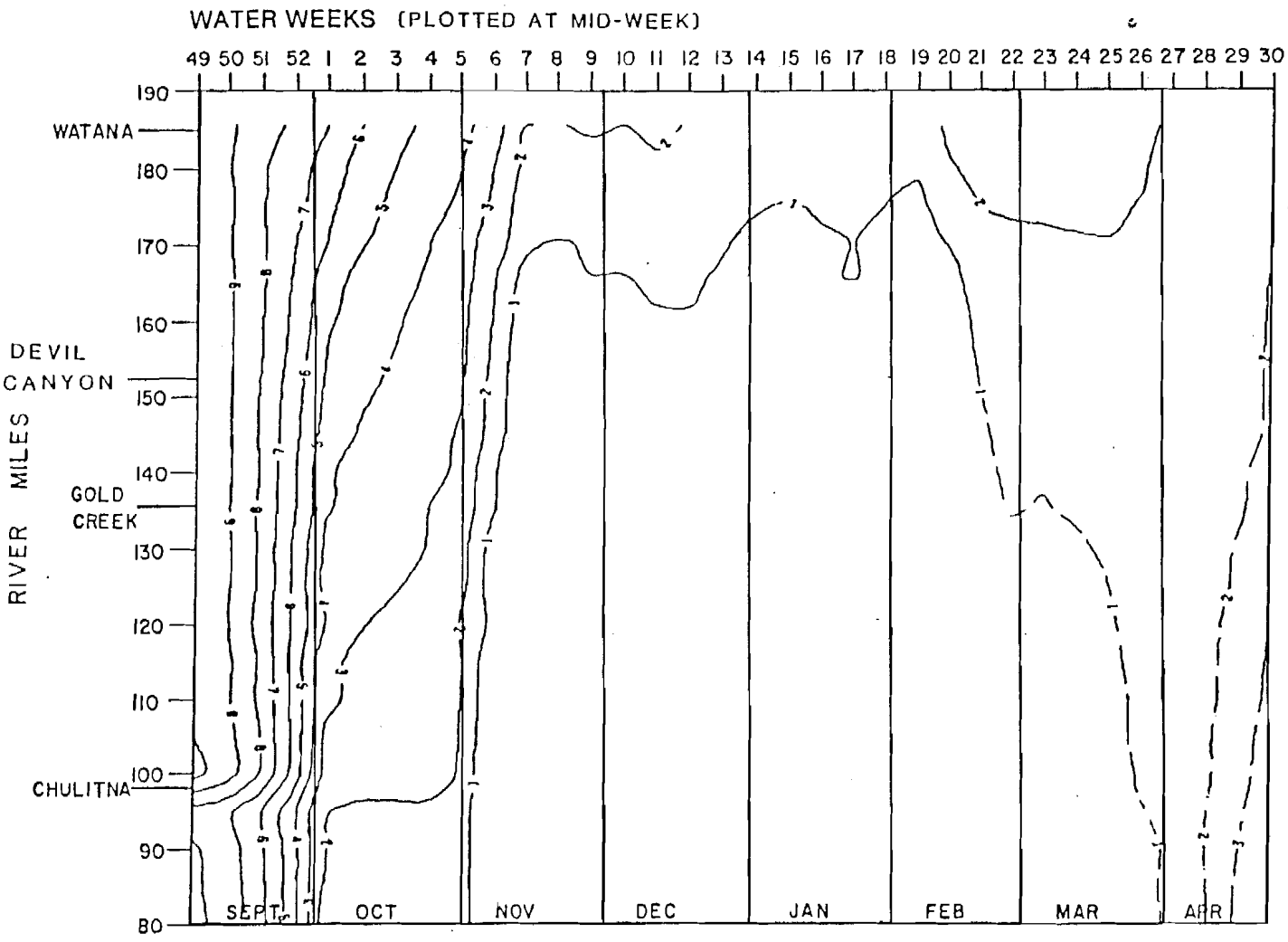
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE


MIDDLE SUSITNA RIVER-ISOTHERMS
WATER WEEKS (PLOTTED AT MID-WEEK)
49 50 51 52 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
RIVER MILES
190
WATANA
180
170
160
DEVIL CANYON
150
140
GOLD CREEK
130
120
110
100
CHULITNA
90
80
SEPT
OCT
NOV
DEC
JAN
FEB
MAR
APR
TIME
NOTES :
1. TEMPERATURES IN °C.
2. ICE SIMULATION NOT MADE FOR THIS CASE. TEMPERATURES FROM NOVEMBER THROUGH APRIL SHOULD NOT BE USED. NOTE SIMILARITY OF THIS CASE TO WINTER OF 1971-1972 FOR 1996 ENERGY DEMAND.
WATANA ONLY, 1996 ENERGY DEMAND
WINTER 1974-1975 CLIMATE DATA
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER
HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. ICE SIMULATION NOT MADE FOR THIS CASE. TEMPERATURES FROM NOVEMBER THROUGH APRIL SHOULD NOT BE USED. NOTE SIMILARITY OF THIS CASE TO WINTER OF 1971-1972 FOR 1996 ENERGY DEMAND.

TIME

WATANA ONLY, 2001 ENERGY DEMAND

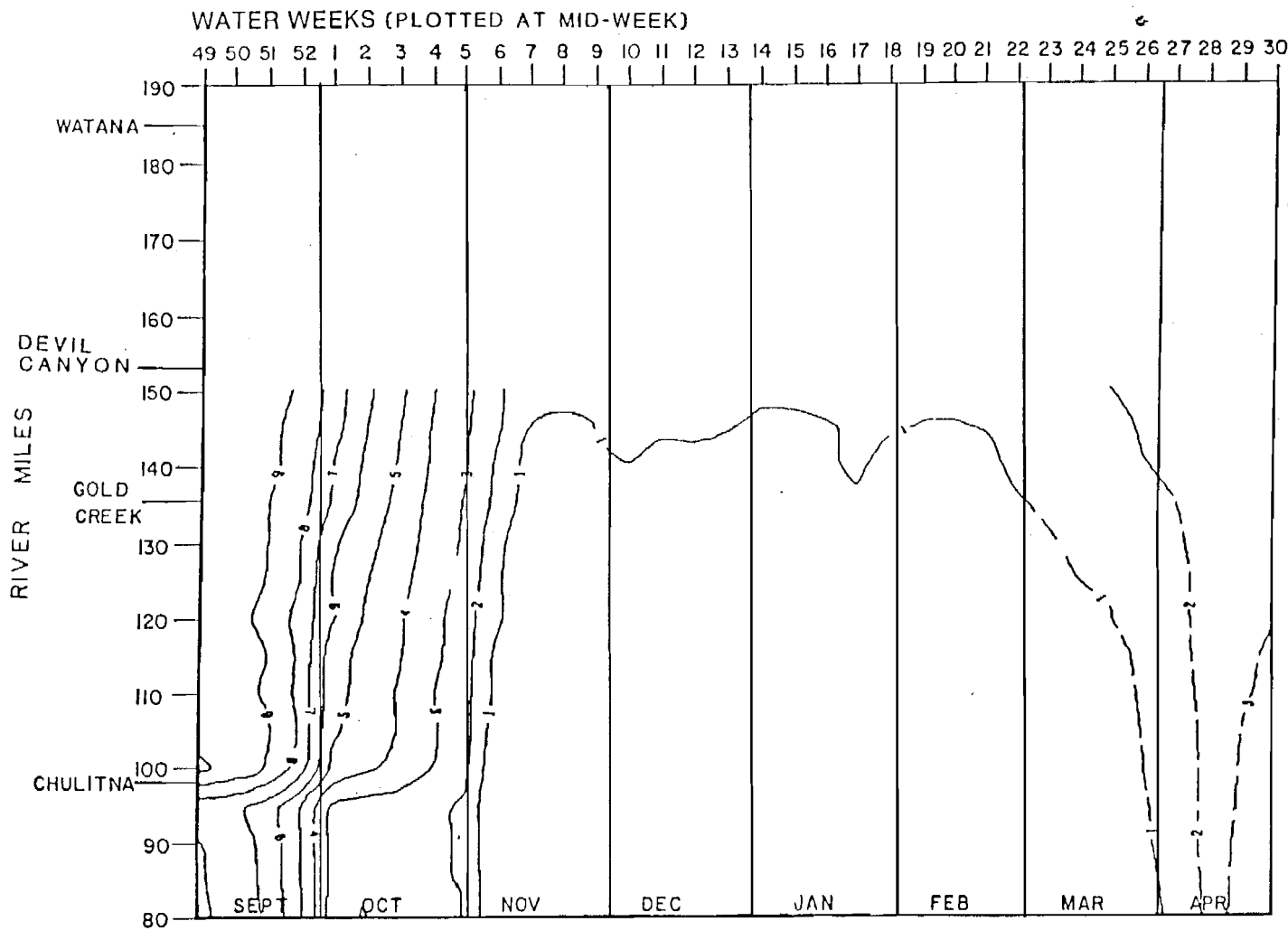
WINTER 1974-1975 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. ICE SIMULATION NOT MADE FOR THIS CASE. TEMPERATURES FOR NOVEMBER THROUGH MARCH SHOULD NOT BE USED.

TIME

WATANA/DEVIL CANYON, 2002 ENERGY DEMAND

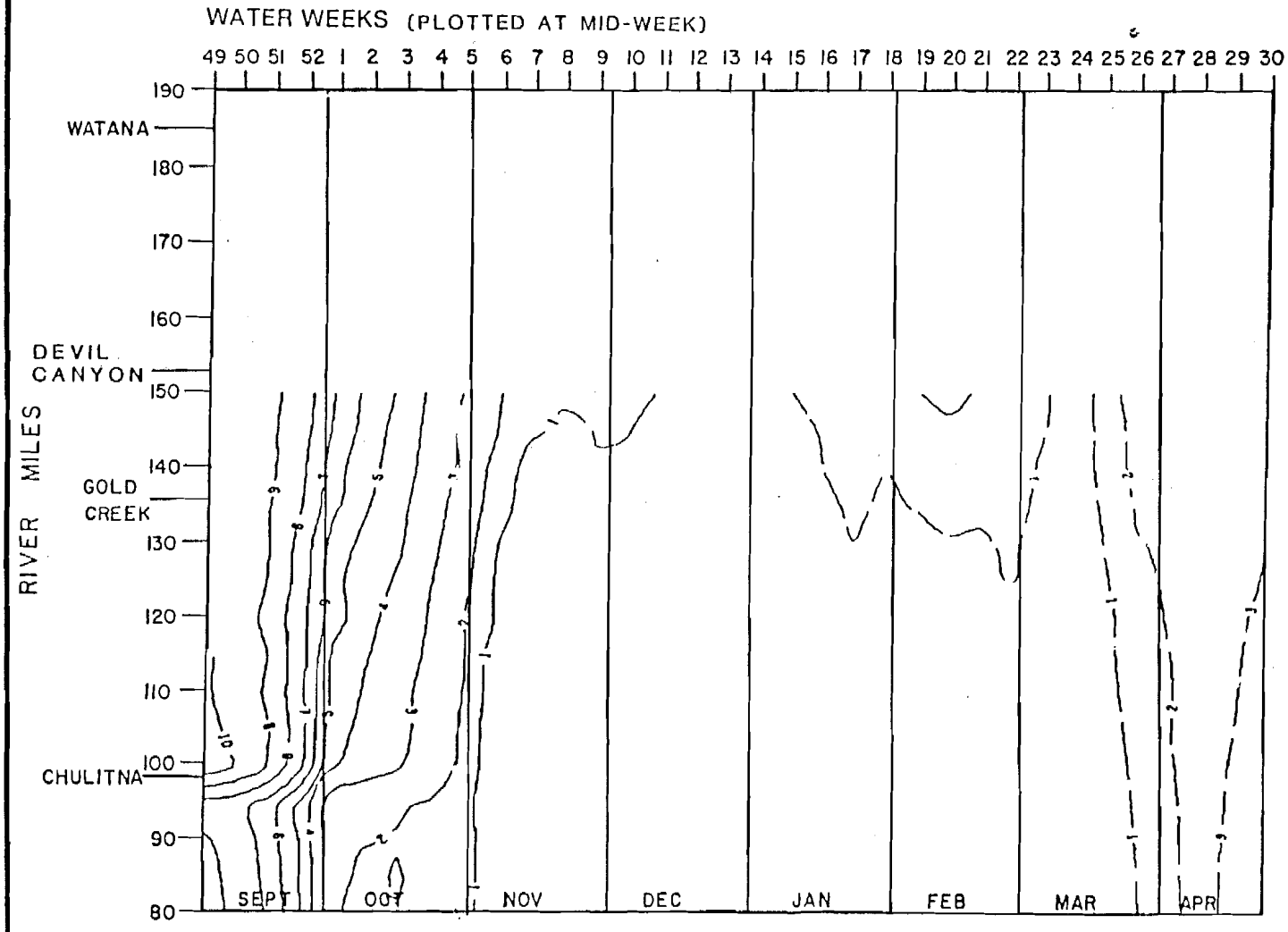
WINTER 1974-1975 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. WINTER ICE SIMULATION NOT MADE FOR THIS CASE. TEMPERATURES FROM NOVEMBER THROUGH APRIL SHOULD NOT BE USED.

TIME

WATANA/DEVIL CANYON, 2020 ENERGY DEMAND

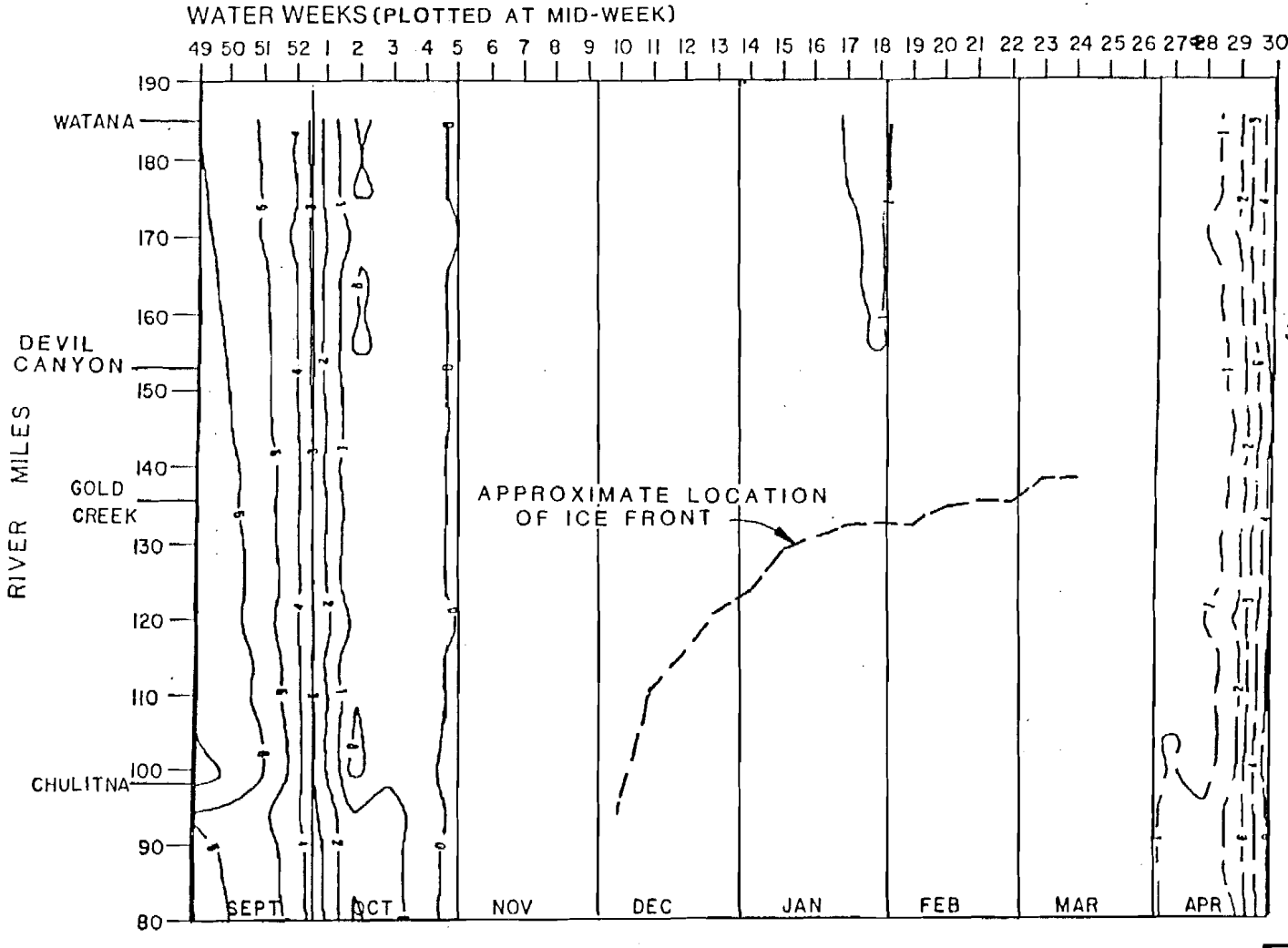
WINTER 1974-1975 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER - ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.
3. ICE FRONT PROGRESSION UPSTREAM OF RIVER MILE 139 NOT MODELED FOR NATURAL CONDITIONS

NATURAL CONDITIONS

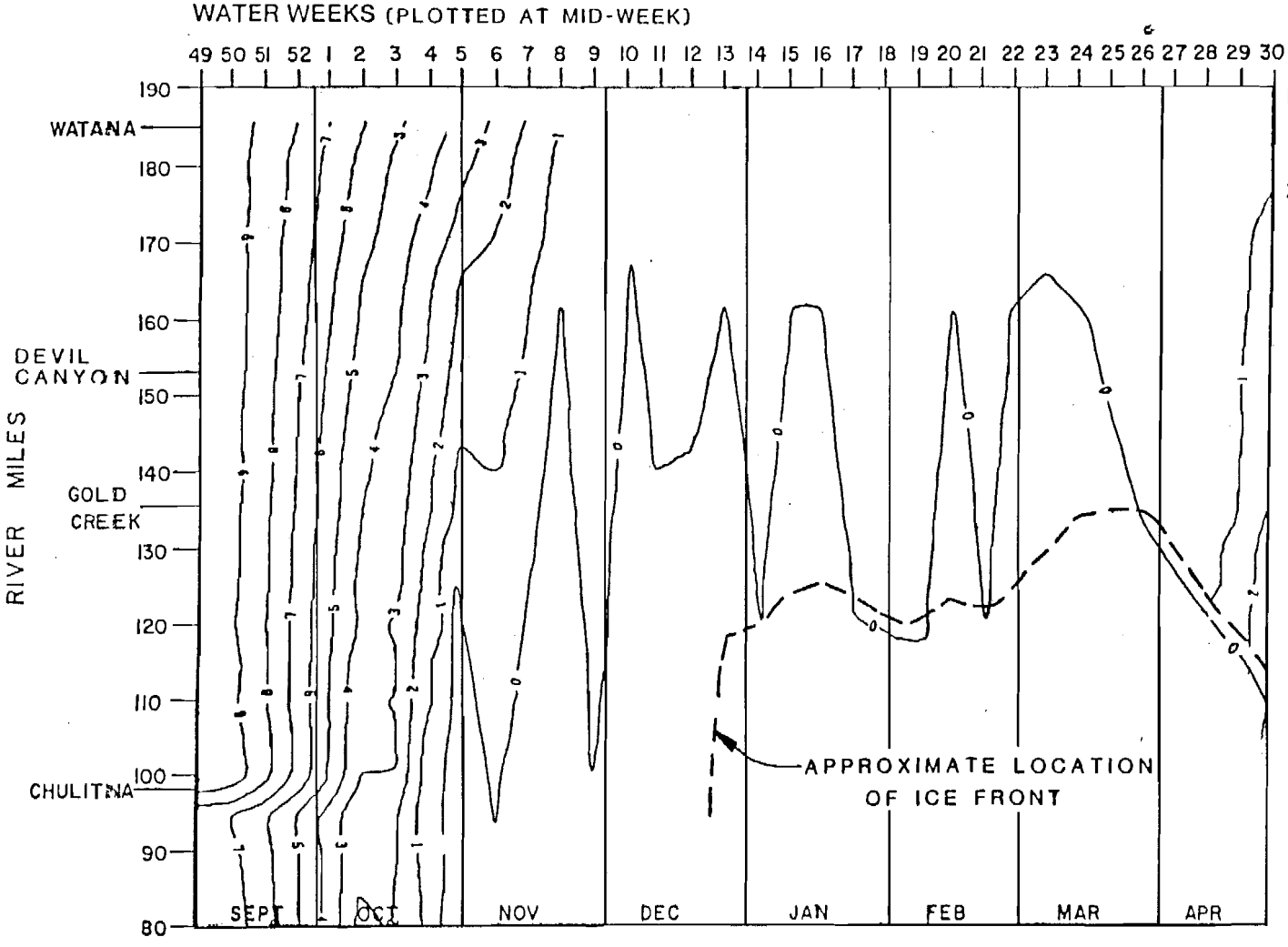
WINTER 1976-1977 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.

TIME

WATANA ONLY, 1996 ENERGY DEMAND

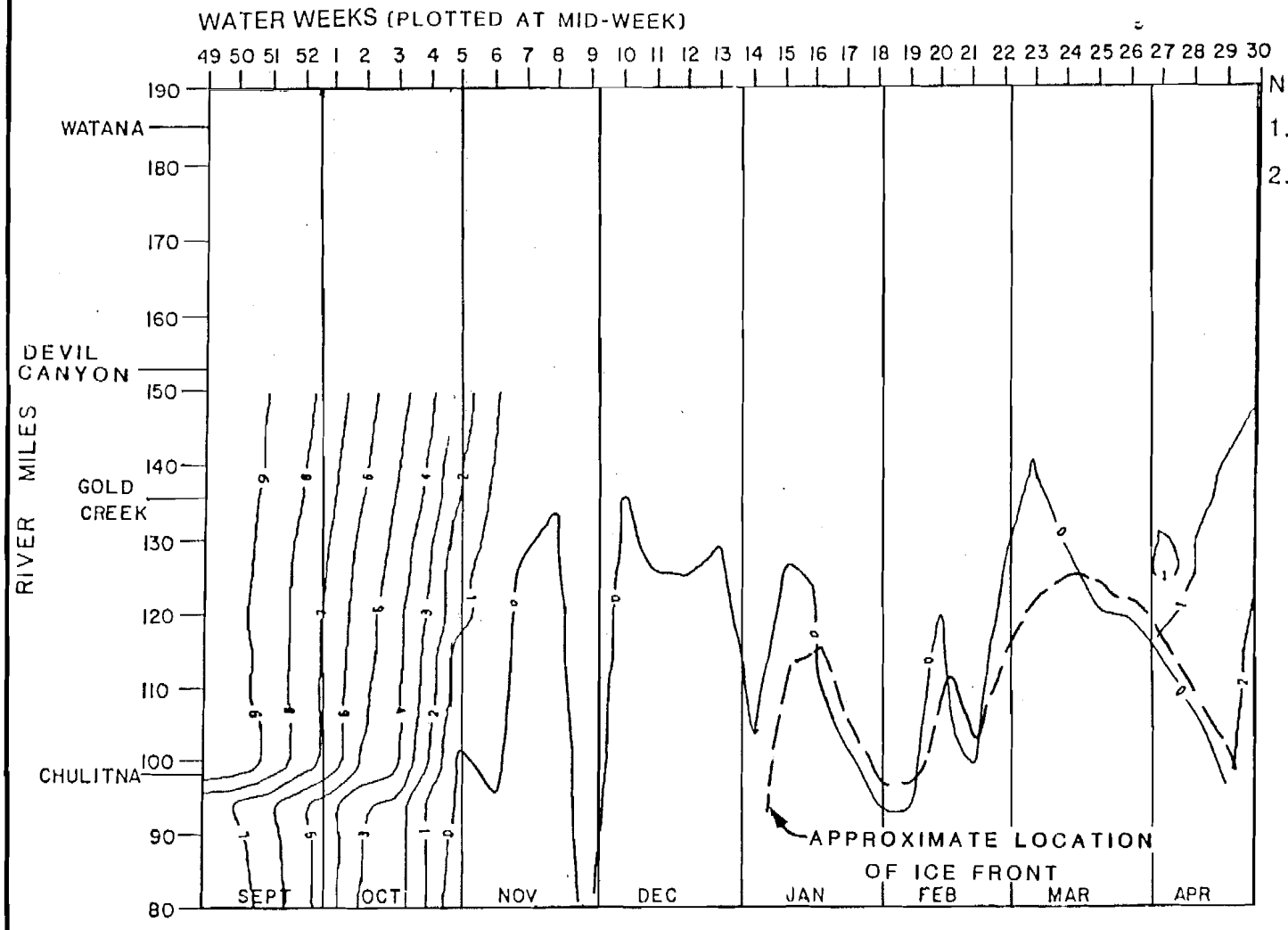
WINTER 1976-1977 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.

TIME

WATANA/DEVIL CANYON, 2002 ENERGY DEMAND

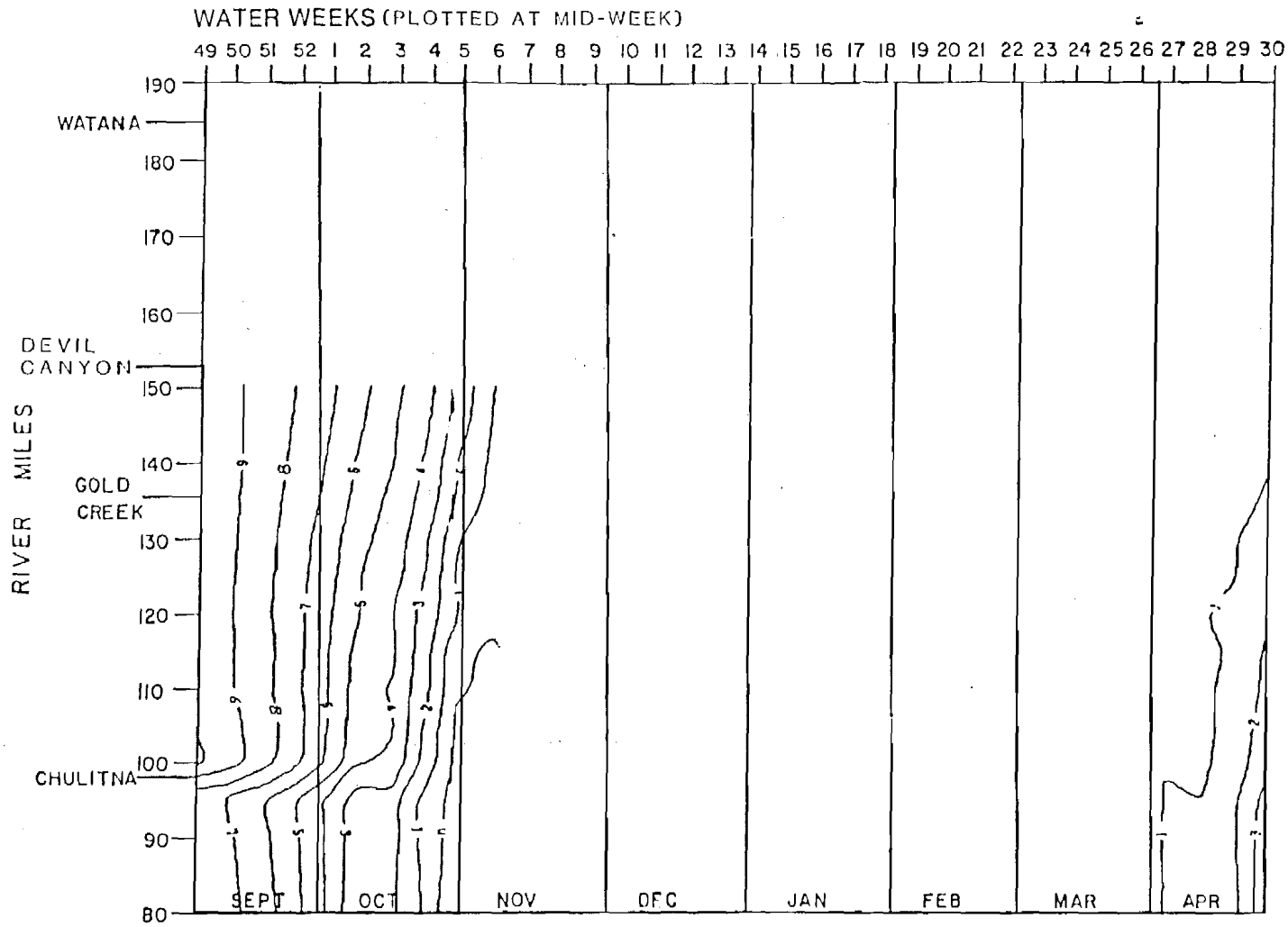
WINTER 1976-1977 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. ICE SIMULATION NOT MADE FOR THIS CASE. TEMPERATURES FROM NOVEMBER THROUGH APRIL SHOULD NOT BE USED.

TIME

WATANA/DEVIL CANYON, 2020 ENERGY DEMAND

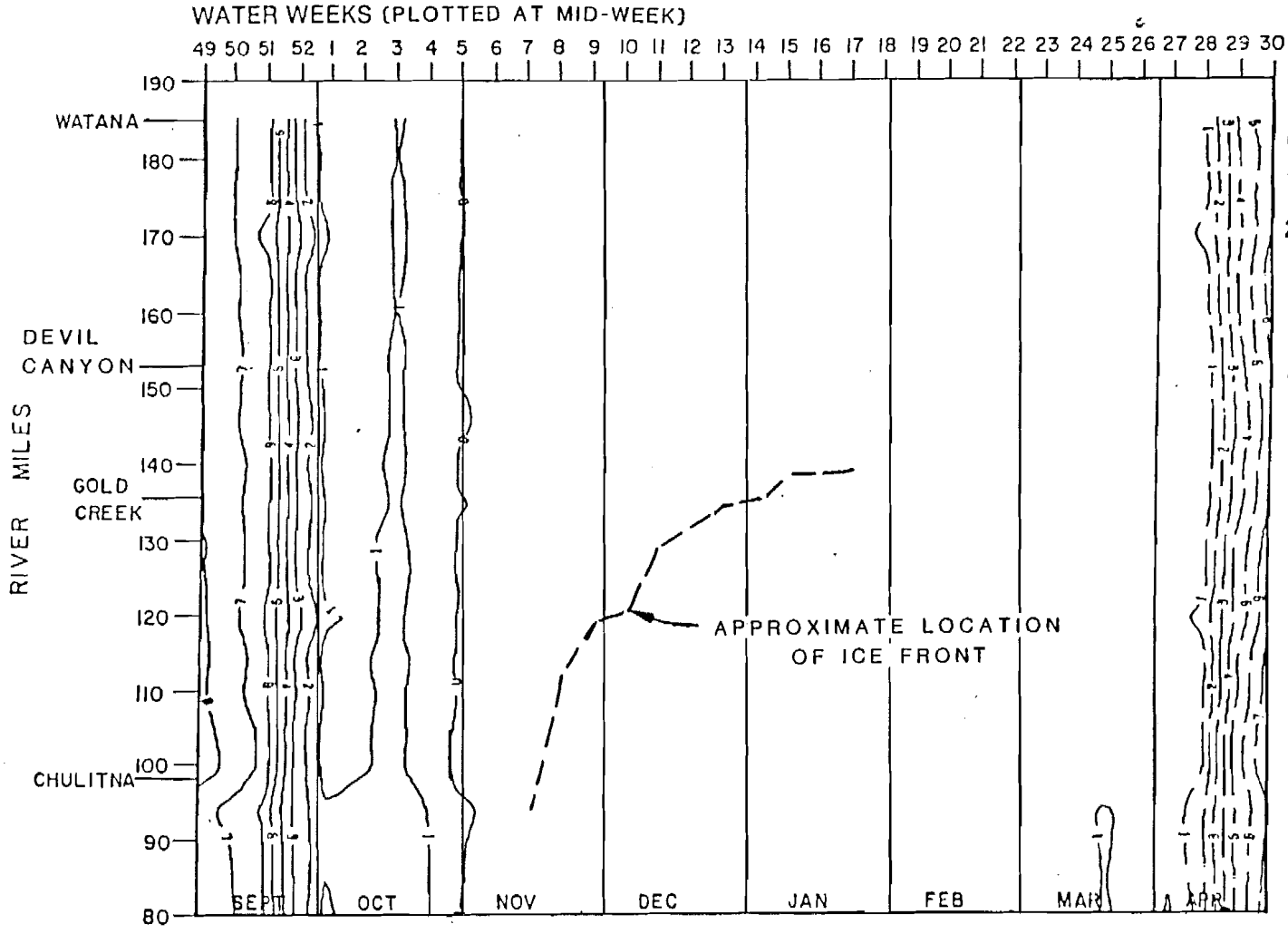
WINTER 1976-1977 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN •C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.
3. ICE FRONT PROGRESSION UPSTREAM OF RIVER MILE 139 NOT MODELED FOR NATURAL CONDITIONS

TIME

NATURAL CONDITIONS

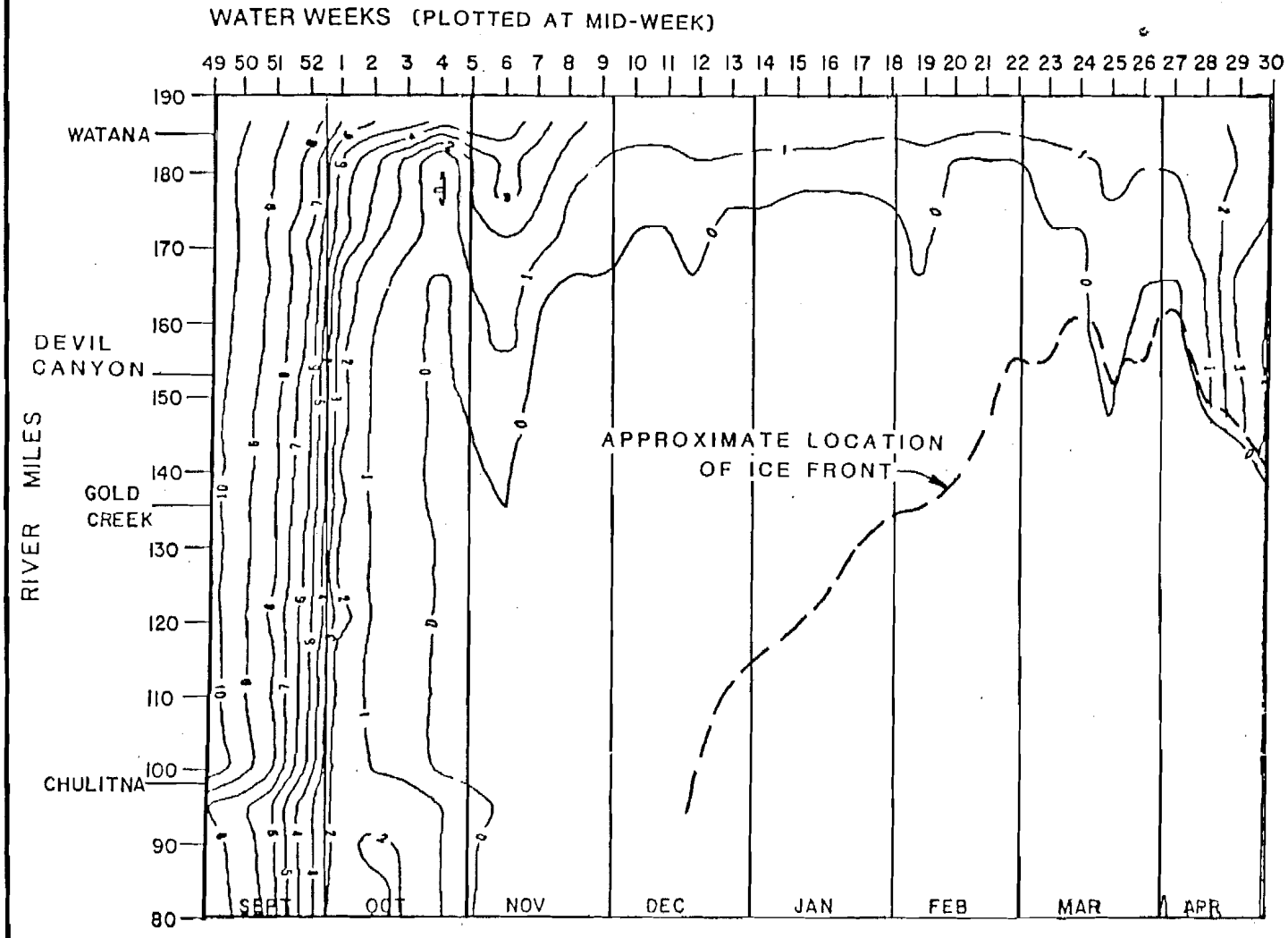
WINTER 1981-1982 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.
3. ICE FRONT PROGRESSION UPSTREAM OF RIVER MILE 140 NOT CONSIDERED ACCURATE FOR FILLING CASE

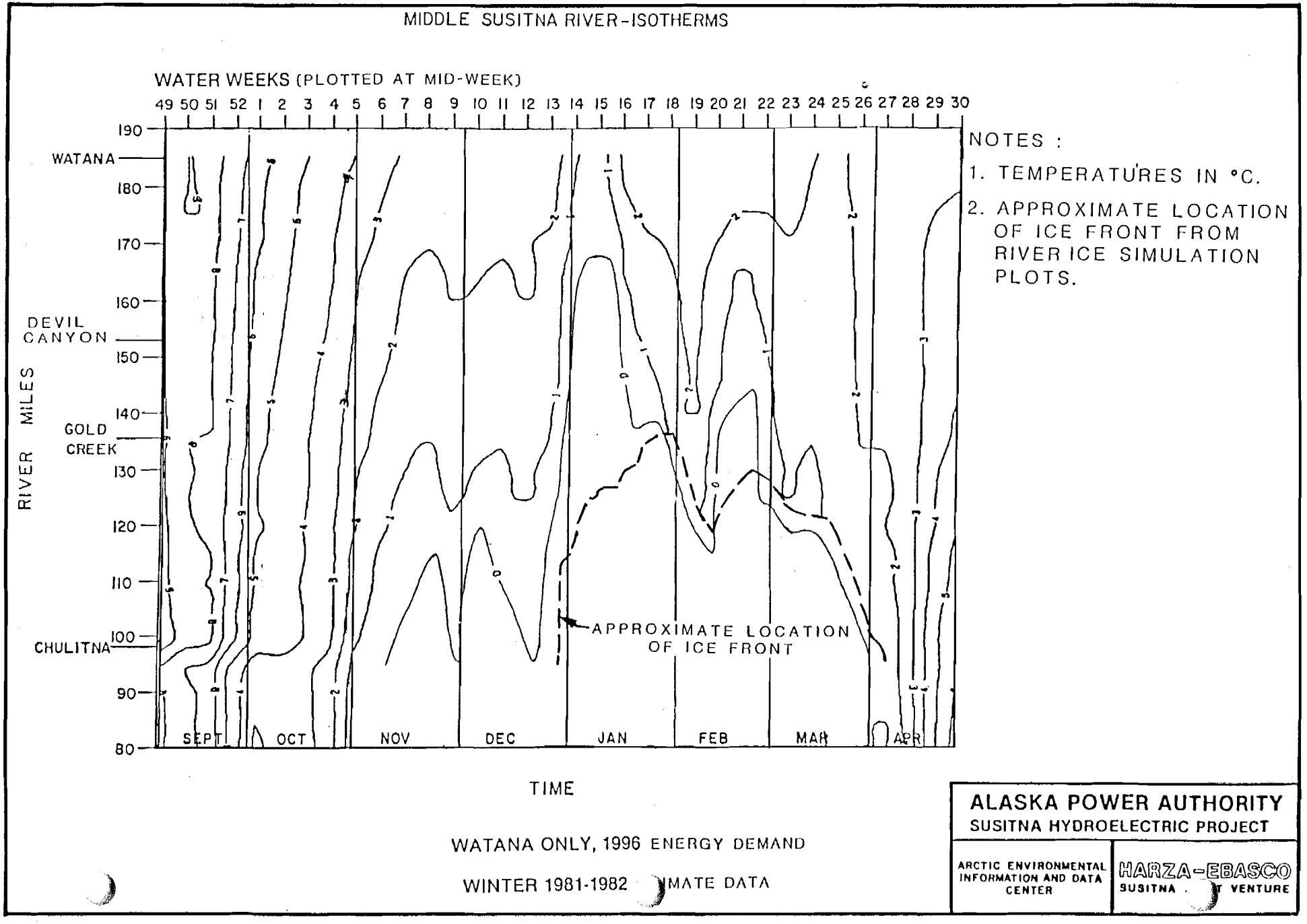
TIME

WATANA FILLING,1992-1993
2nd WINTER
WINTER 1981-1982 CLIMATE DATA

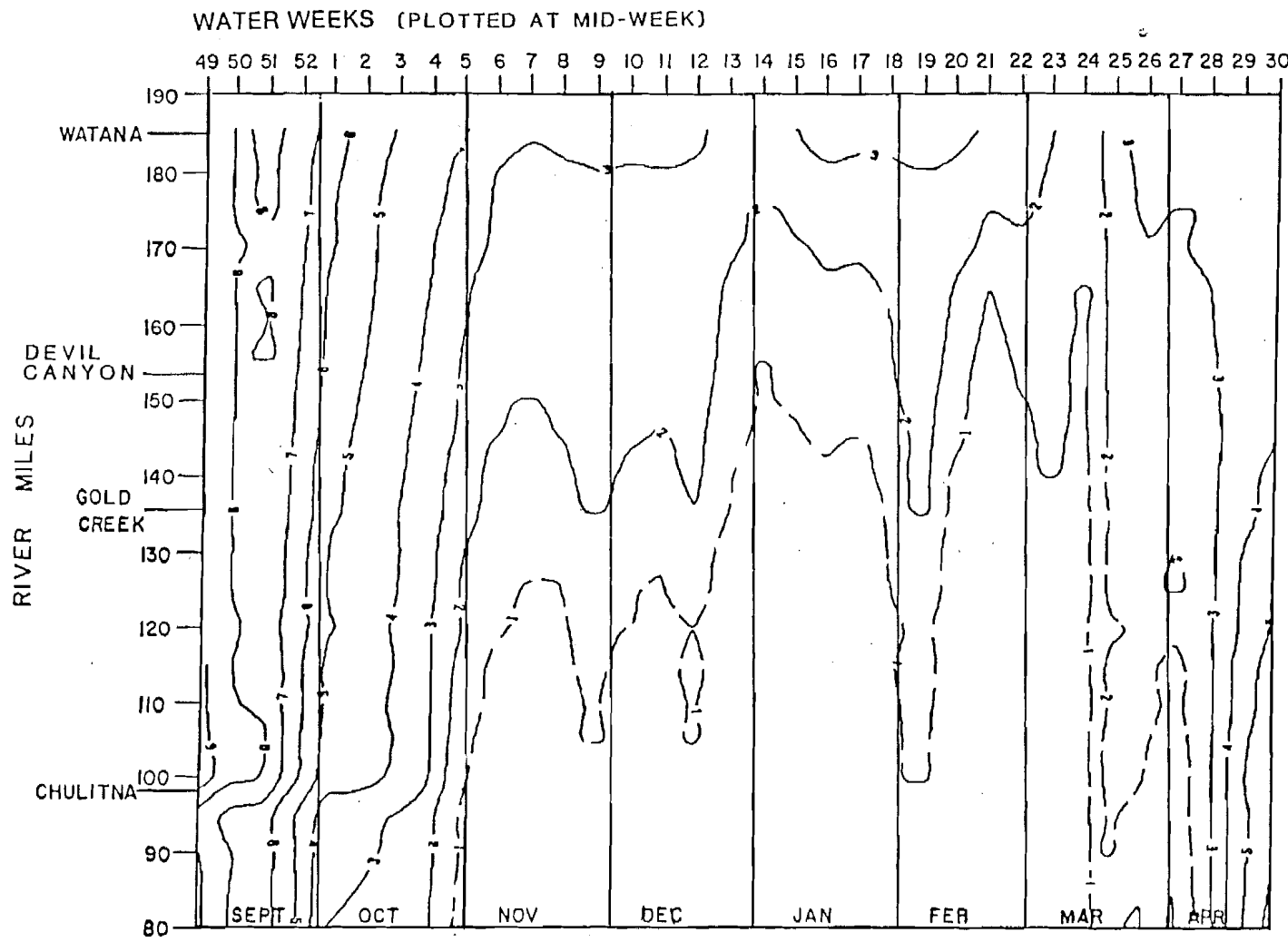
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE


MIDDLE SUSITNA RIVER-ISOTHERMS
WATER WEEKS (PLOTTED AT MID-WEEK)
49 50 51 52 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
190
180
170
160
150
140
130
120
110
100
90
80
WATANA
DEVIL CANYON
GOLD CREEK
CHULITNA
RIVER MILES
SEPT
OCT
NOV
DEC
JAN
FEB
MAR
APR
APPROXIMATE LOCATION OF ICE FRONT
TIME
NOTES :
1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.
WATANA ONLY, 1996 ENERGY DEMAND
WINTER 1981-1982 CLIMATE DATA
ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT
ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER
HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. ICE SIMULATION NOT MADE FOR THIS CASE. TEMPERATURES FOR NOVEMBER THROUGH MARCH SHOULD NOT BE USED.

TIME

WATANA ONLY, 2001 ENERGY DEMAND

WINTER 1981-1982 CLIMATE DATA

ALASKA POWER AUTHORITY
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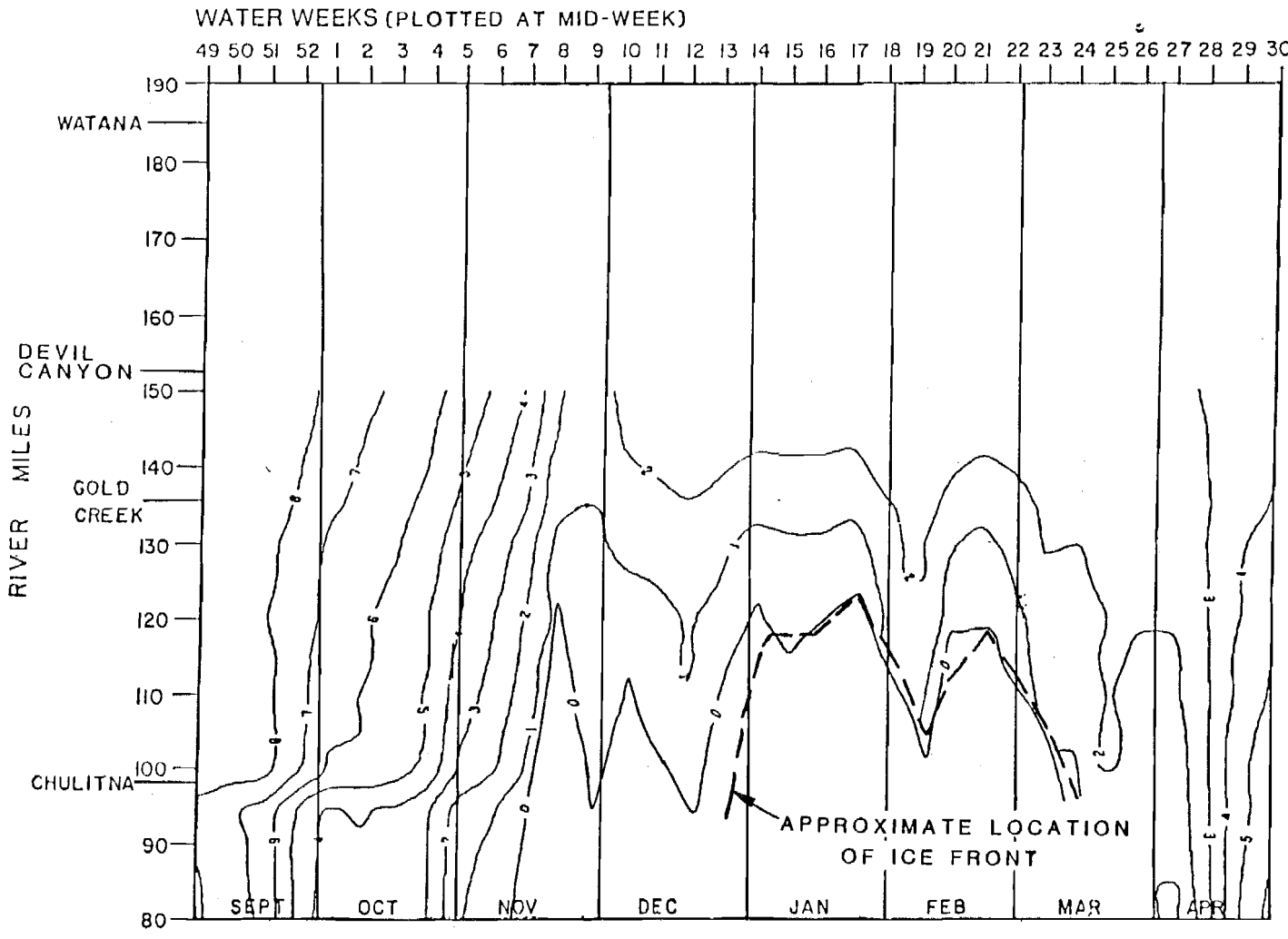
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.

TIME

WATANA/DEVIL CANYON, 2002 ENERGY DEMAND

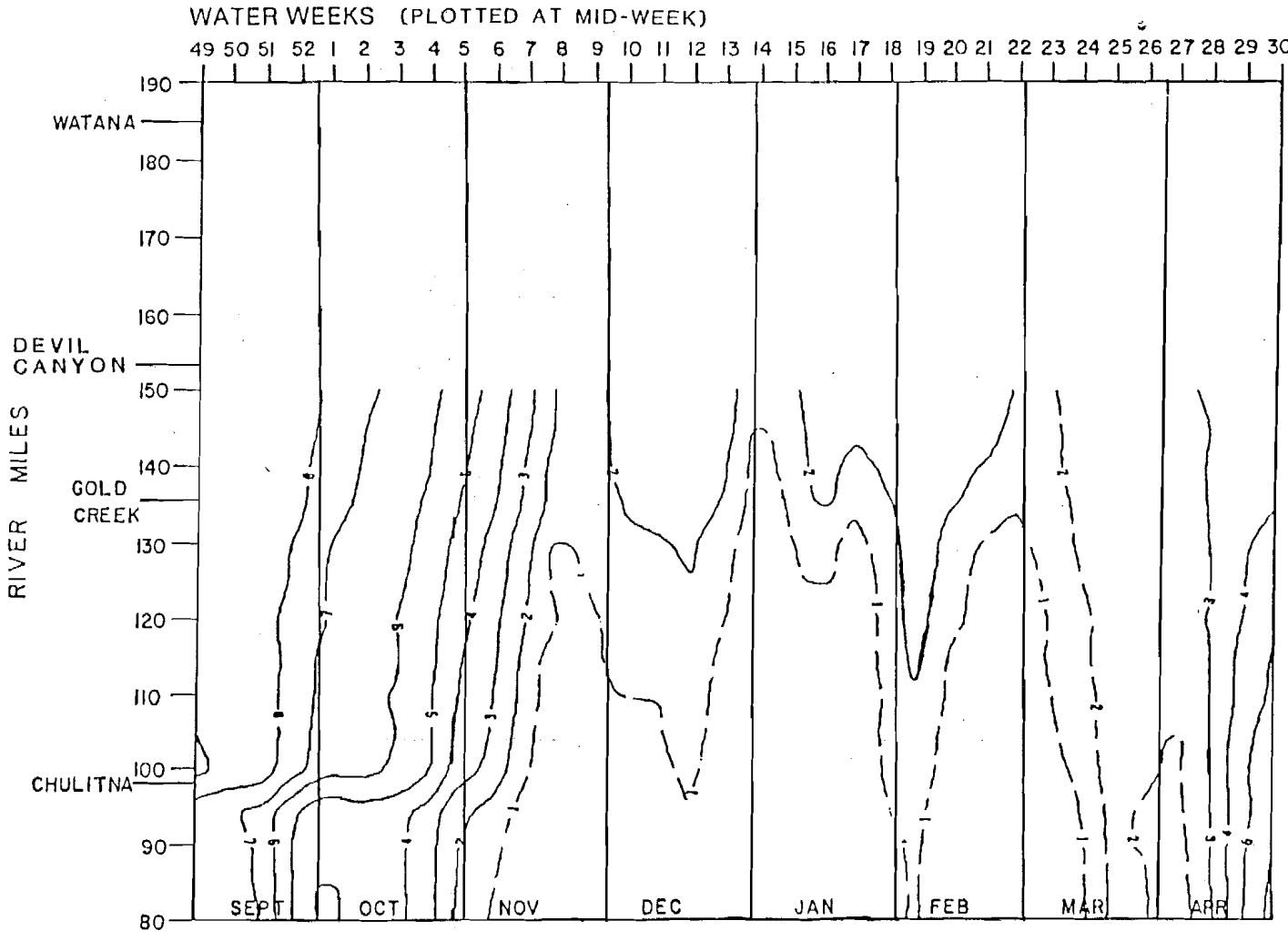
WINTER 1981-1982 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. ICE SIMULATION NOT MADE FOR THIS CASE. TEMPERATURES FOR NOVEMBER THROUGH MARCH SHOULD NOT BE USED.
   NOTE SIMILARITY TO WATANA/DEVIL CANYON, 2002 WINTER 1981-1982.

TIME

WATANA/DEVIL CANYON, 2020 ENERGY DEMAND

WINTER 1981-1982 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

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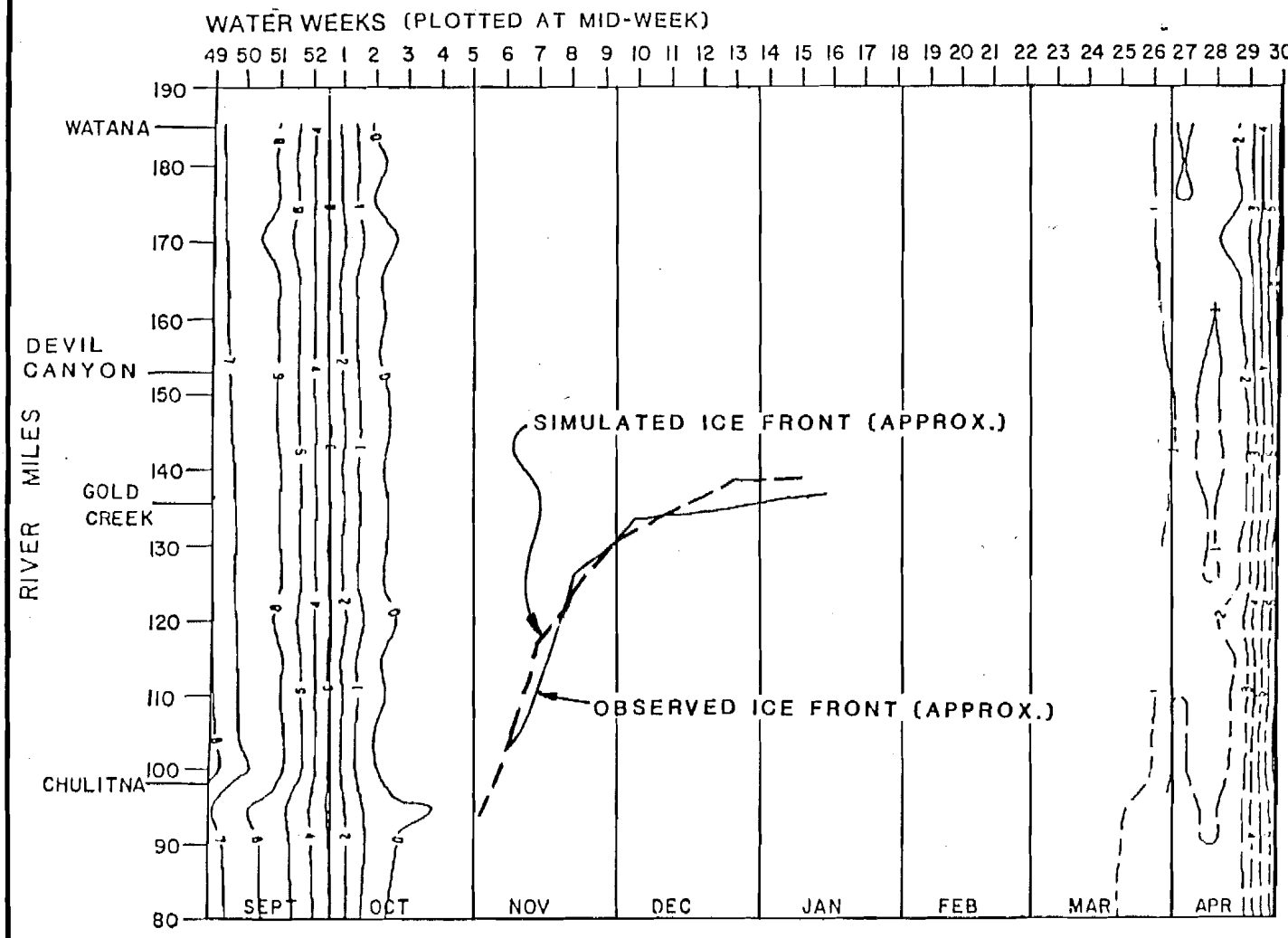
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS. SIMULATED TEMPERATURES FOR MARCH AND APRIL SHOULD NOT BE USED.
3. ICE FRONT PROGRESSION UPSTREAM OF RIVER MILE 139 NOT MODELED FOR NATURAL CONDITIONS

TIME

NATURAL CONDITIONS

WINTER 1982-1983 CLIMATIC DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

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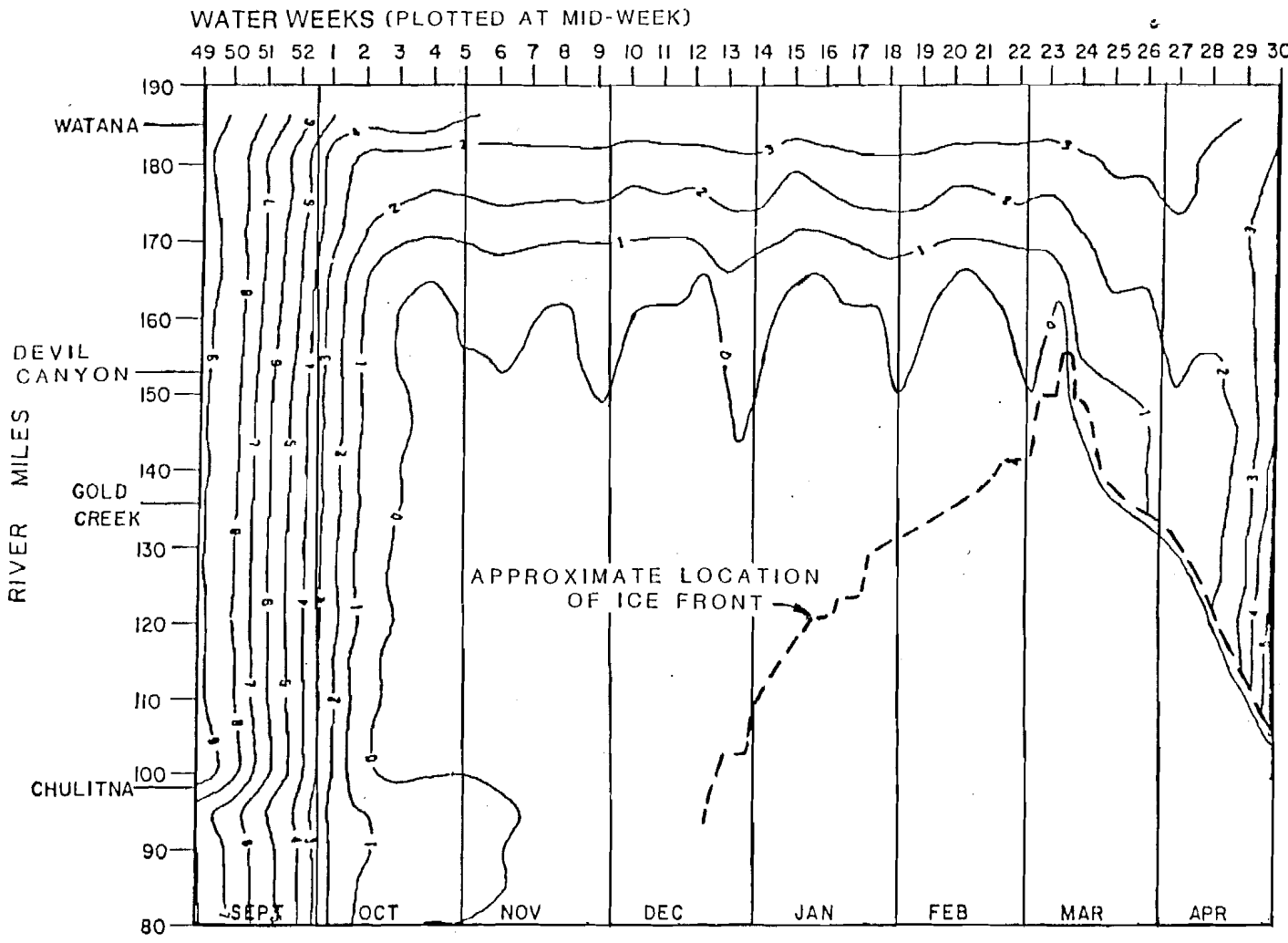
MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

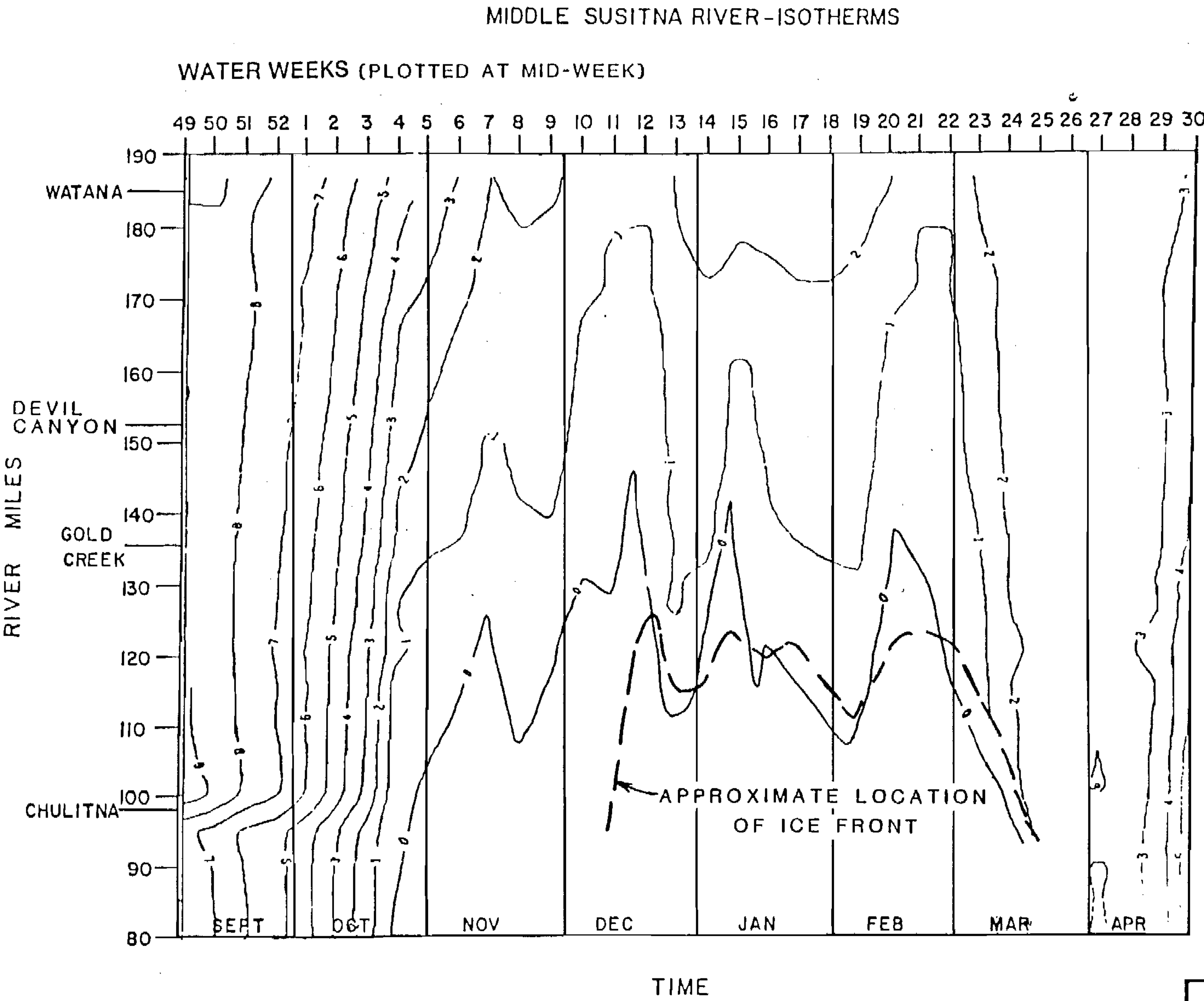
1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.
3. ICE FRONT PROGRESSION UPSTREAM OF RIVER MILE 140 NOT CONSIDERED ACCURATE FOR FILLING CASE

WATANA FILLING, 1991-1992
1st WINTER
WINTER 1982-1983 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.

WATANA ONLY, 1996 ENERGY DEMAND

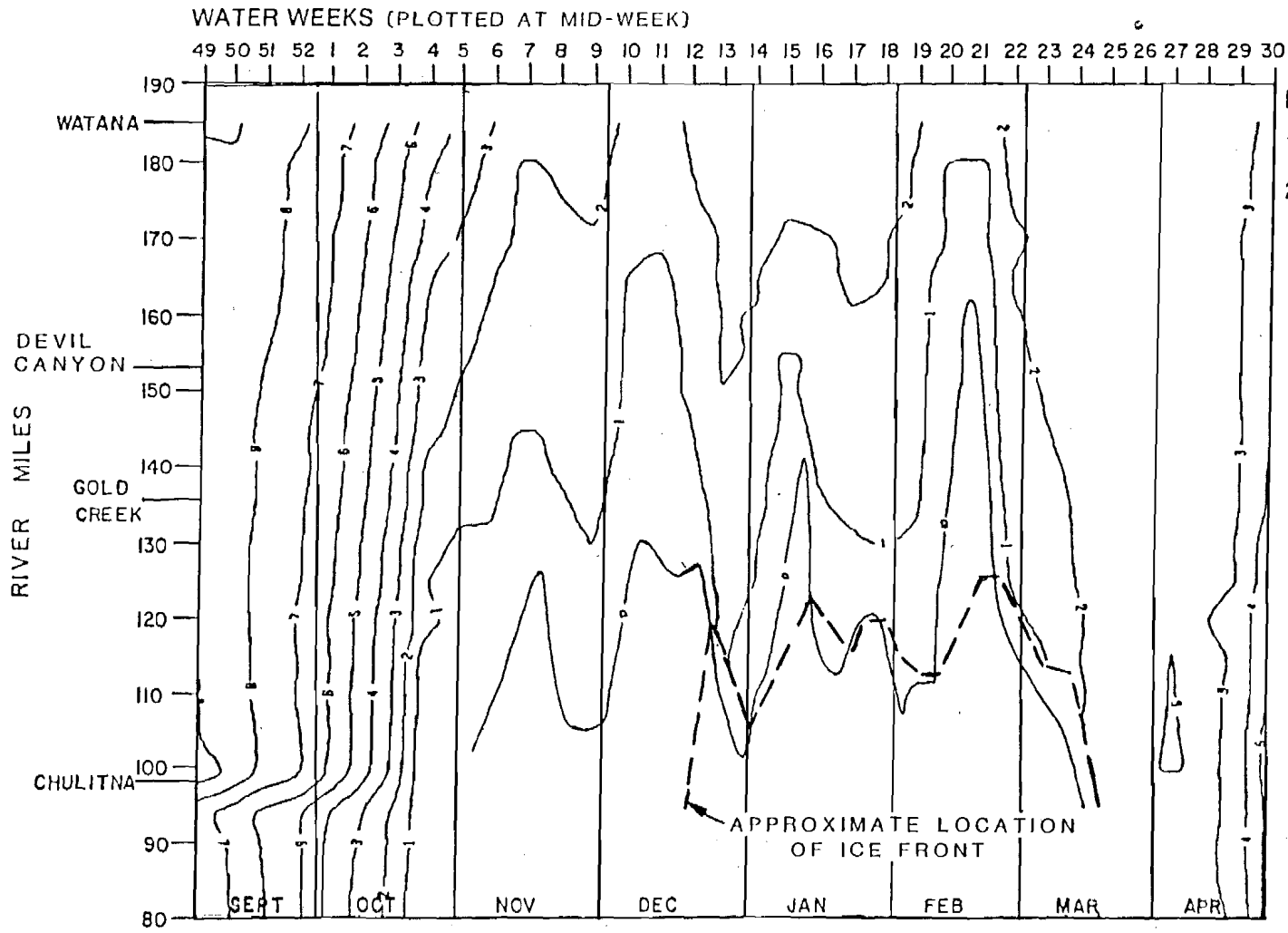
WINTER 1982-1983 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.

TIME

WATANA ONLY, 2001 ENERGY DEMAND

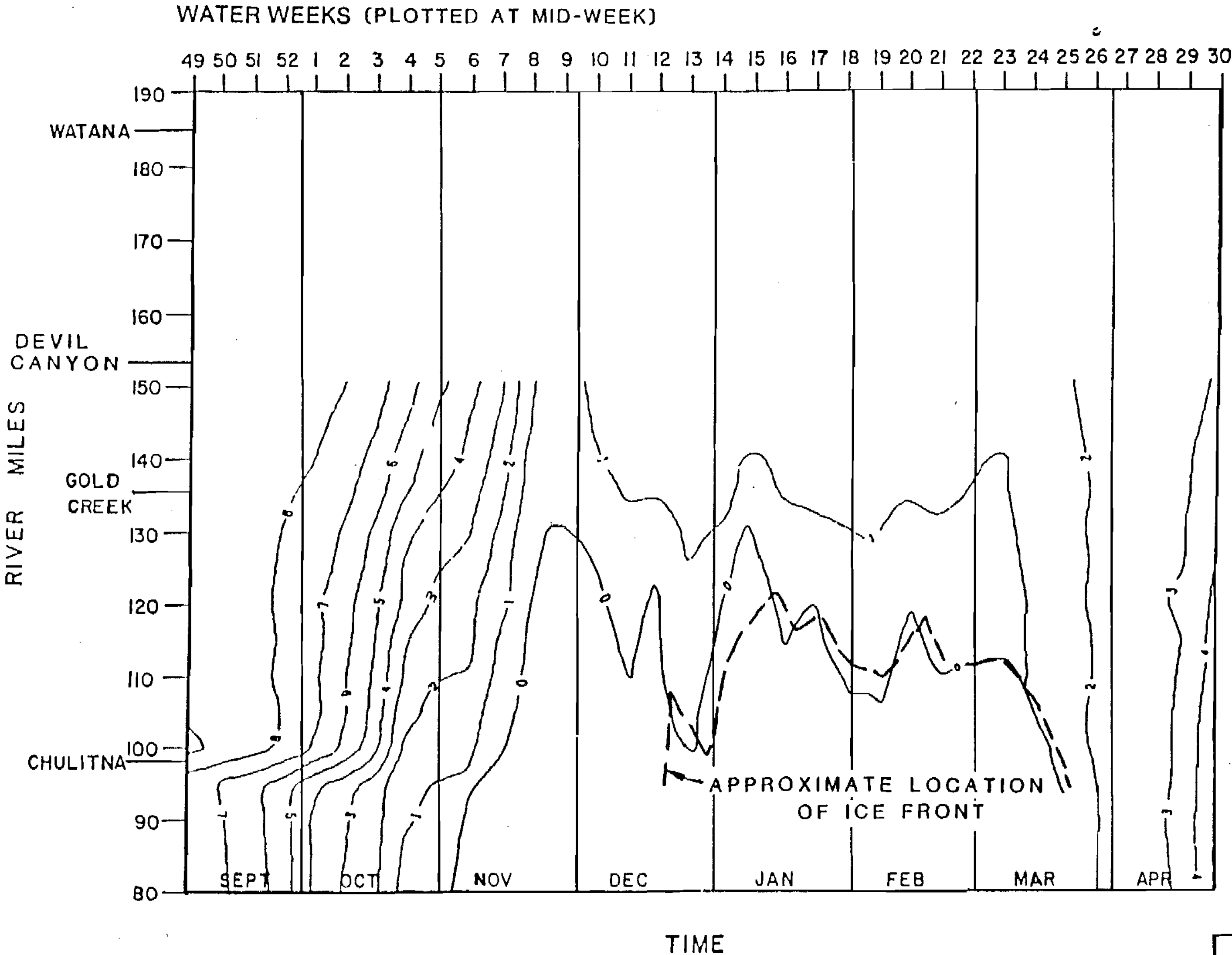
WINTER 1982-1983 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.

WATANA/DEVIL CANYON, 2002 ENERGY DEMAND

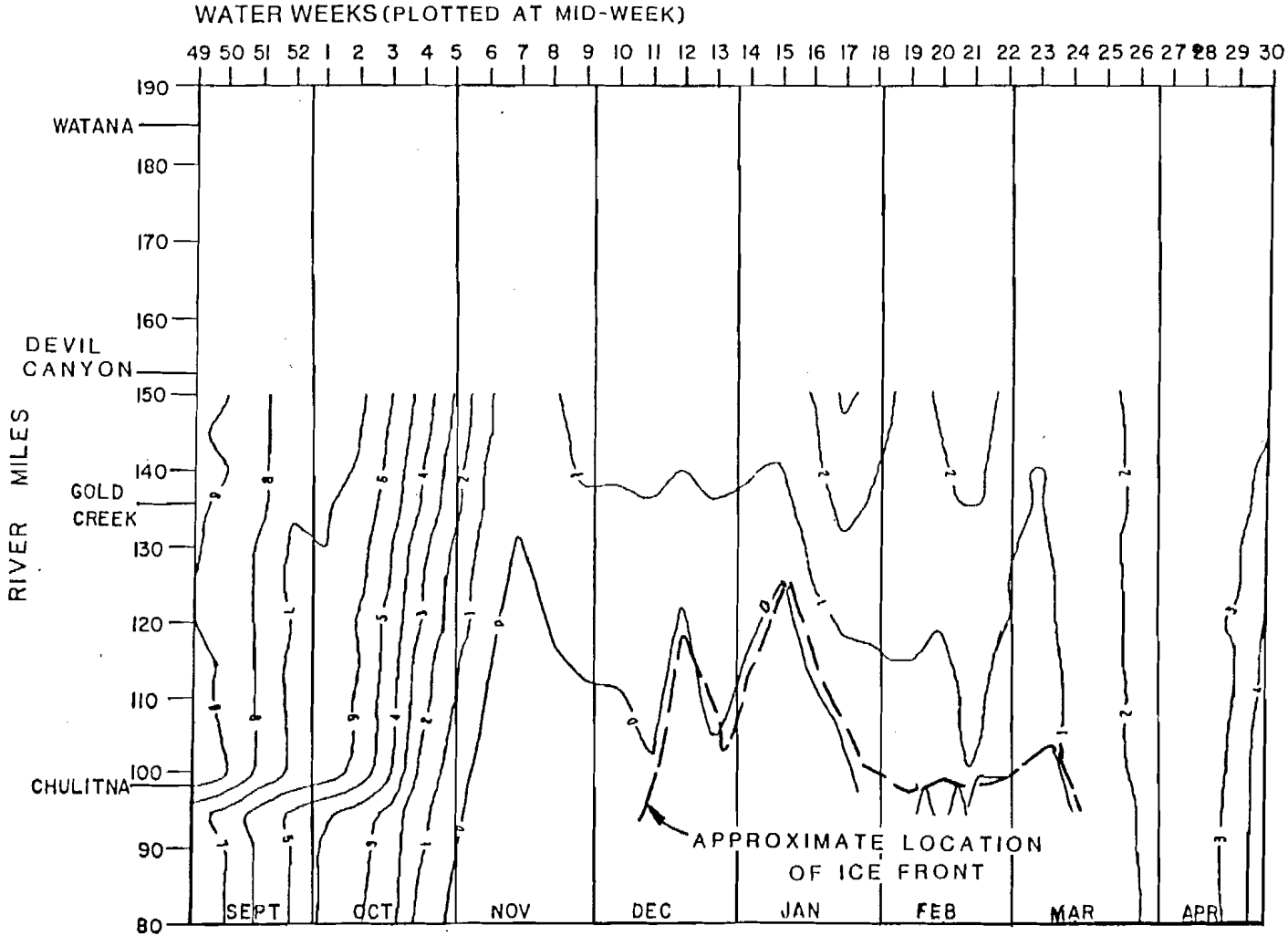
WINTER 1982-1983 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

MIDDLE SUSITNA RIVER-ISOTHERMS



NOTES :

1. TEMPERATURES IN °C.
2. APPROXIMATE LOCATION OF ICE FRONT FROM RIVER ICE SIMULATION PLOTS.

TIME

WATANA/DEVIL CANYON, 2020 ENERGY DEMAND

WINTER 1982-1983 CLIMATE DATA

ALASKA POWER AUTHORITY
SUSITNA HYDROELECTRIC PROJECT

ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

HARZA-EBASCO
SUSITNA JOINT VENTURE

APPENDIX C

Susitna, Chulitna and Talkeetna
stream width functions.

Appendix C. Susitna, Chulitna, and Talkeetna Stream Width Functions.
Width(meters) = a * Flow(cms) ** b.

Location	Susitna River Kilometer	a	b
Watana dam site	296.8		
		10.878	0.3533
URX 106	296.7		
		37.776	0.1946
URX 107	296.4		
		30.057	0.1564
URX 108	295.7		
		47.302	0.1319
URX 109	294.1		
		153.677	0.0233
URX 110	293.6		
		40.746	0.2744
URX 111	293.0		
		55.320	0.1485
URX 112	292.5		
		8.006	0.3613
URX 113	291.2		
		103.522	0.0398
URX 114	289.7		
		40.382	0.3155
URX 115	287.7		
		10.776	0.4136
URX 116	284.3		
		9.046	0.4196
URX 117	283.2		
		41.173	0.2231
URX 118	280.0		
		18.509	0.3574
URX 119	278.5		
		105.559	0.0523
URX 120	268.7		
		91.630	0.0851
URX 121	260.8		
		52.917	0.1001
Devil Creek	259.5		
		85.000	0.0000
Chinook Confluence	248.8		
		108.500	0.0000
LRX 68	241.7		
		71.643	0.0526
LRX 67	241.0		
		113.764	0.0109
LRX 66	240.6		
		25.268	0.2923
LRX 65	240.5		

Appendix C. (Continued) Susitna, Chulitna, and Talkeetna Stream Width Functions. Width(meters) = a * Flow(cms) ** b.

Location	Susitna River Kilometer	a	b
LRX 65	240.5		
		2.820	0.5887
LRX 64	240.3		
		71.673	0.0473
LRX 63	240.0		
		60.074	0.0630
LRX 62	239.6		
		77.780	0.0334
LRX 61	239.3		
		61.343	0.0620
LRX 60	237.4		
		48.581	0.1288
LRX 59	233.0		
		34.000	0.2823
LRX 58	230.4		
		32.714	0.2840
LRX 57	229.0		
		117.343	0.0558
LRX 56	228.7		
		30.601	0.2743
LRX 55	227.7		
		11.214	0.4866
LRX 54	226.6		
		8.525	0.4994
LRX 53	225.5		
		87.139	0.0960
LRX 52	224.4		
		28.307	0.4333
LRX 51	223.5		
		148.259	0.0454
LRX 50	222.8		
		50.641	0.1717
LRX 49	222.4		
		24.954	0.3441
LRX 48	221.1		
		3.312	0.6789
LRX 47	220.7		
		1.167	0.7812
LRX 46	220.4		
		2.970	0.6400
LRX 45	219.9		
		40.703	0.1680
LRX 44	219.5		
		4.209	0.6132
LRX 43	218.4		

Appendix C. (Continued) Susitna, Chulitna, and Talkeetna Stream Width Functions. Width(meters) = a * Flow(cms) ** b.

Location	Susitna River Kilometer	a	b
LRX 43	218.4		
		3.932	0.5704
LRX 42	217.8		
		269.900	0.0905
LRX 41	216.8		
		2.108	0.7594
LRX 40	216.1		
		149.464	0.0343
LRX 39	214.5		
		105.709	0.1548
LRX 38	213.8		
		12.497	0.4541
LRX 37	212.1		
		9.042	0.4902
LRX 36	211.1		
		6.768	0.5805
LRX 35	210.6		
		54.553	0.1148
LRX 34	209.9		
		9.088	0.4952
LRX 33	209.4		
		13.226	0.5510
LRX 32	208.6		
		3.600	0.6620
LRX 31	207.0		
		150.968	0.0615
LRX 30	205.1		
		13.680	0.5630
LRX 29	202.9		
		116.096	0.0651
LRX 28	200.2		
		34.025	0.3469
LRX 27	198.4		
		77.661	0.0932
LRX 26	197.2		
		77.661	0.0932
LRX 25	195.7		
		4.489	0.6720
LRX 24	194.1		
		63.219	0.1179
LRX 23	193.5		
		108.387	0.1260
LRX 22	192.0		
		46.912	0.2310
LRX 21	191.7		

Appendix C. (Continued) Susitna, Chulitna, and Talkeetna Stream Width Functions. Width(meters) = a * Flow(cms) ** b.

Location	Susitna River Kilometer	a	b
LRX 21	191.7		
		5.235	0.5707
LRX 20	188.6		
		3.812	0.7019
LRX 19	187.4		
		76.728	0.1176
LRX 18	181.8		
		130.537	0.0508
LRX 17	181.3		
		94.245	0.1845
LRX 16	180.8		
		48.248	0.2905
LRX 15	179.9		
		78.550	0.1955
LRX 14	178.4		
		43.742	0.3086
LRX 13	177.6		
		12.288	0.4169
LRX 12	174.4		
		30.236	0.2505
LRX 11	171.6		
		175.296	0.0358
LRX 10	168.5		
		130.727	0.1112
LRX 9	166.1		
		6.313	0.3922
LRX 8	164.7		
		34.848	0.2973
LRX 7	163.3		
		72.890	0.2664
LRX 6	162.4		
		41.108	0.3476
LRX 5	161.5		
		60.970	0.3241
LRX 4	160.2		
		4.183	0.7030
LRX 3	158.6		
		0.080	1.3196
Chulitna confluence	158.1		
		1.006	0.9124
Talkeetna confluence	156.1		
		0.997	0.9485
Section 0.8	154.8		
		0.989	0.9501
Section 0.6	153.5		

Appendix C. (Continued) Susitna, Chulitna, and Talkeetna Stream Width Functions. Width(meters) = a * Flow(cms) ** b.

Location	Susitna River Kilometer	a	b
Section 0.6	153.5		
		1.329	0.9610
Section 0.3	151.7		
		1.031	0.9282
Trapper confluence	146.7		
		1.134	0.9671
Section 0.04	144.6		
		1.057	0.9077
Section 0.03	141.9		
		0.981	0.9212
Section 0.02	139.7		
		0.977	0.8633
Section 0.01	136.6		
		0.944	0.8765
Parks Highway bridge	134.8		
Chulitna River	-----	38.917	0.2086
Talkeetna River	-----	55.906	0.1761

note: miles = 0.62 * kilometers
feet = 0.305 * meters
width(feet) = a' * flow(cfs) ** b, a' = 3.281 * a * (0.0283 ** b)

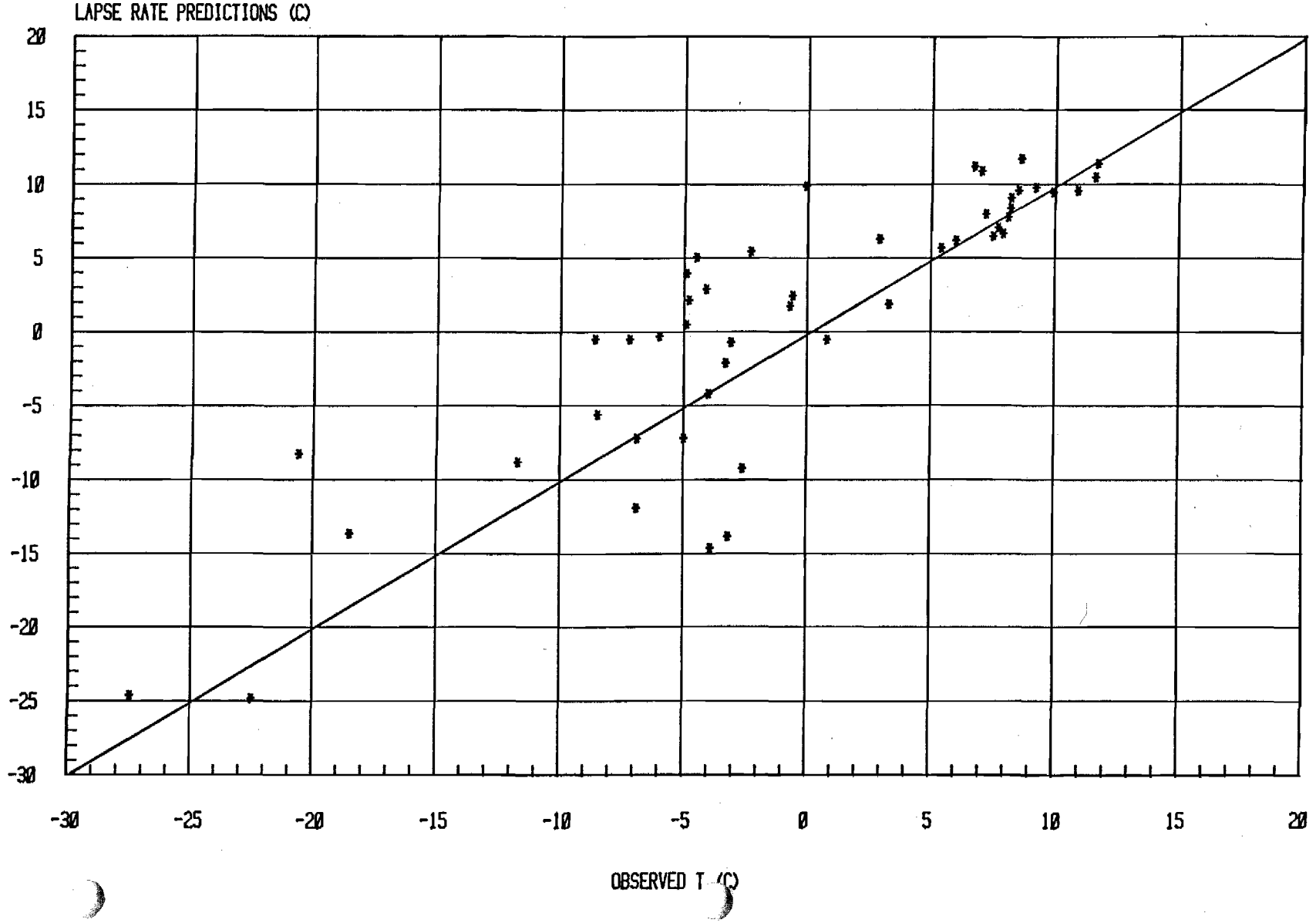
APPENDIX D

Observed versus predicted air temperatures for water years 1981-1983.

The observed air temperatures (independent variable) are plotted against the predicted air temperatures (dependent variable) for each of the three water years at Watana and Devil Canyon, and at Sherman for water year 1983. Predicted temperatures that match observed values fall on the diagonal line provided on the graph; over-predicted values fall above this line while under-predicted values fall below it. The predicted temperatures, calculated using a lapse rate function, generally show a good fit for temperatures greater than 0 C, but tend towards overprediction when air temperatures fall below 0 C.

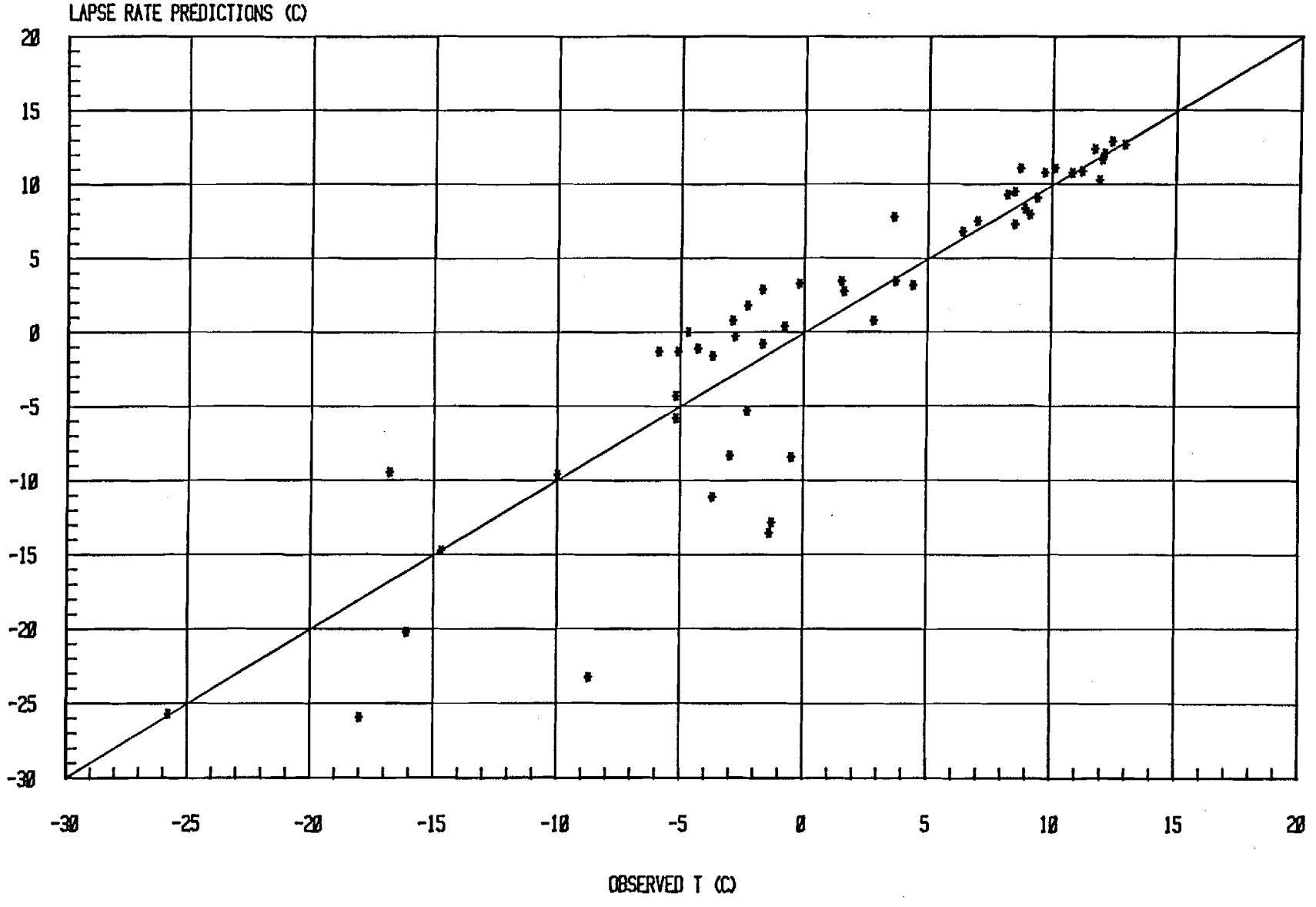
WATANA WEEKLY AIR TEMPERATURES

WATER YEAR 1981 OBSERVED VS PREDICTED



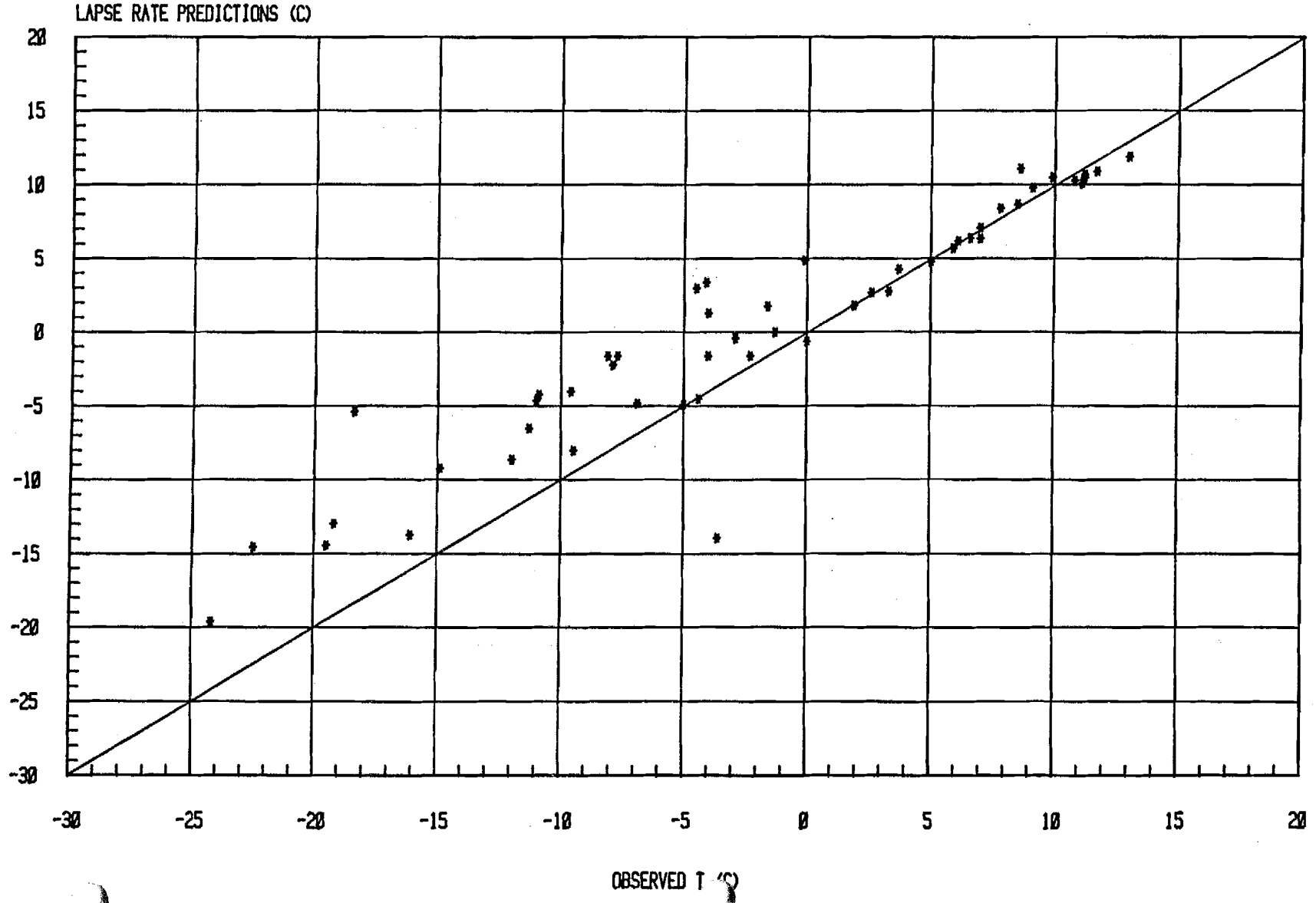
DEVIL CANYON WEEKLY AIR TEMPERATURES

WATER YEAR 1981 OBSERVED VS PREDICTED



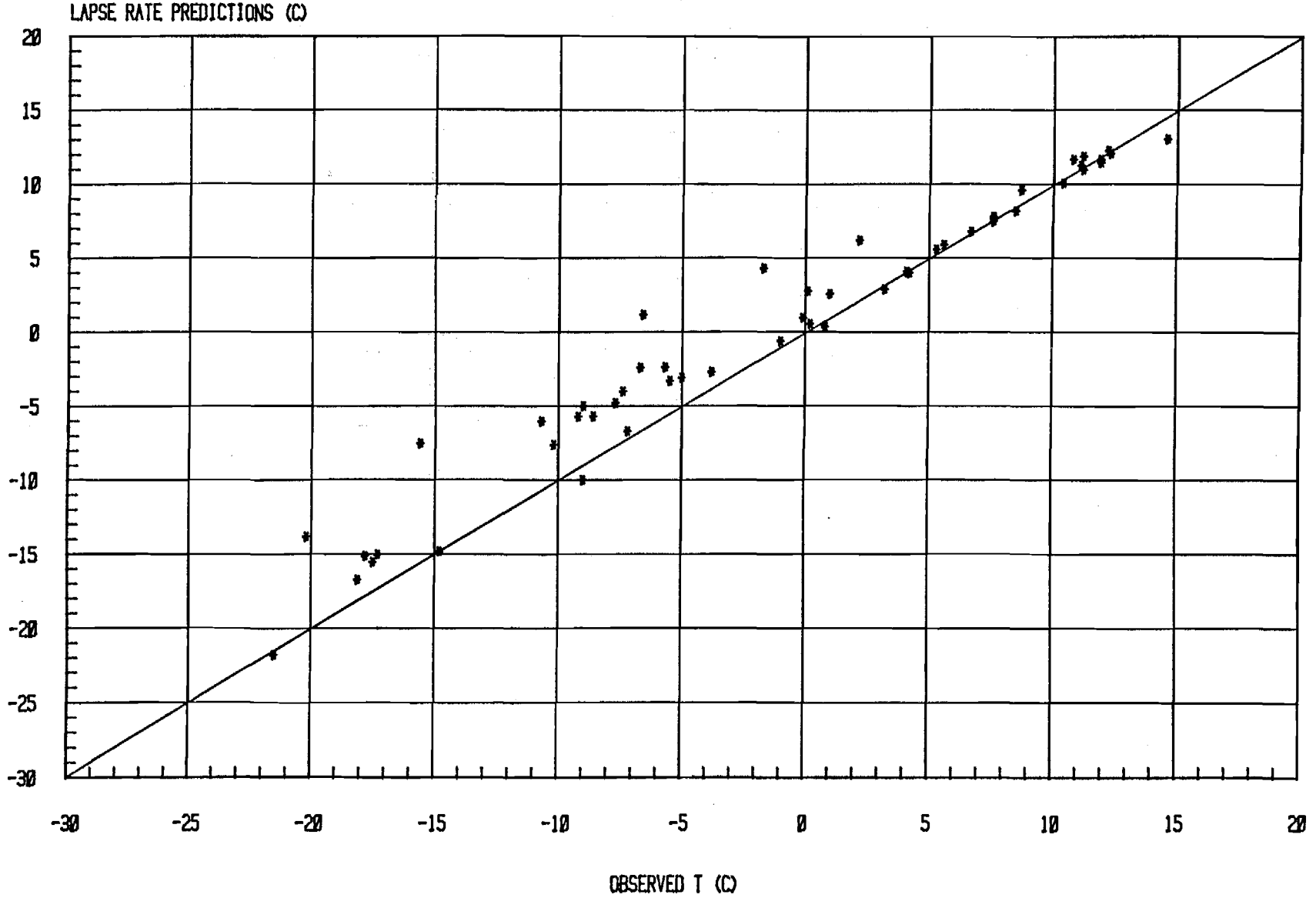
WATANA WEEKLY AIR TEMPERATURES

WATER YEAR 1982 OBSERVED VS PREDICTED



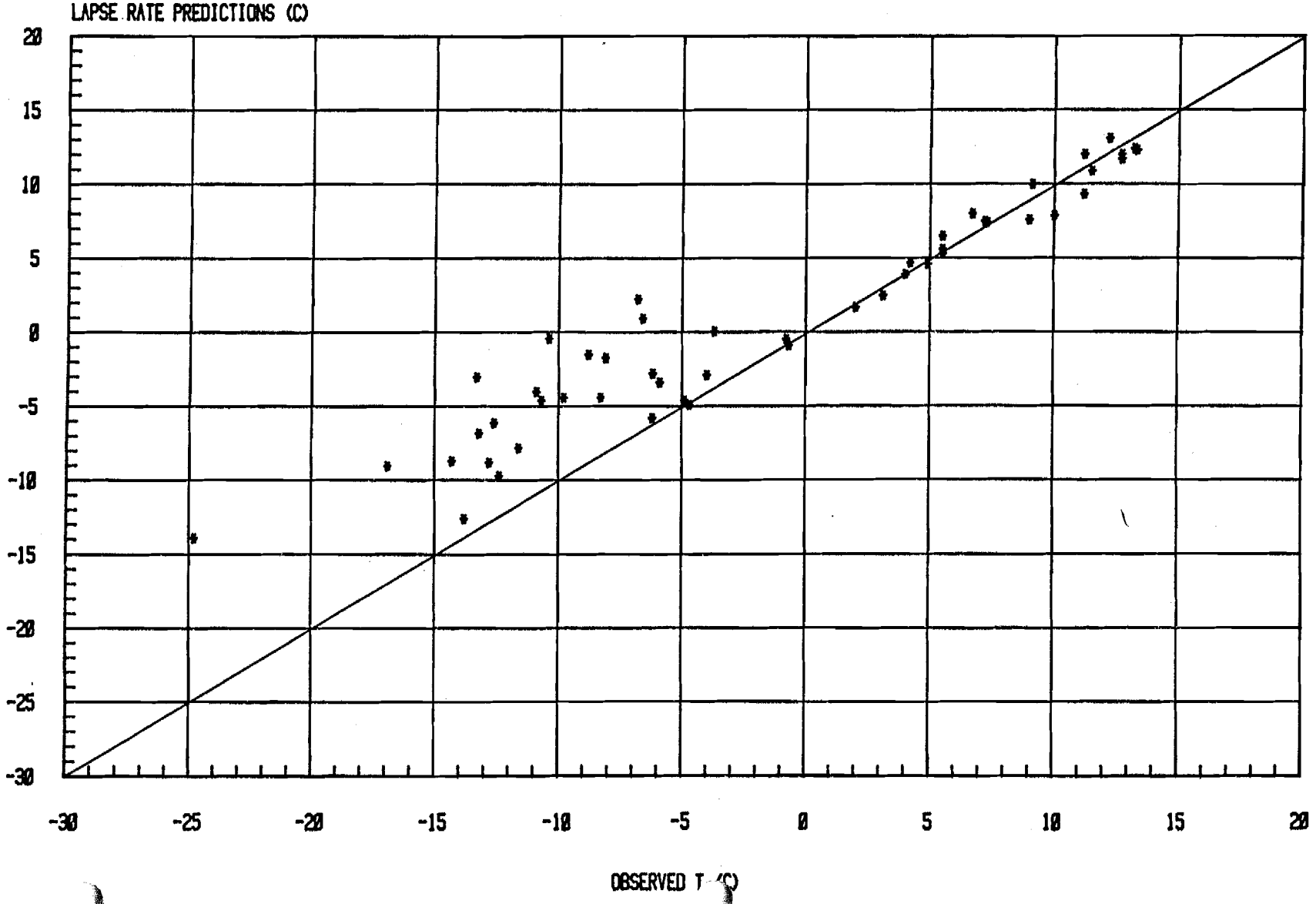
DEVIL CANYON WEEKLY AIR TEMPERATURES

WATER YEAR 1982 OBSERVED VS PREDICTED



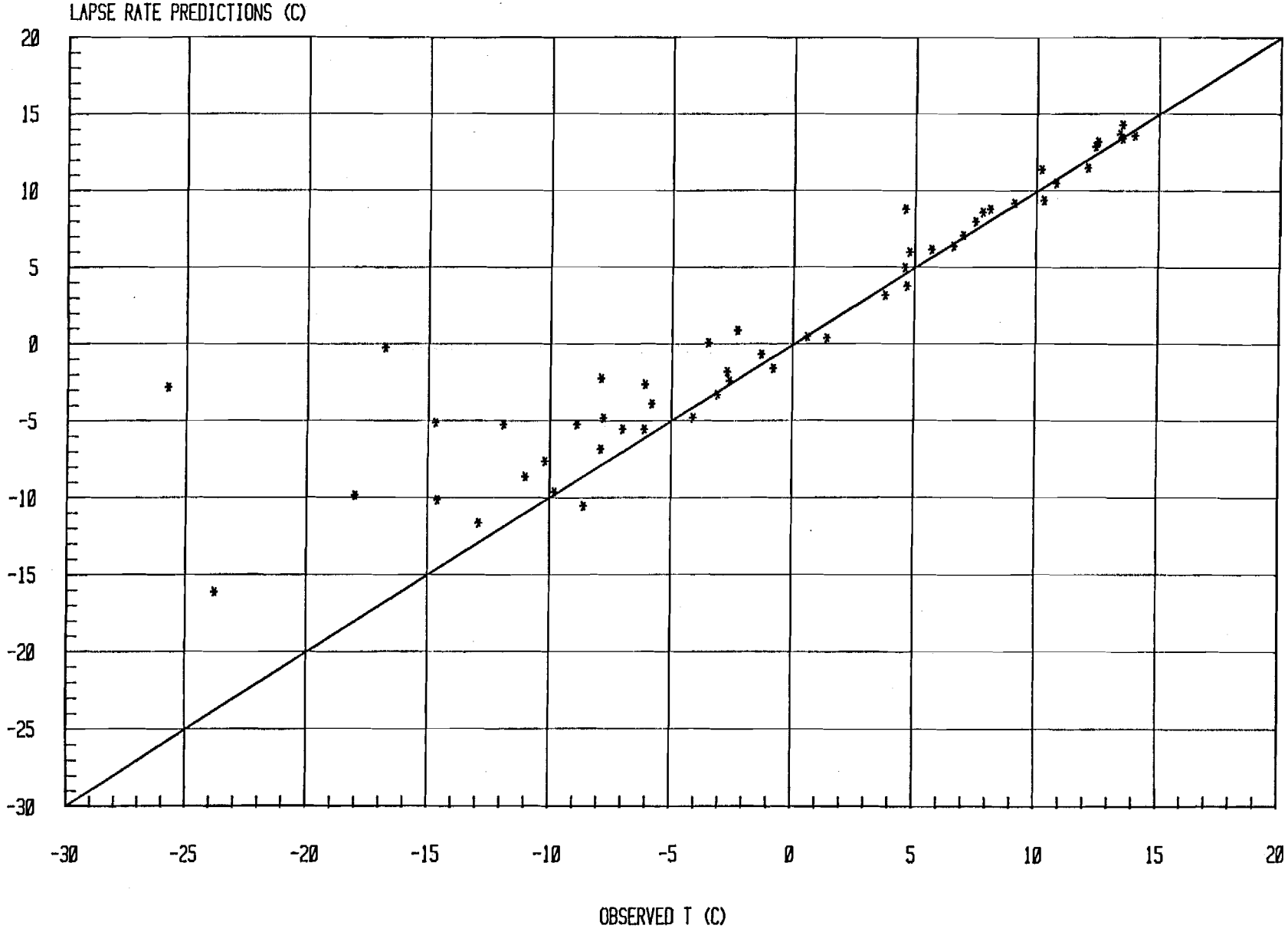
WATANA WEEKLY AIR TEMPERATURES

WATER YEAR 1983 OBSERVED VS PREDICTED



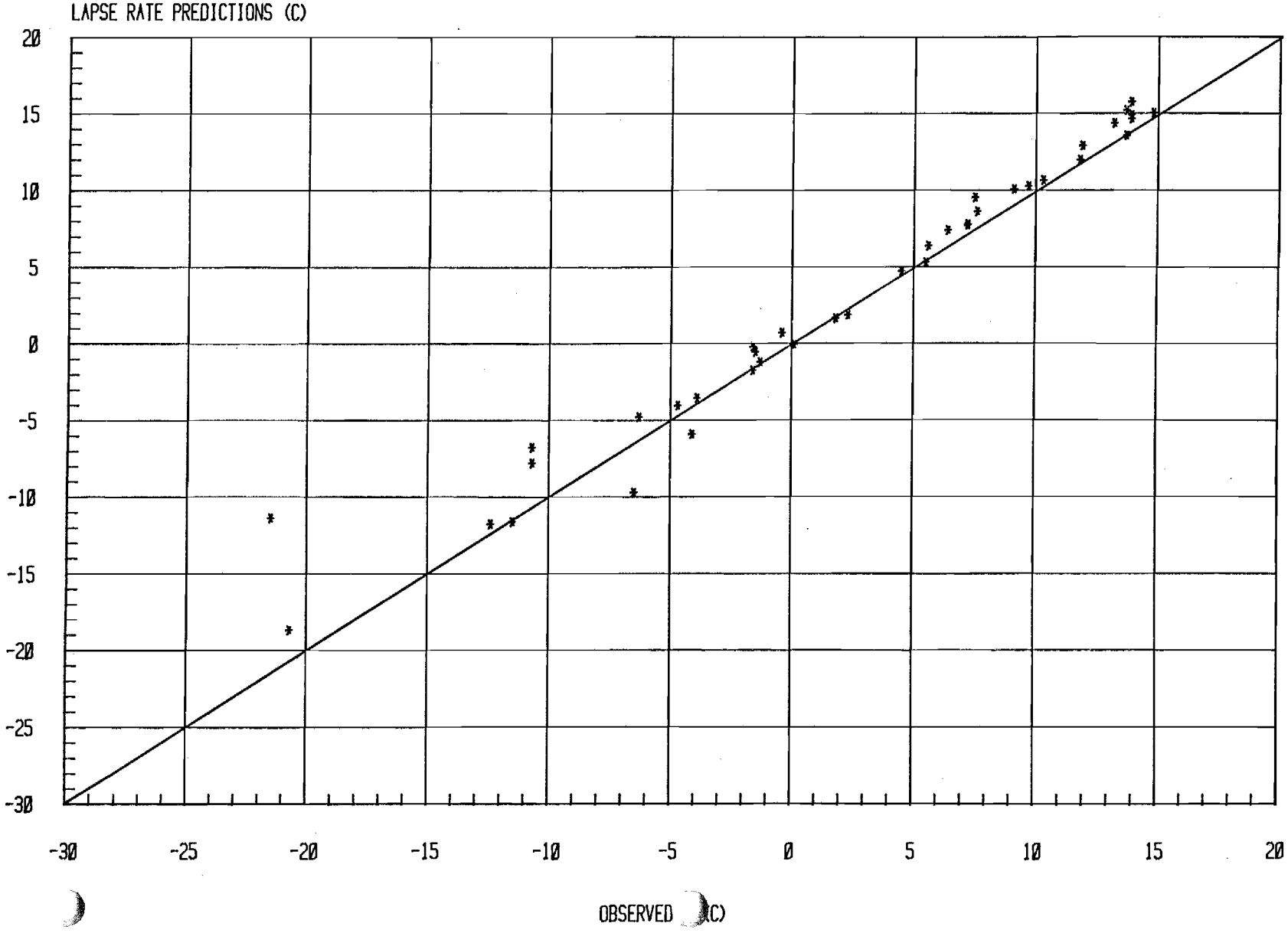
DEVIL CANYON WEEKLY AIR TEMPERATURES

WATER YEAR 1983 OBSERVED VS PREDICTED



SHERMAN WEEKLY AIR TEMPERATURES

WATER YEAR 1983 OBSERVED VS PREDICTED



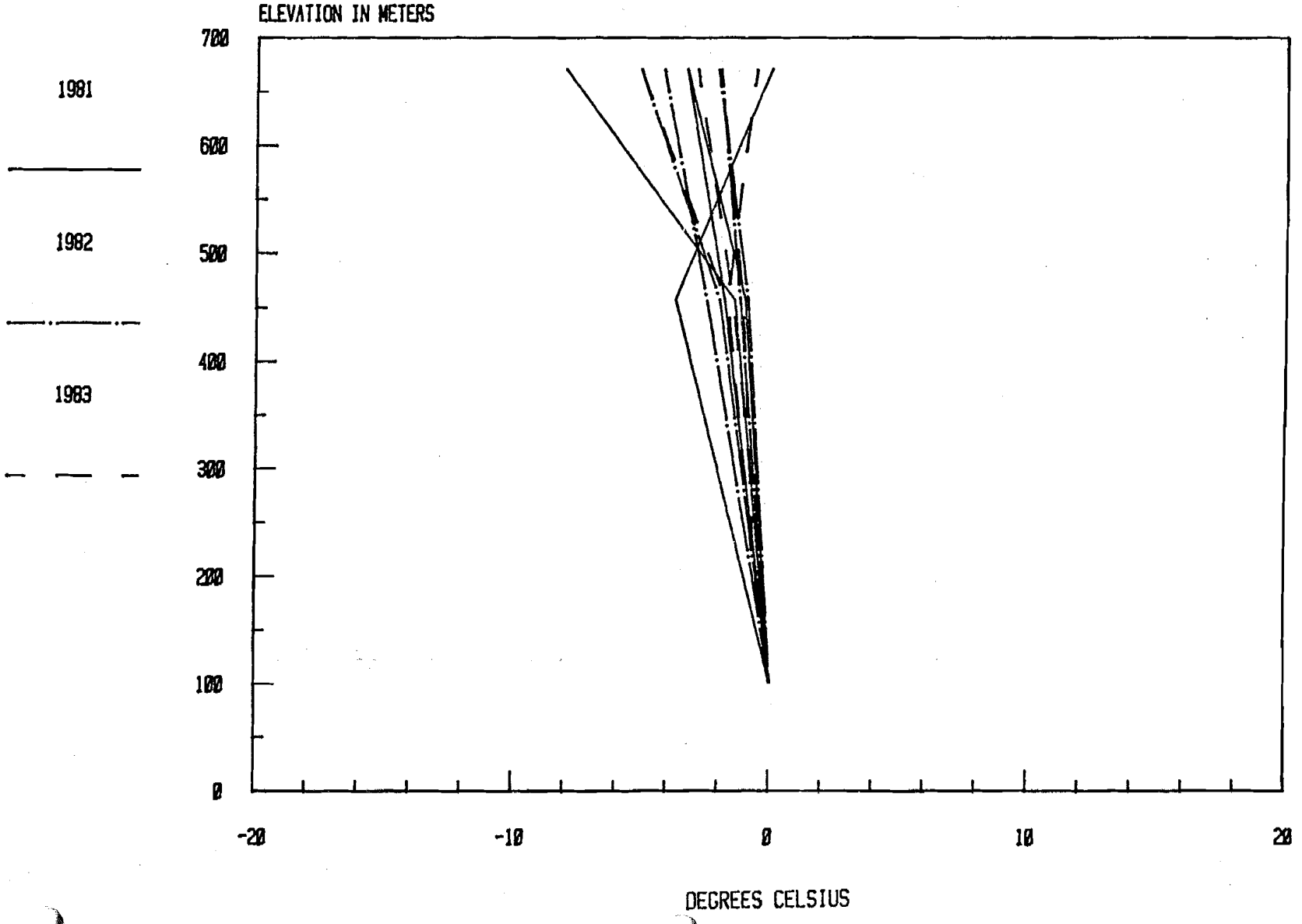
APPENDIX E

Observed vertical air temperature profiles

The graphs contained in this appendix illustrate the departures in mean weekly air temperatures at various stations from those at Talkeetna as a function of station elevation. Data are displayed by individual months on twelve graphs. Data are used from stations at Watana (elevation 670 m), Devil Canyon (elevation 460 m) and Sherman (elevation 200 m) when available for 1981 through 1983. If the mean weekly temperature at all stations were equal to the temperature at Talkeetna for a given week, the graphed line would be vertical at the 0 C location.

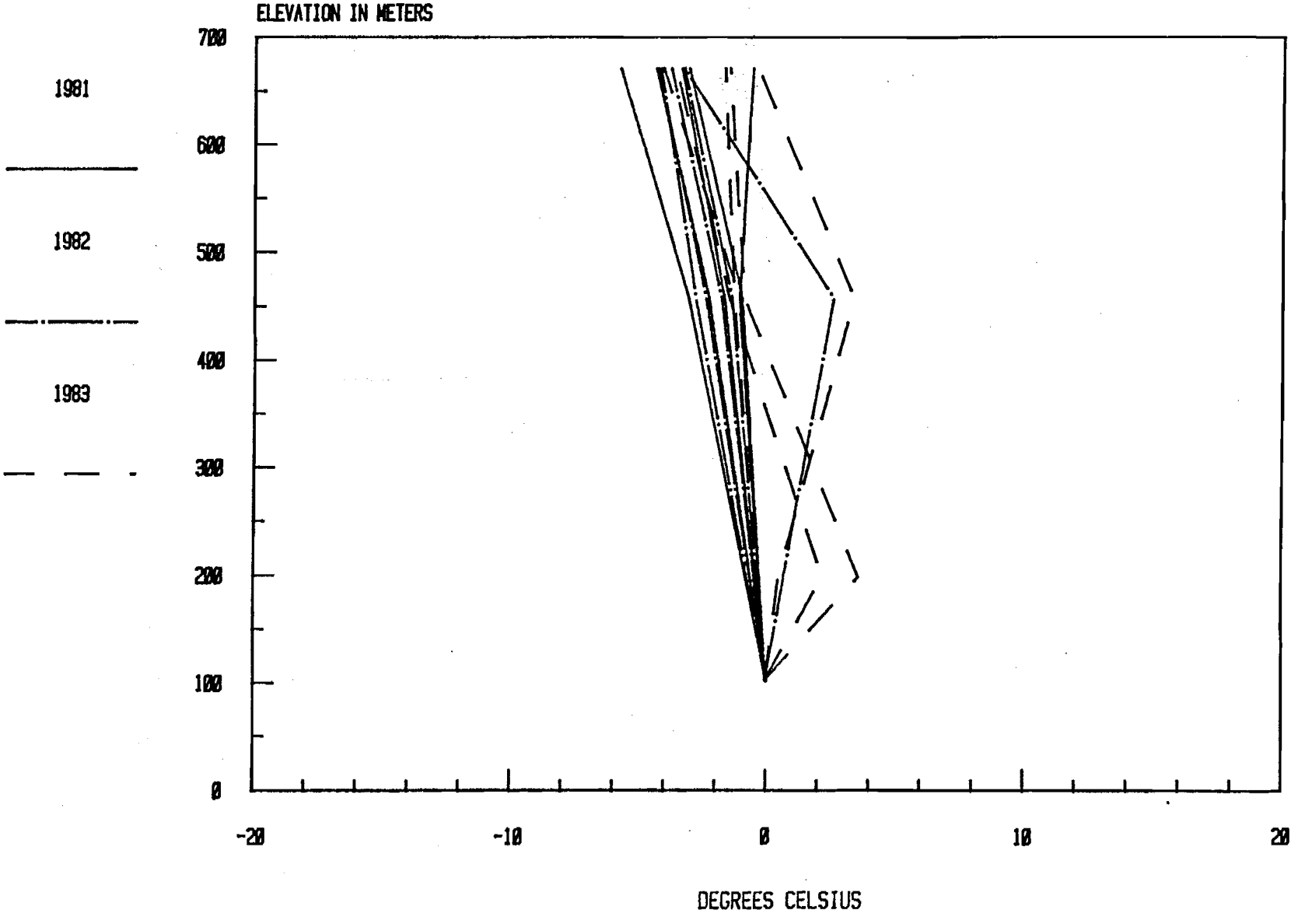
VERTICAL TEMPERATURE PROFILES: OCTOBER

DEPARTURE FROM TALKEETNA



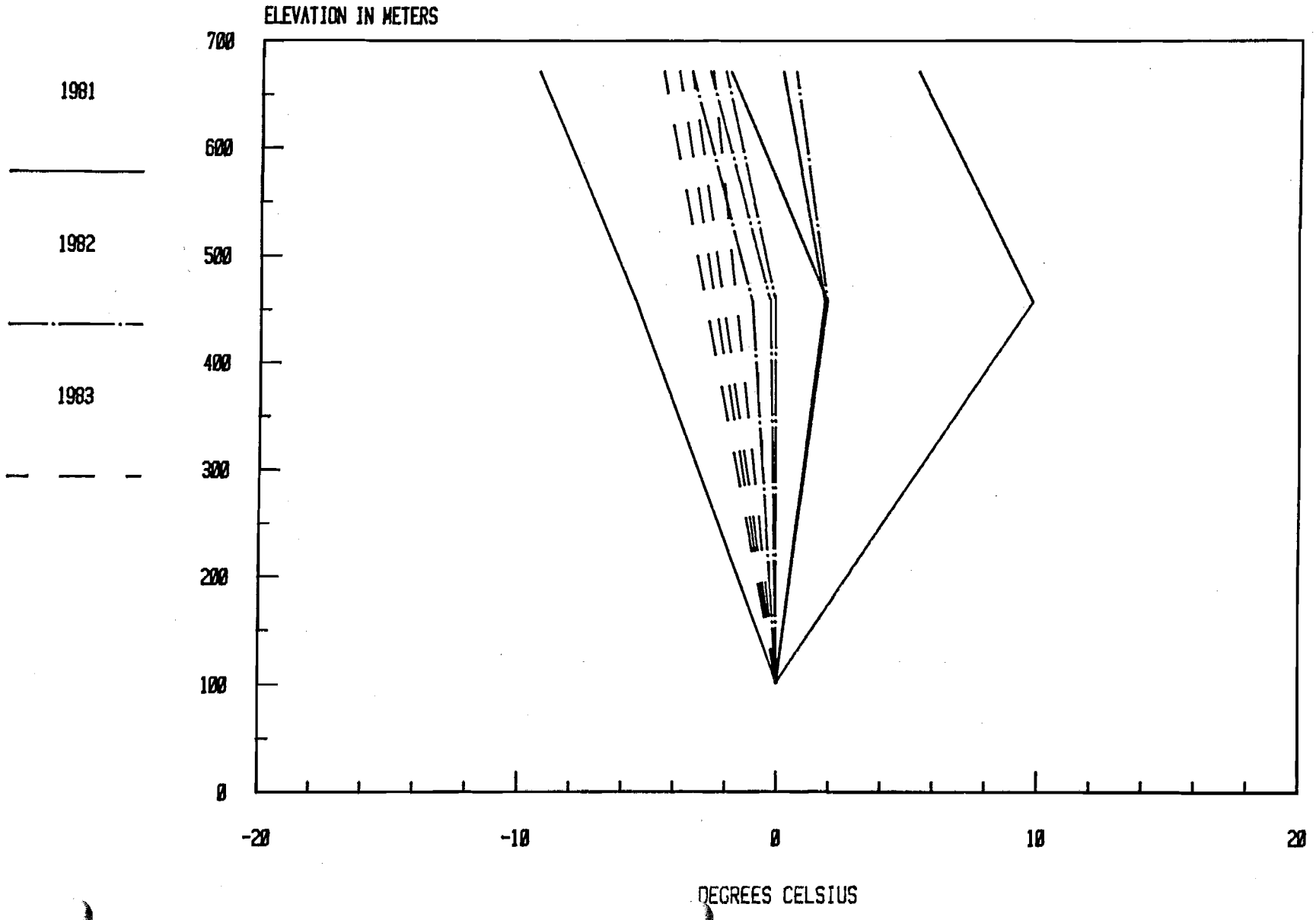
VERTICAL TEMPERATURE PROFILES: NOVEMBER

DEPARTURE FROM TALKEETNA



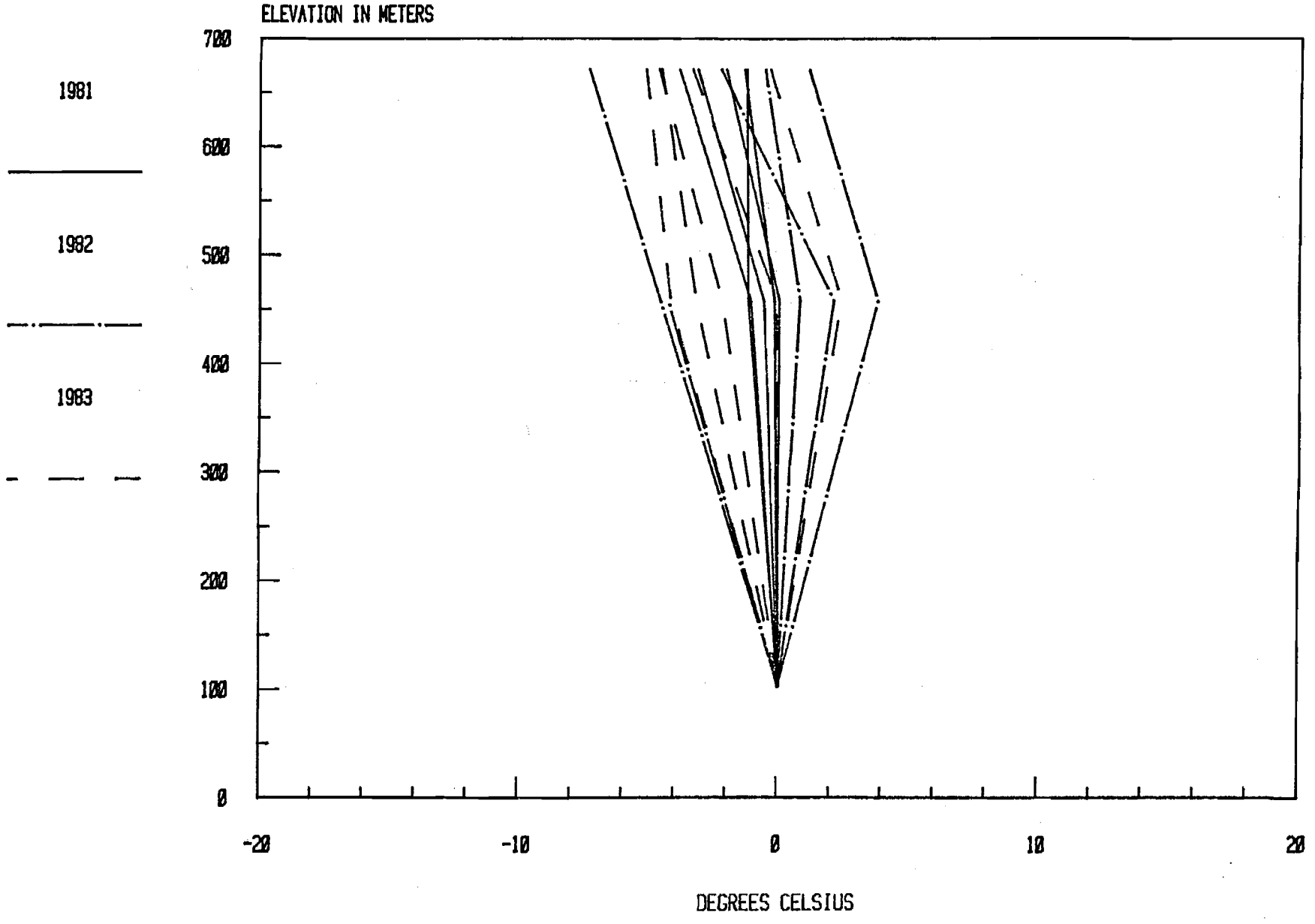
VERTICAL TEMPERATURE PROFILES: DECEMBER

DEPARTURE FROM TALKEETNA



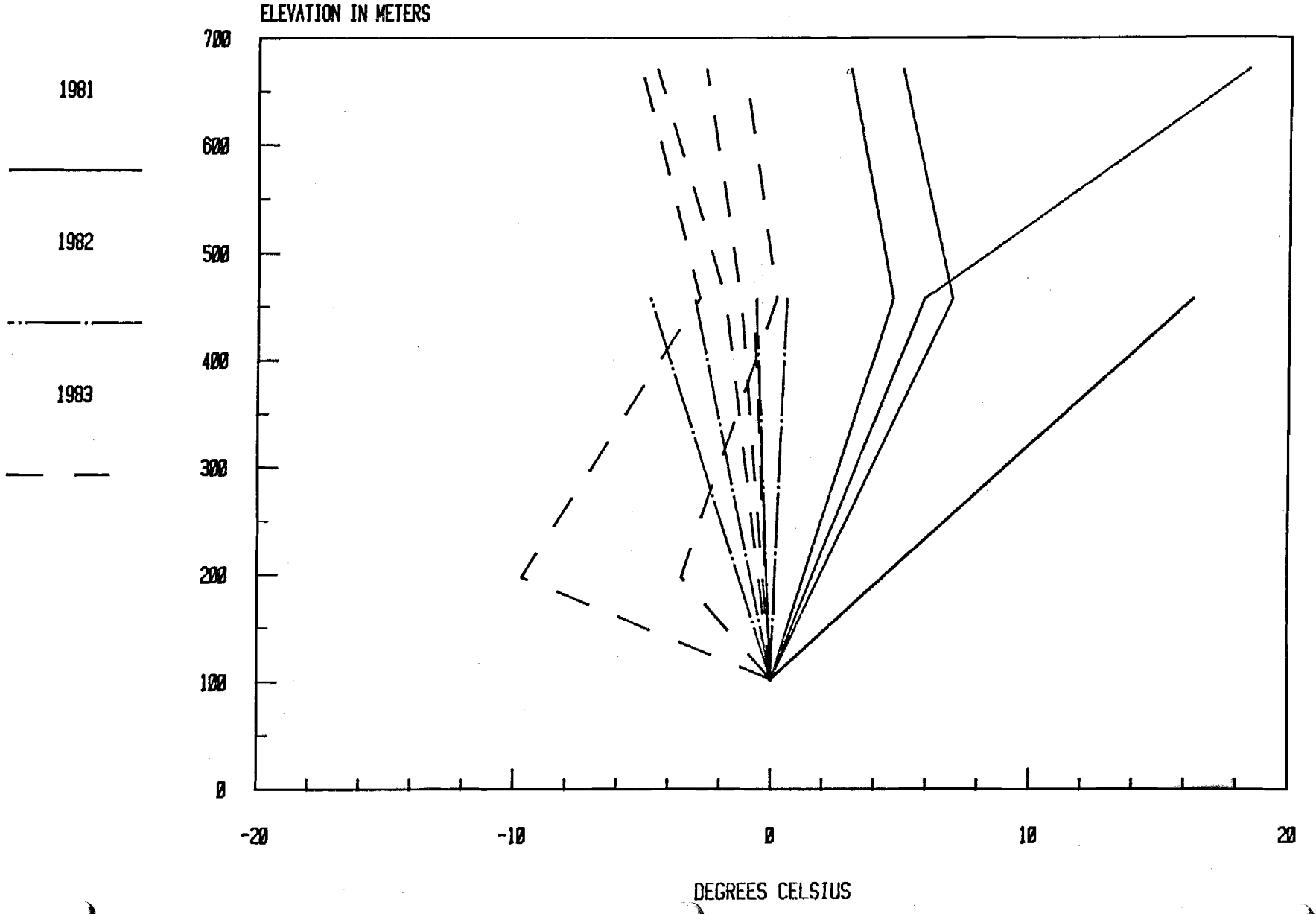
VERTICAL TEMPERATURE PROFILES: JANUARY

DEPARTURE FROM TALKEETNA



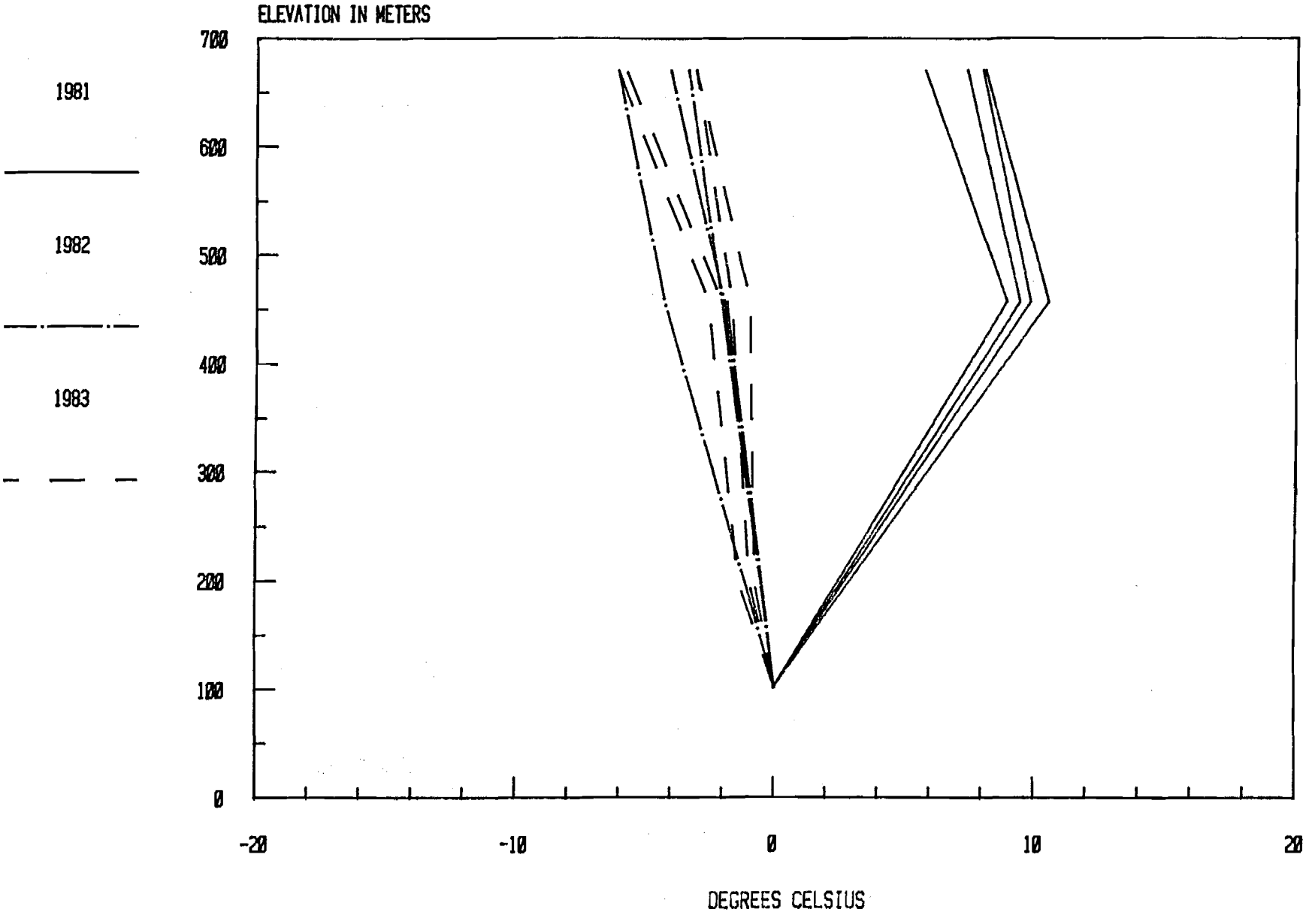
VERTICAL TEMPERATURE PROFILES: FEBRUARY

DEPARTURE FROM TALKEETNA



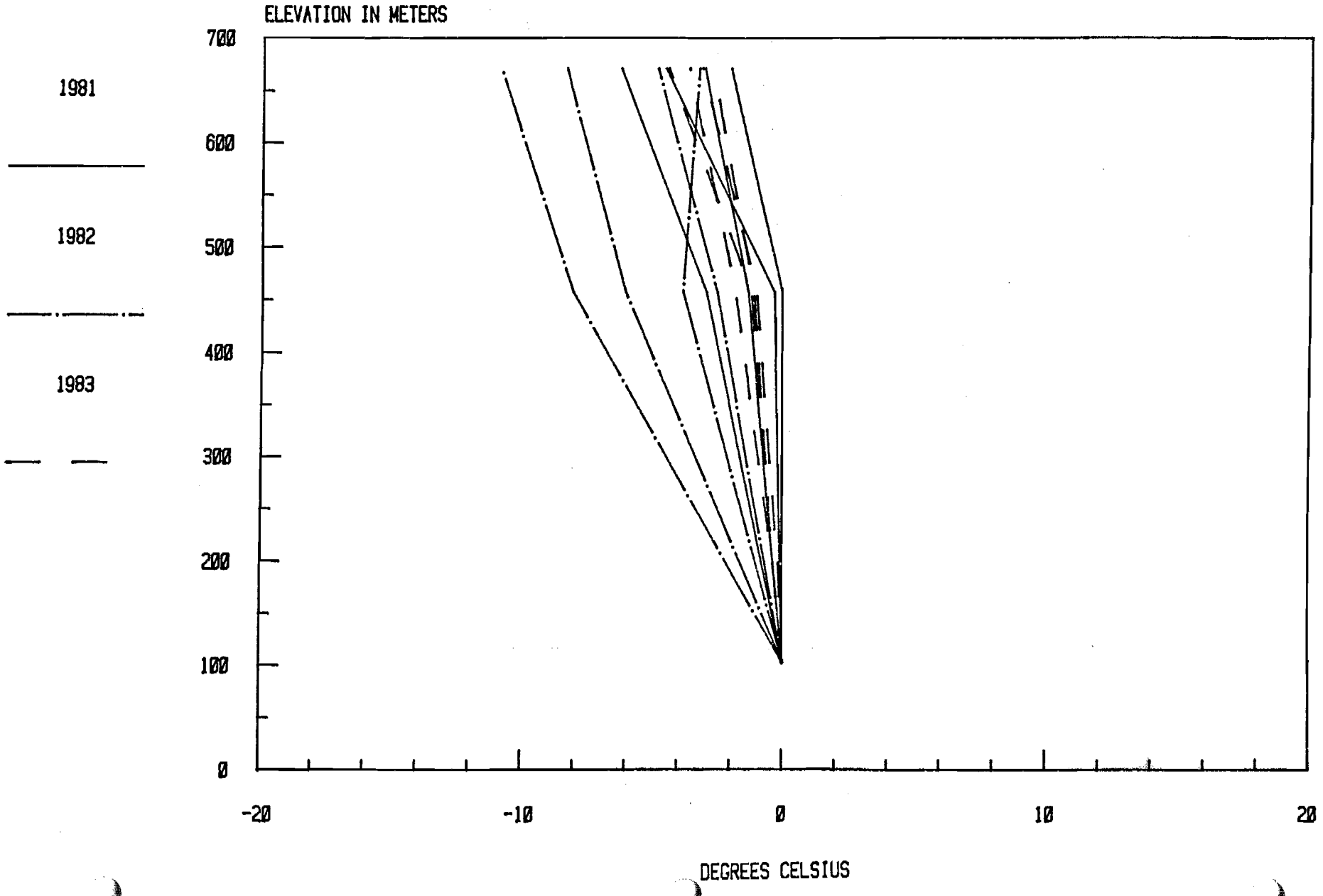
VERTICAL TEMPERATURE PROFILES: MARCH

DEPARTURE FROM TALKEETNA



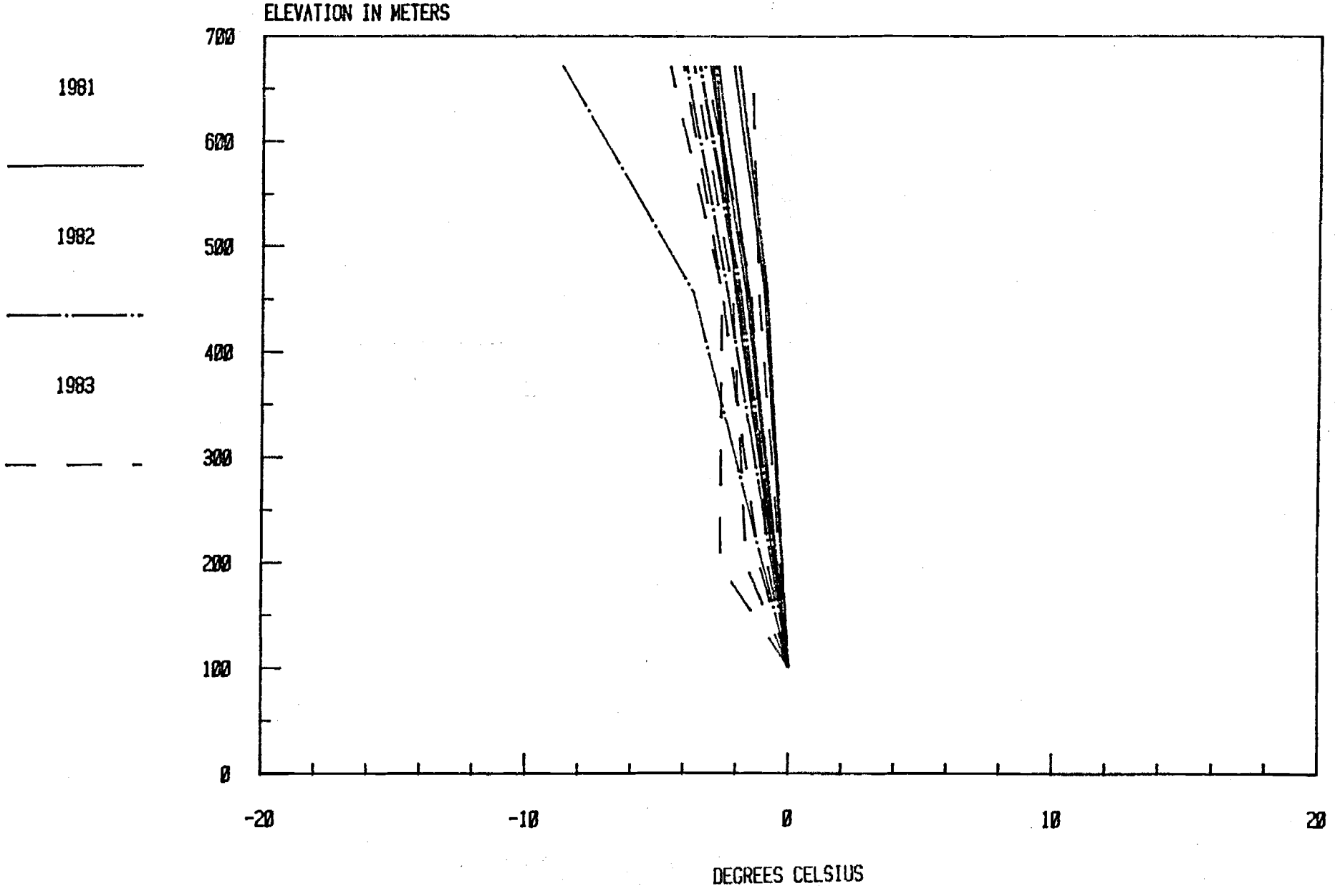
VERTICAL TEMPERATURE PROFILES: APRIL

DEPARTURE FROM TALKEETNA



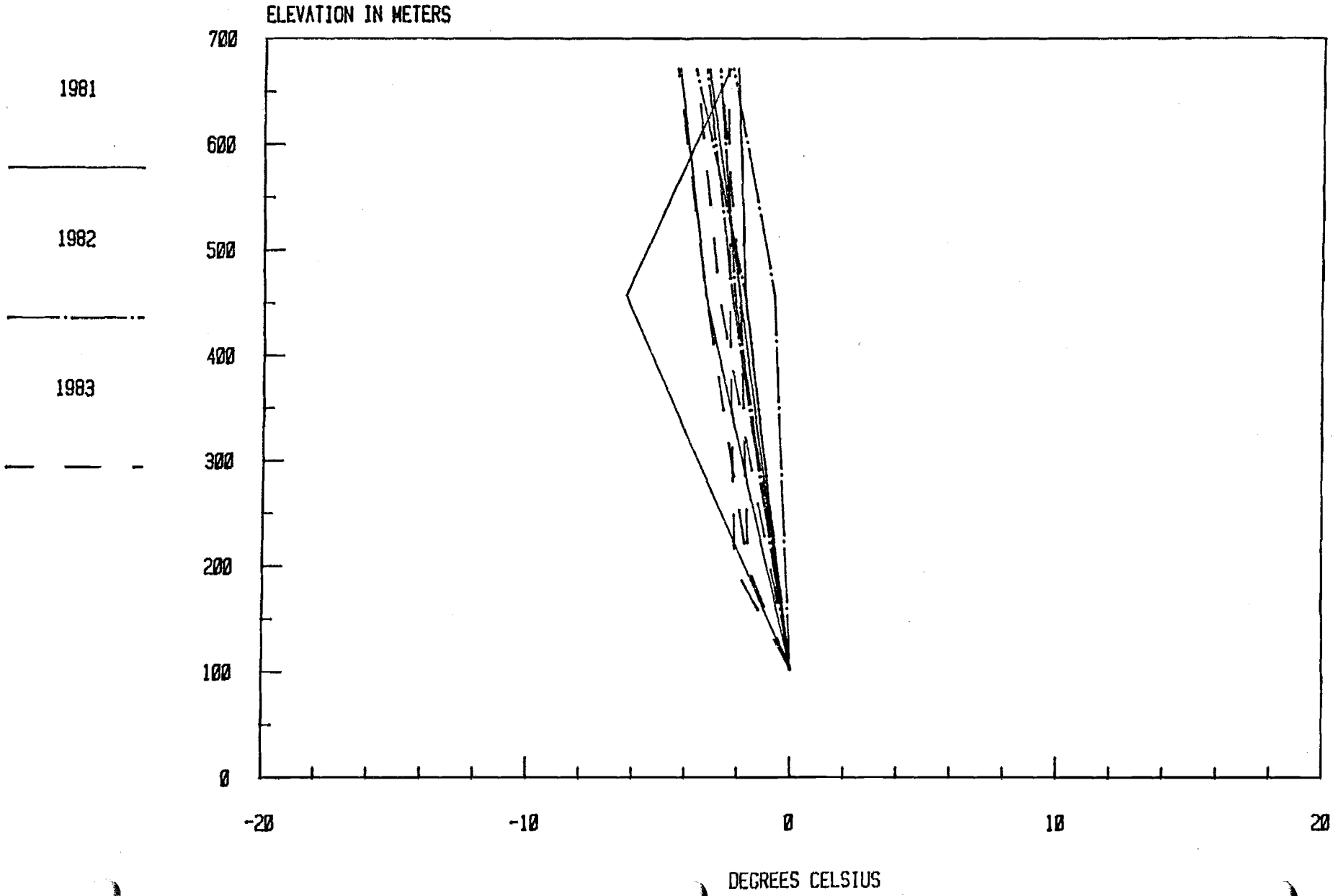
VERTICAL TEMPERATURE PROFILES: MAY

DEPARTURE FROM TALKEETNA



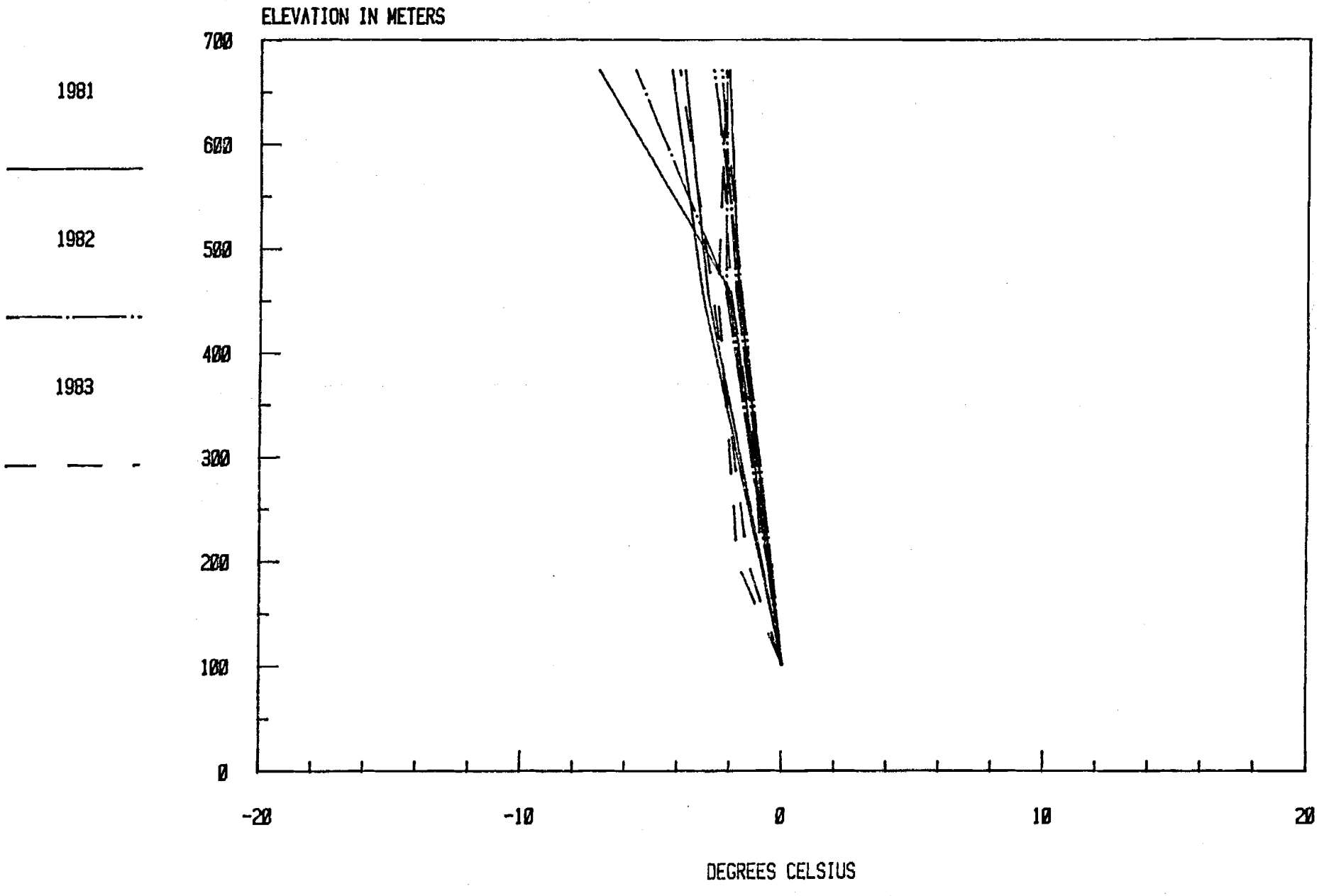
VERTICAL TEMPERATURE PROFILES: JUNE

DEPARTURE FROM TALKEETNA



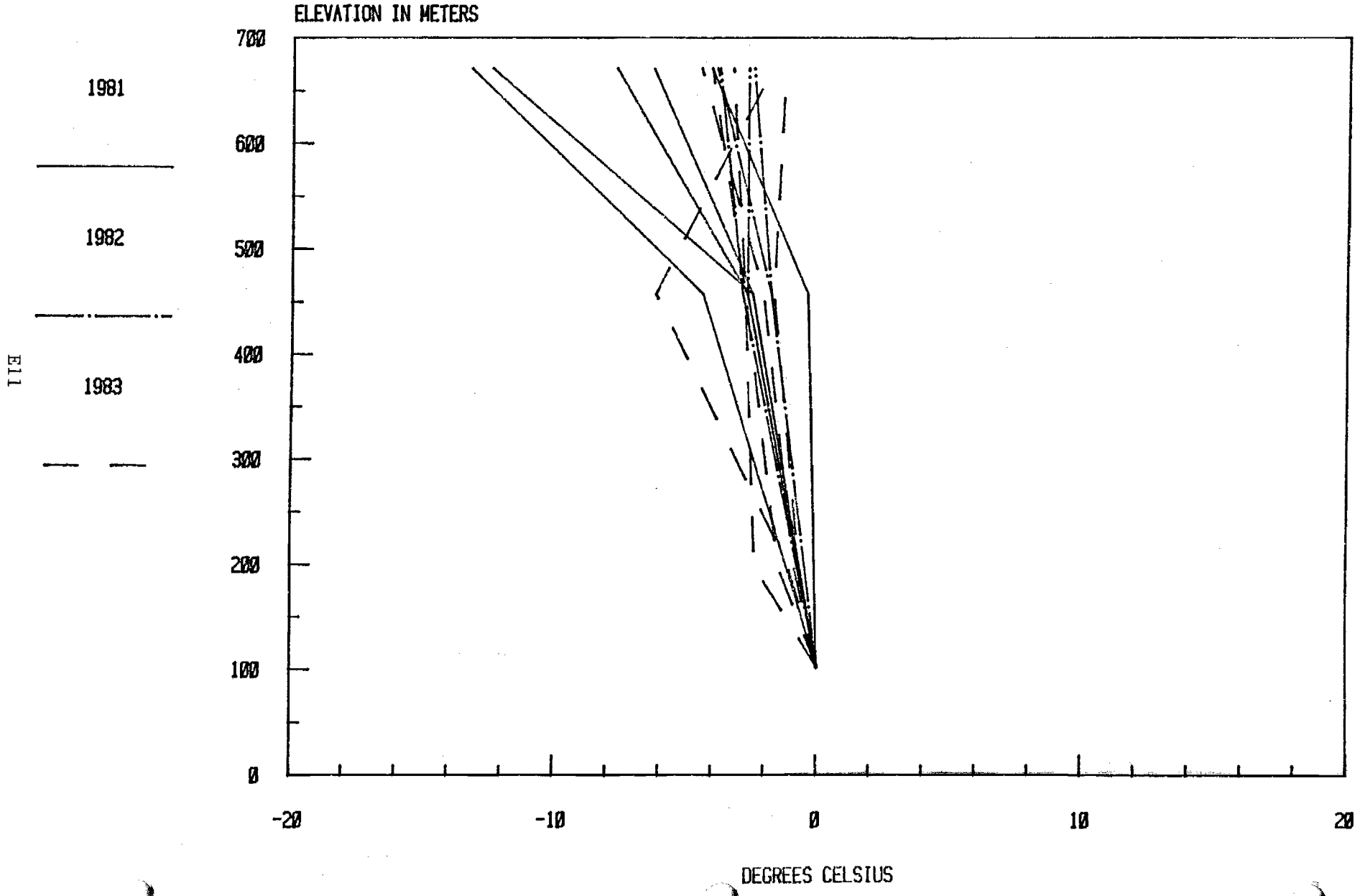
VERTICAL TEMPERATURE PROFILES: JULY

DEPARTURE FROM TALKEETNA



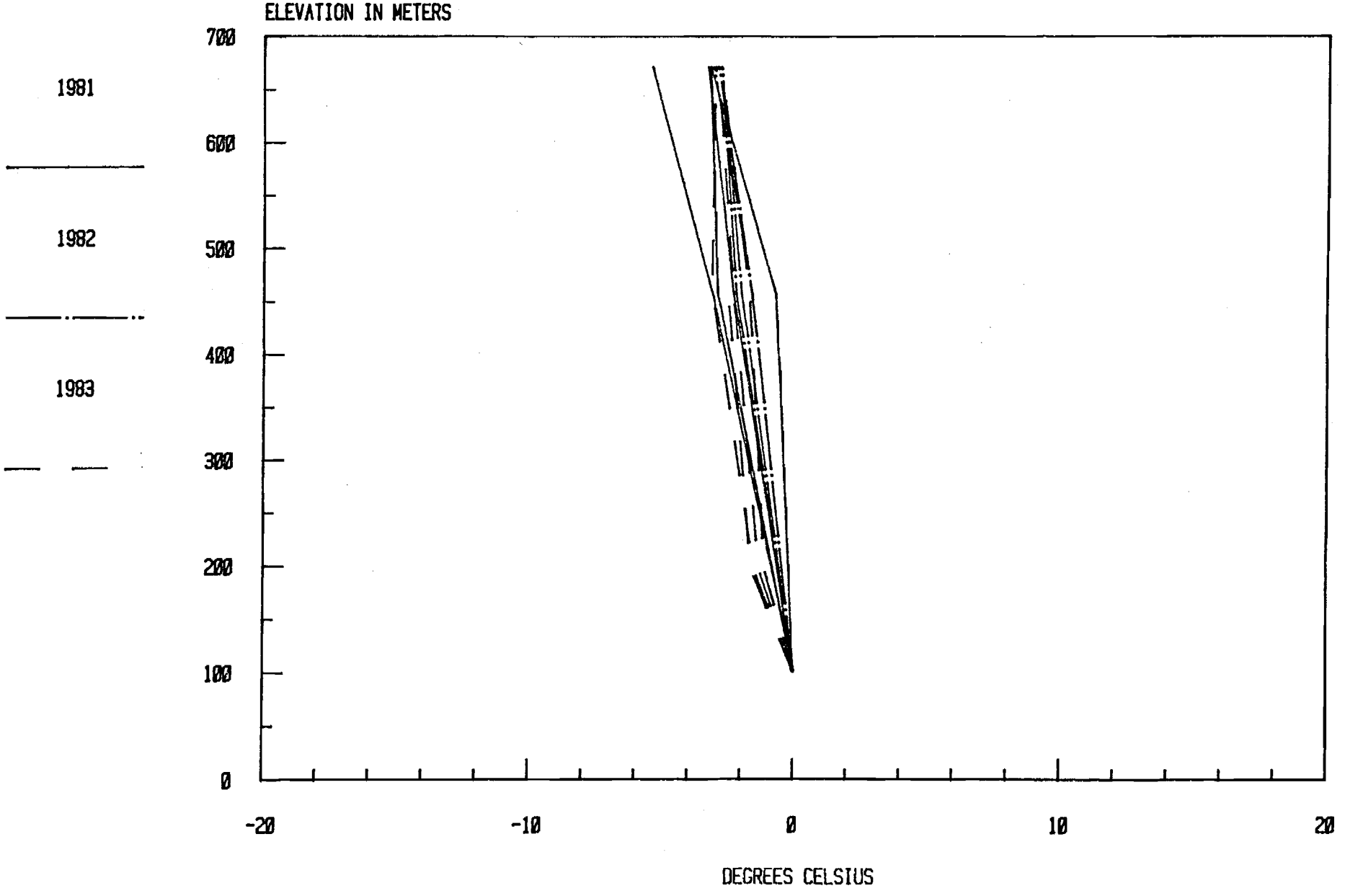
VERTICAL TEMPERATURE PROFILES: AUGUST

DEPARTURE FROM TALKEETNA



VERTICAL TEMPERATURE PROFILES: SEPTEMBER

DEPARTURE FROM TALKEETNA

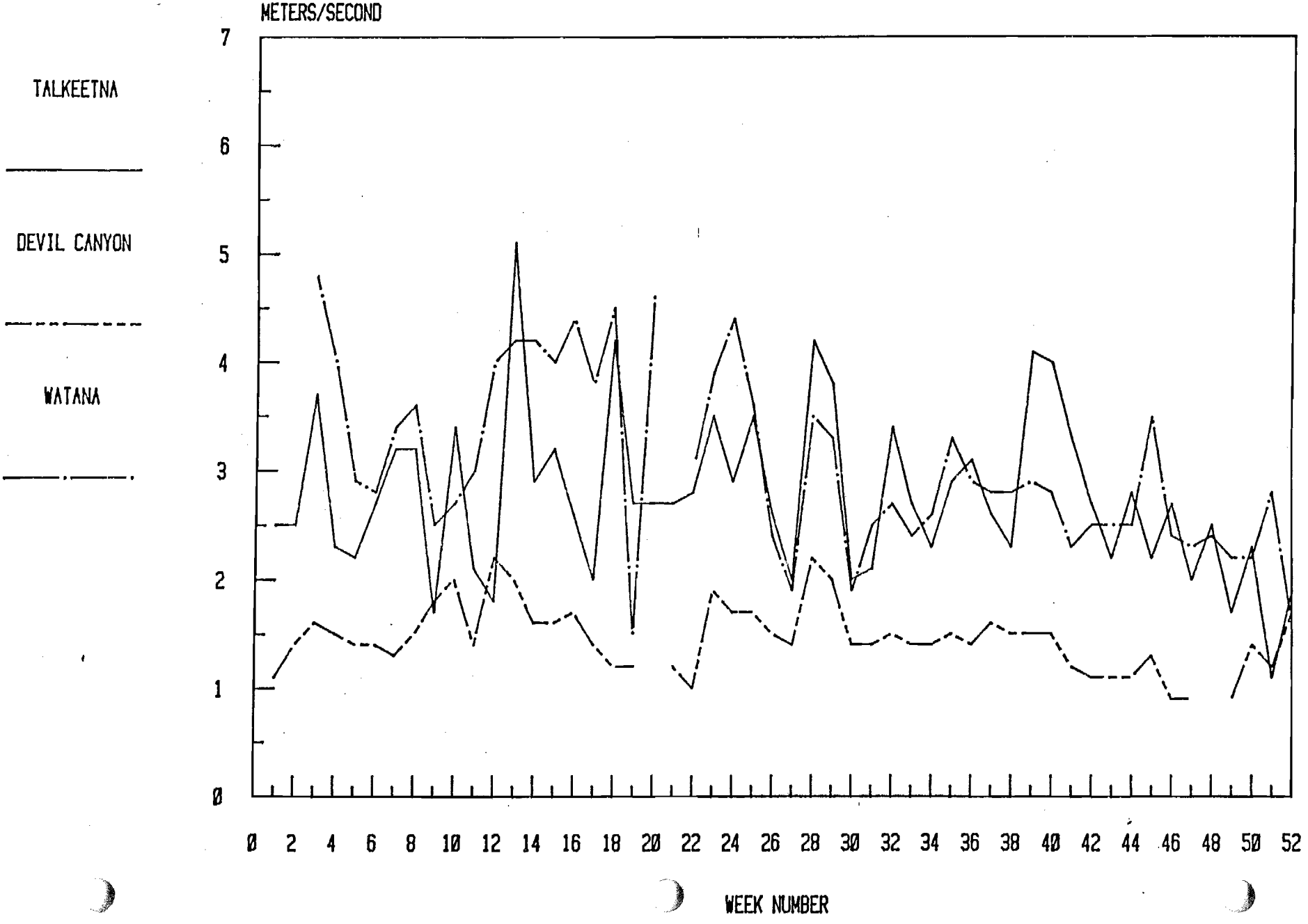


APPENDIX F

Basin weekly wind speeds

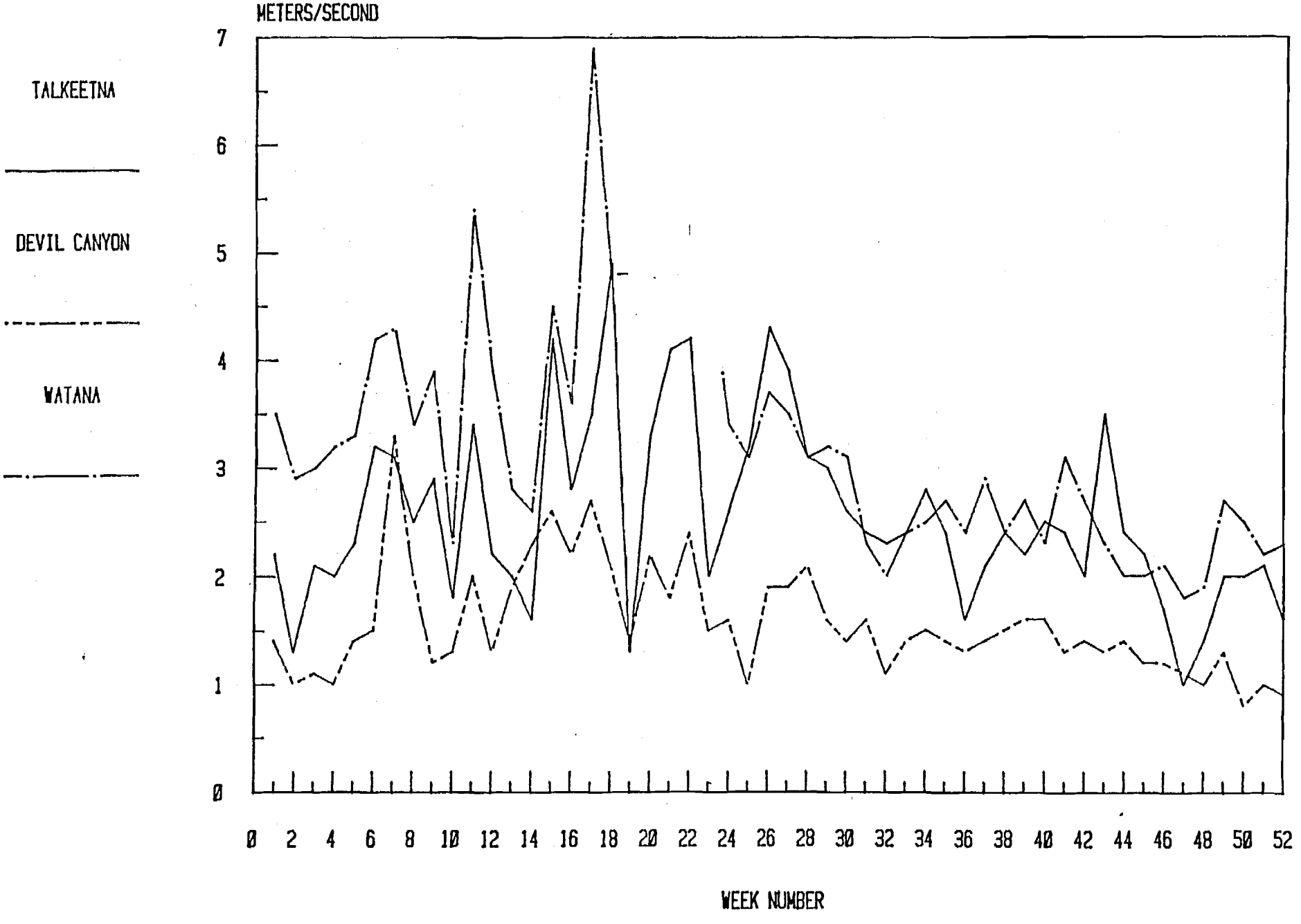
AVERAGE WEEKLY WIND SPEEDS

WATER YEAR 1981



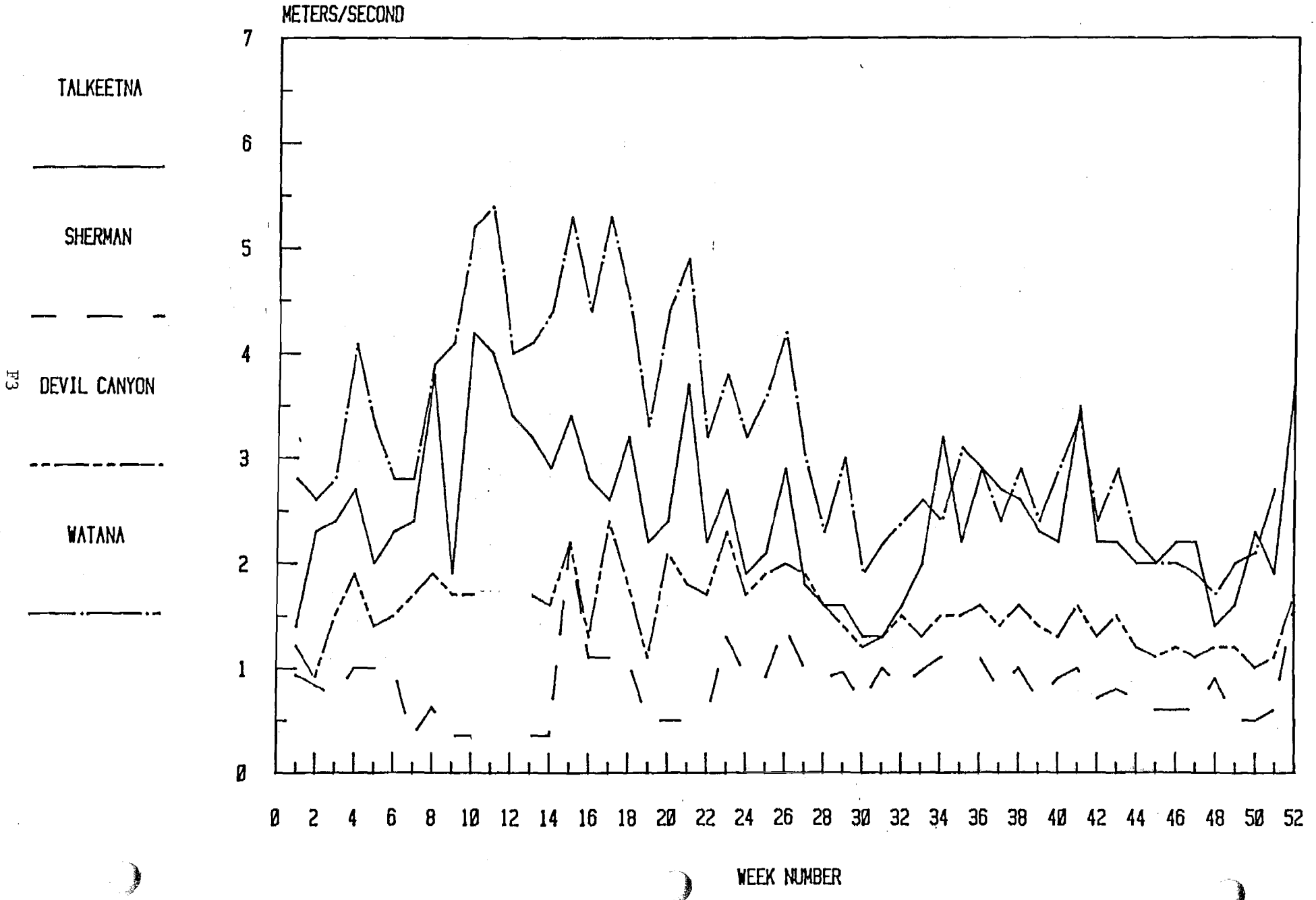
AVERAGE WEEKLY WIND SPEEDS

WATER YEAR 1982



AVERAGE WEEKLY WIND SPEEDS

WATER YEAR 1983



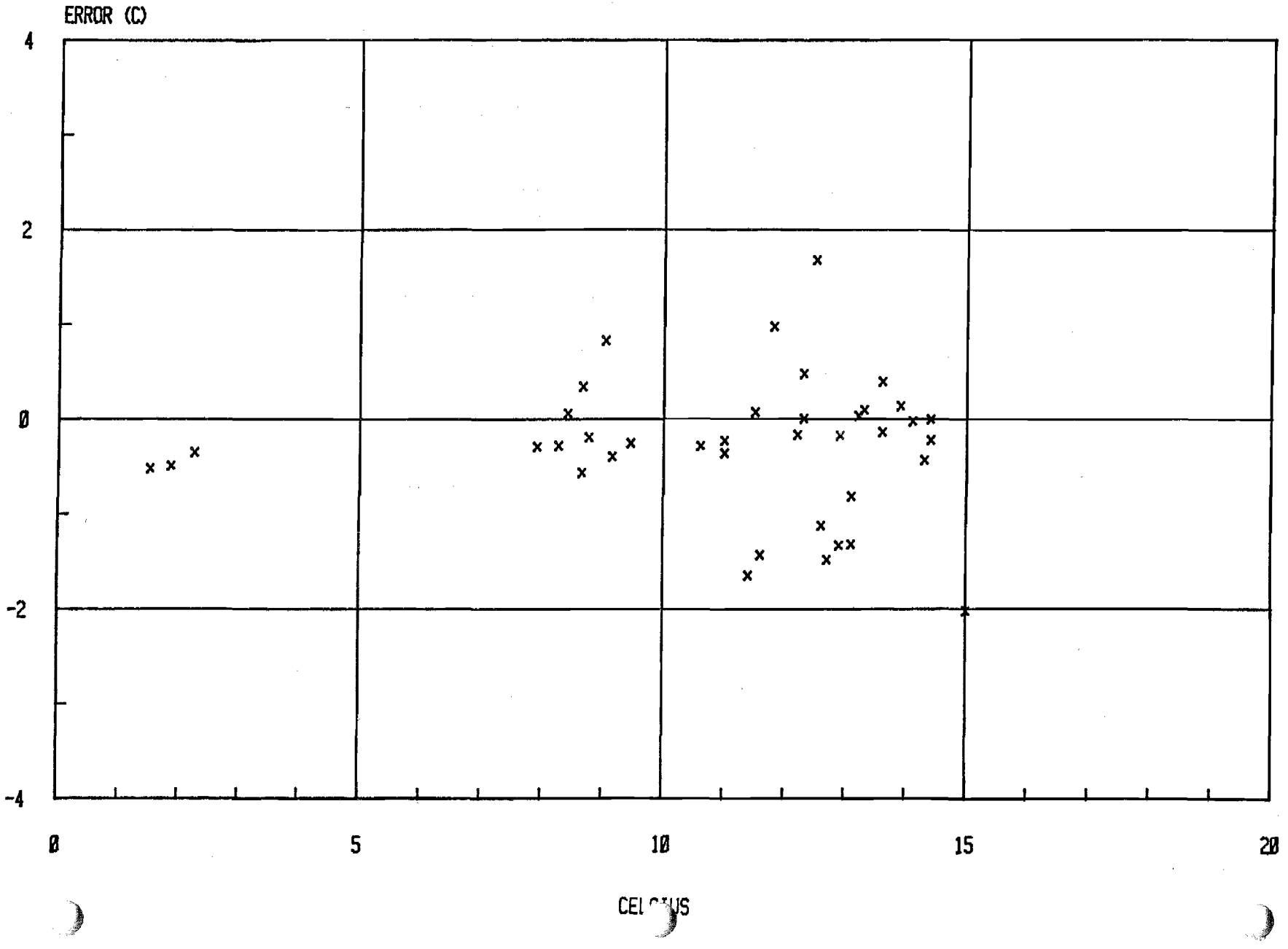
F3

APPENDIX G

Residual errors as functions of air temperature, humidity, possible sunshine and wind speed.

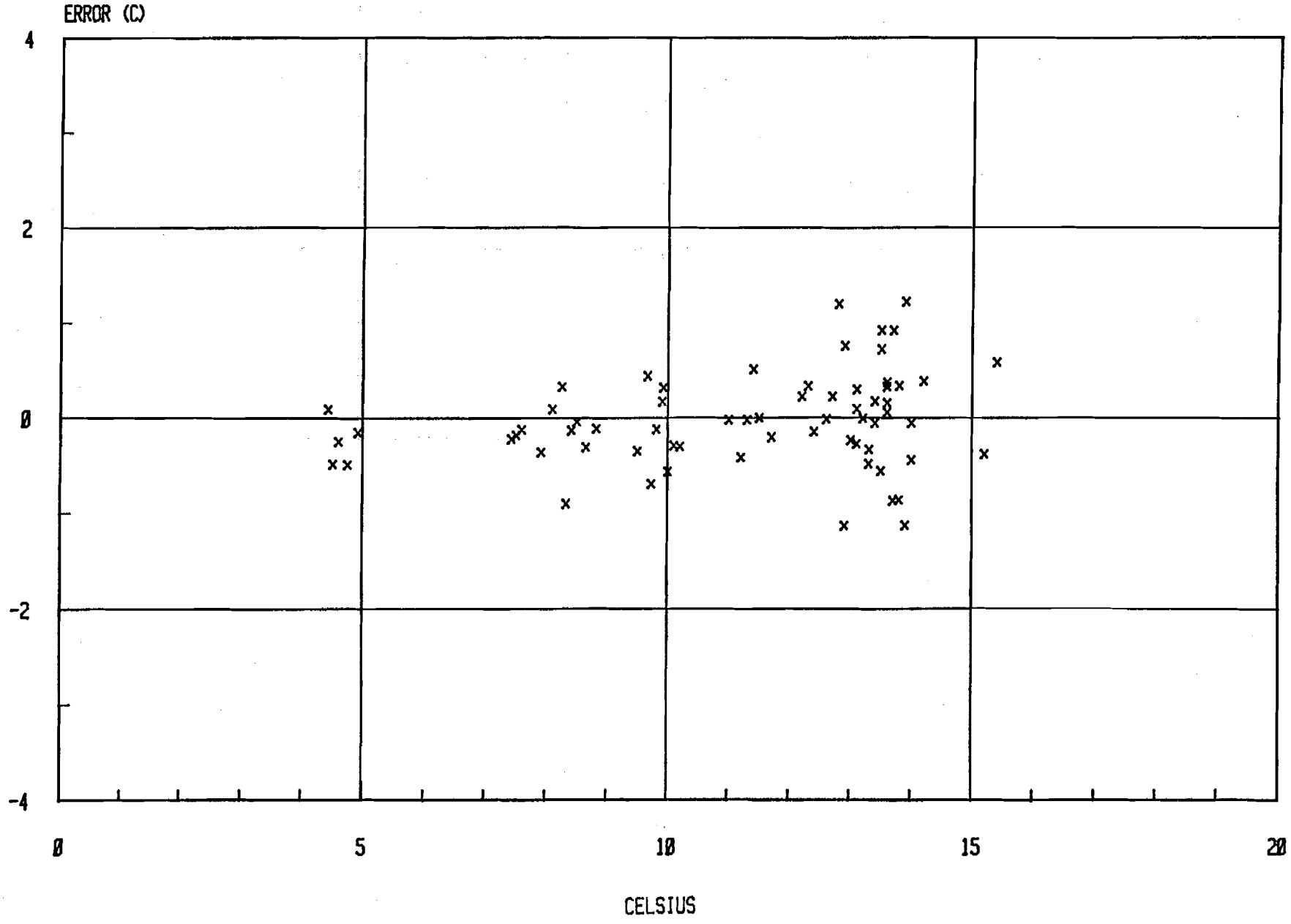
STREAM TEMPERATURE RESIDUALS

AIR TEMPERATURE 1981



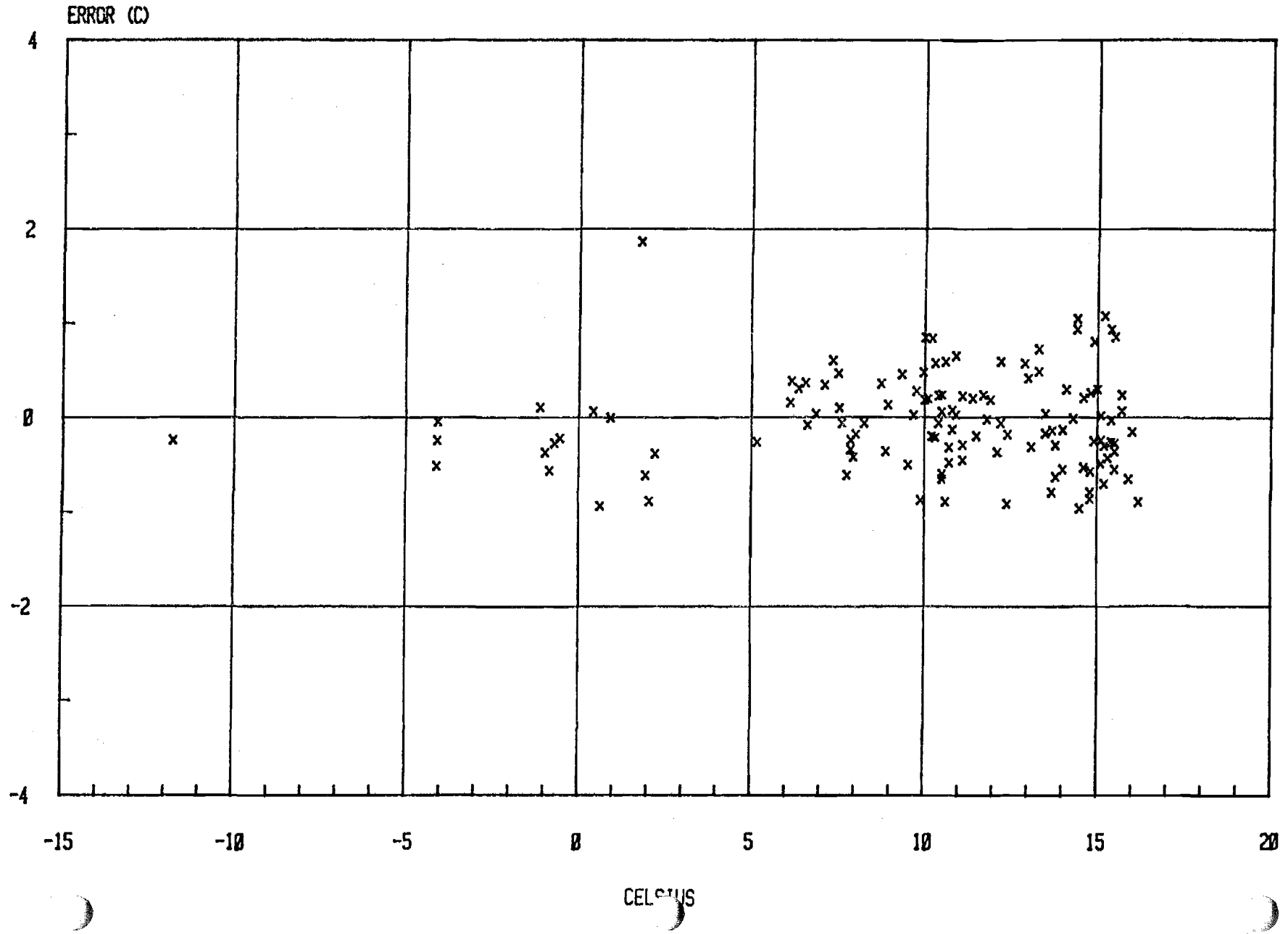
STREAM TEMPERATURE RESIDUALS

AIR TEMPERATURE 1982



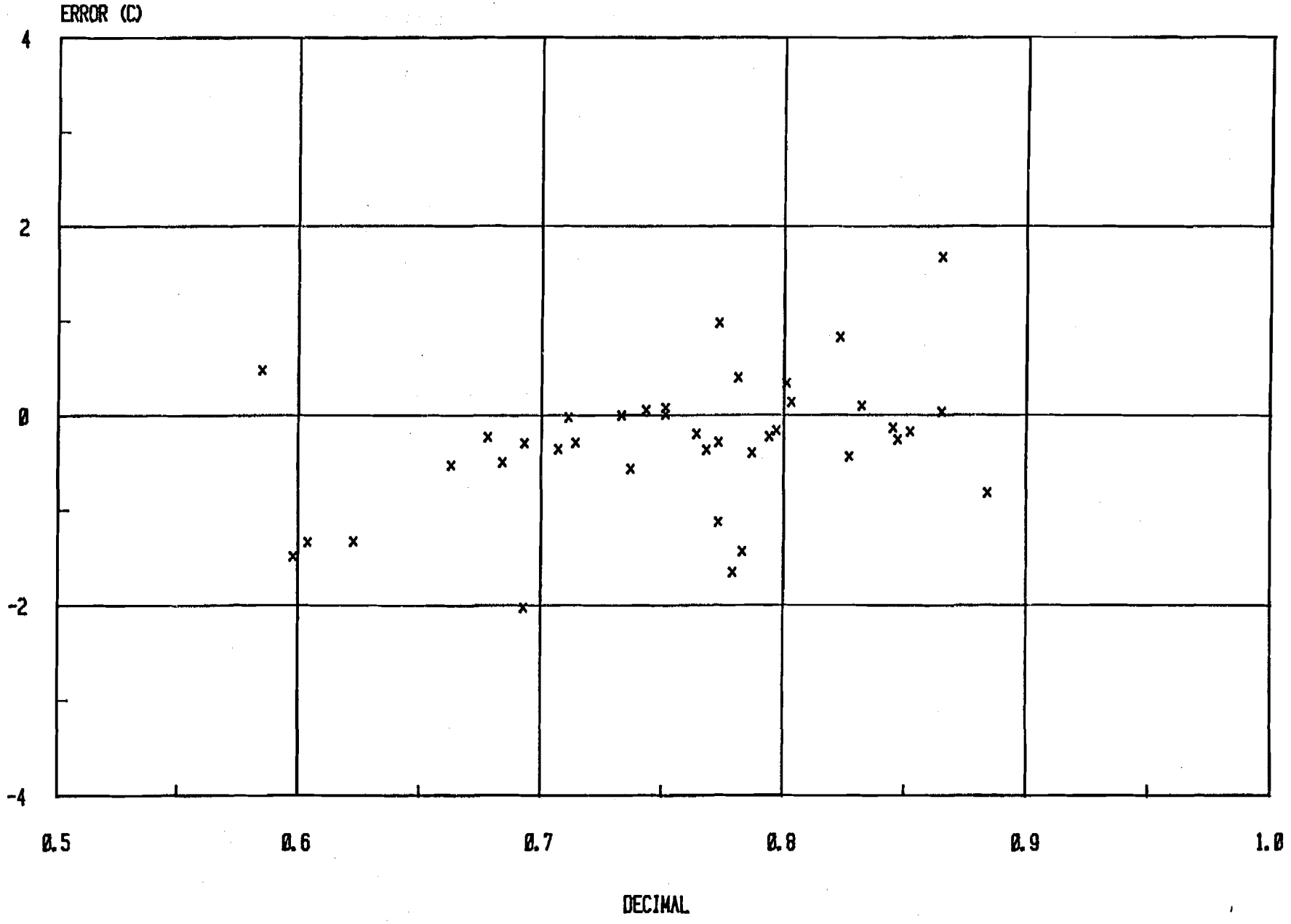
STREAM TEMPERATURE RESIDUALS

AIR TEMPERATURE 1983



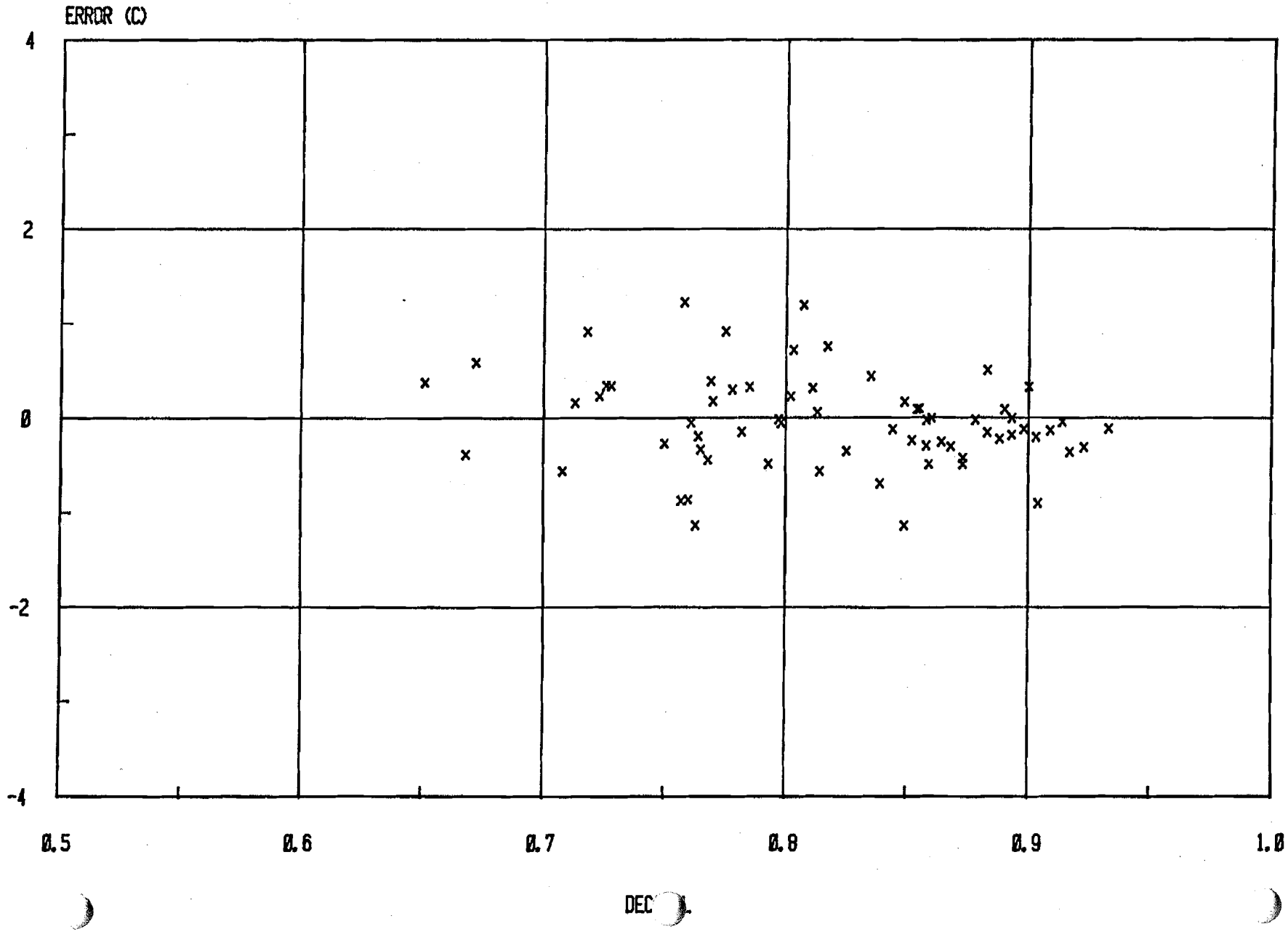
STREAM TEMPERATURE RESIDUALS

RELATIVE HUMIDITY 1981



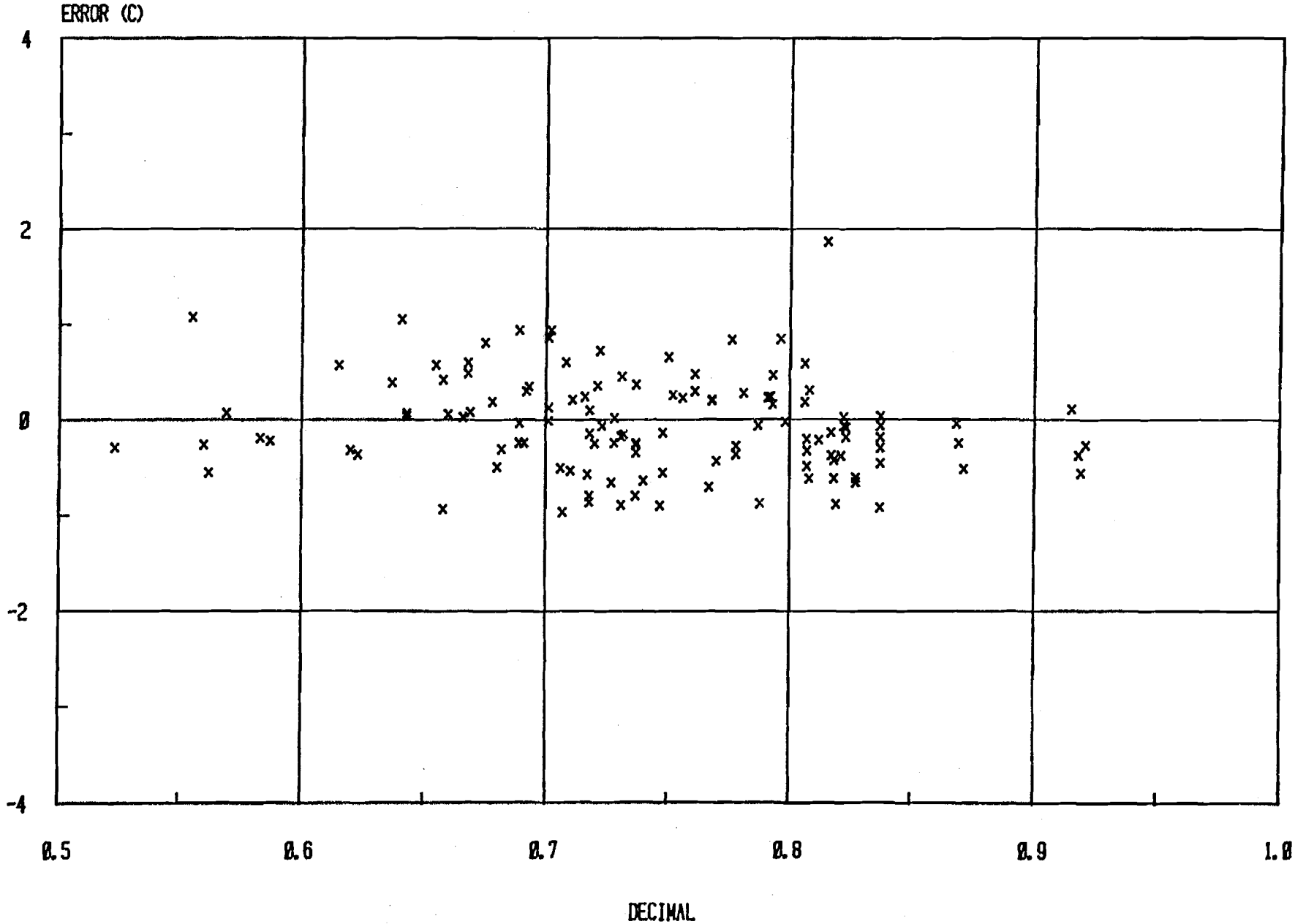
STREAM TEMPERATURE RESIDUALS

RELATIVE HUMIDITY 1982



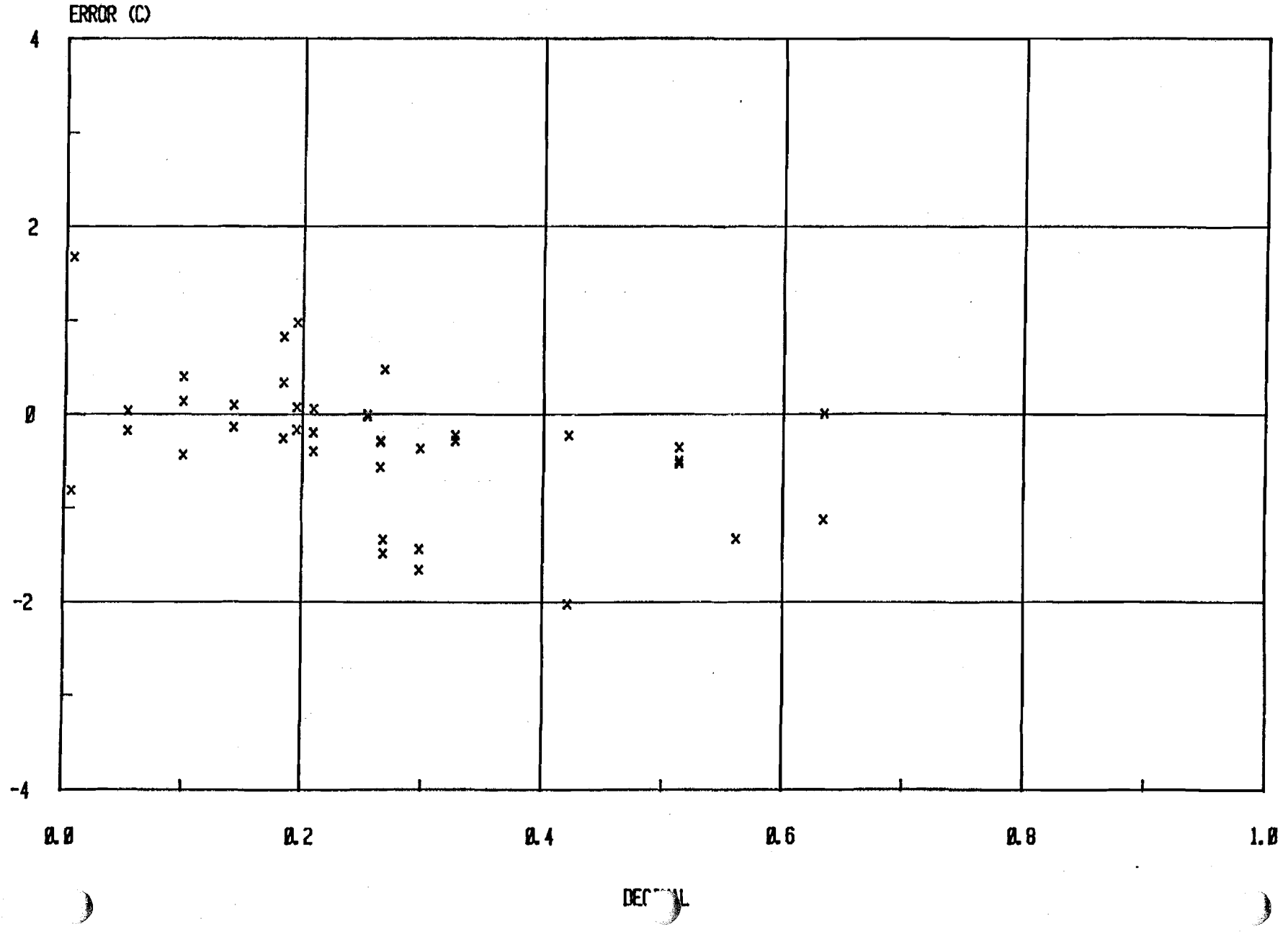
STREAM TEMPERATURE RESIDUALS

RELATIVE HUMIDITY 1983



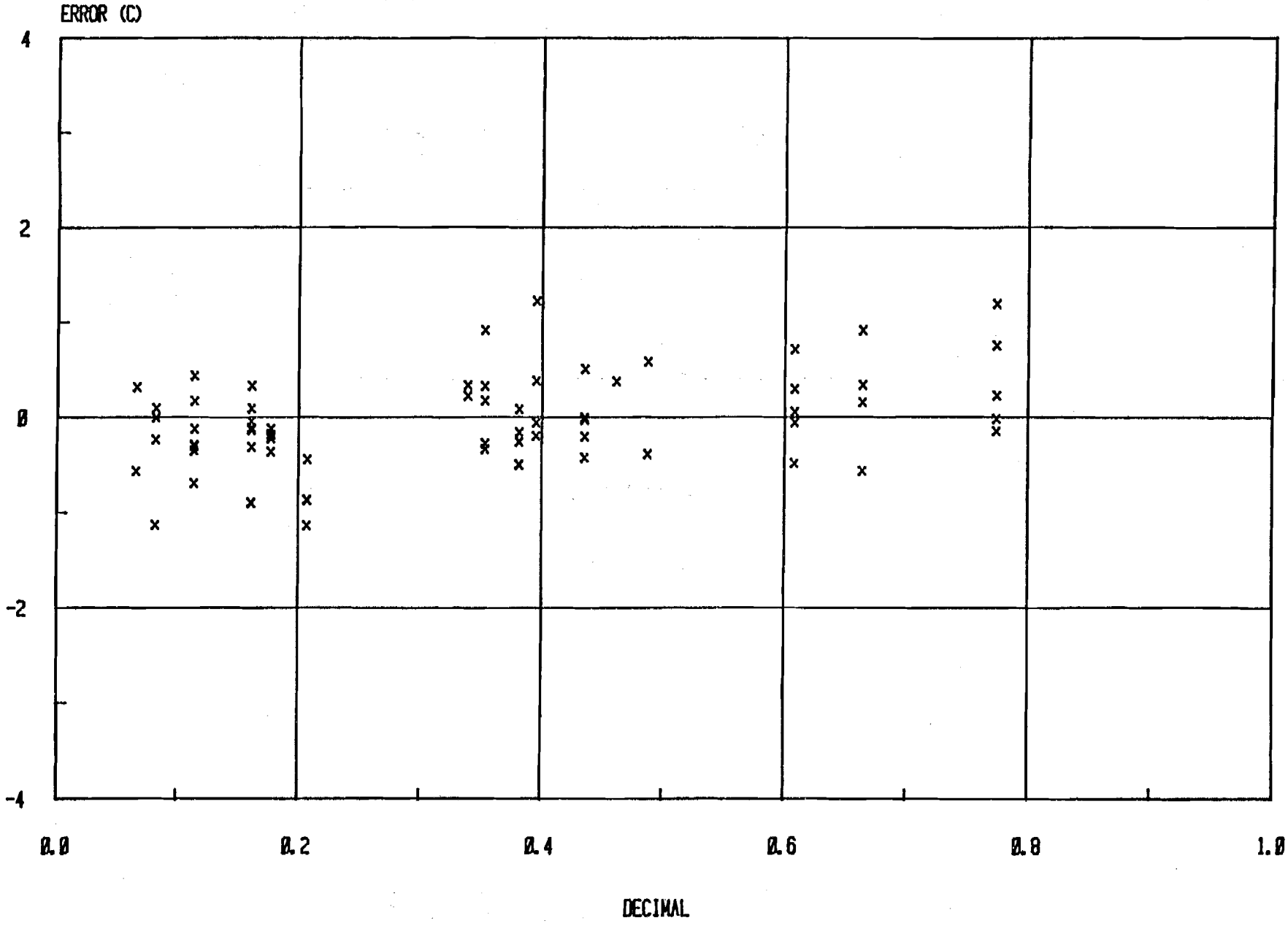
STREAM TEMPERATURE RESIDUALS

POSSIBLE SUNSHINE 1981



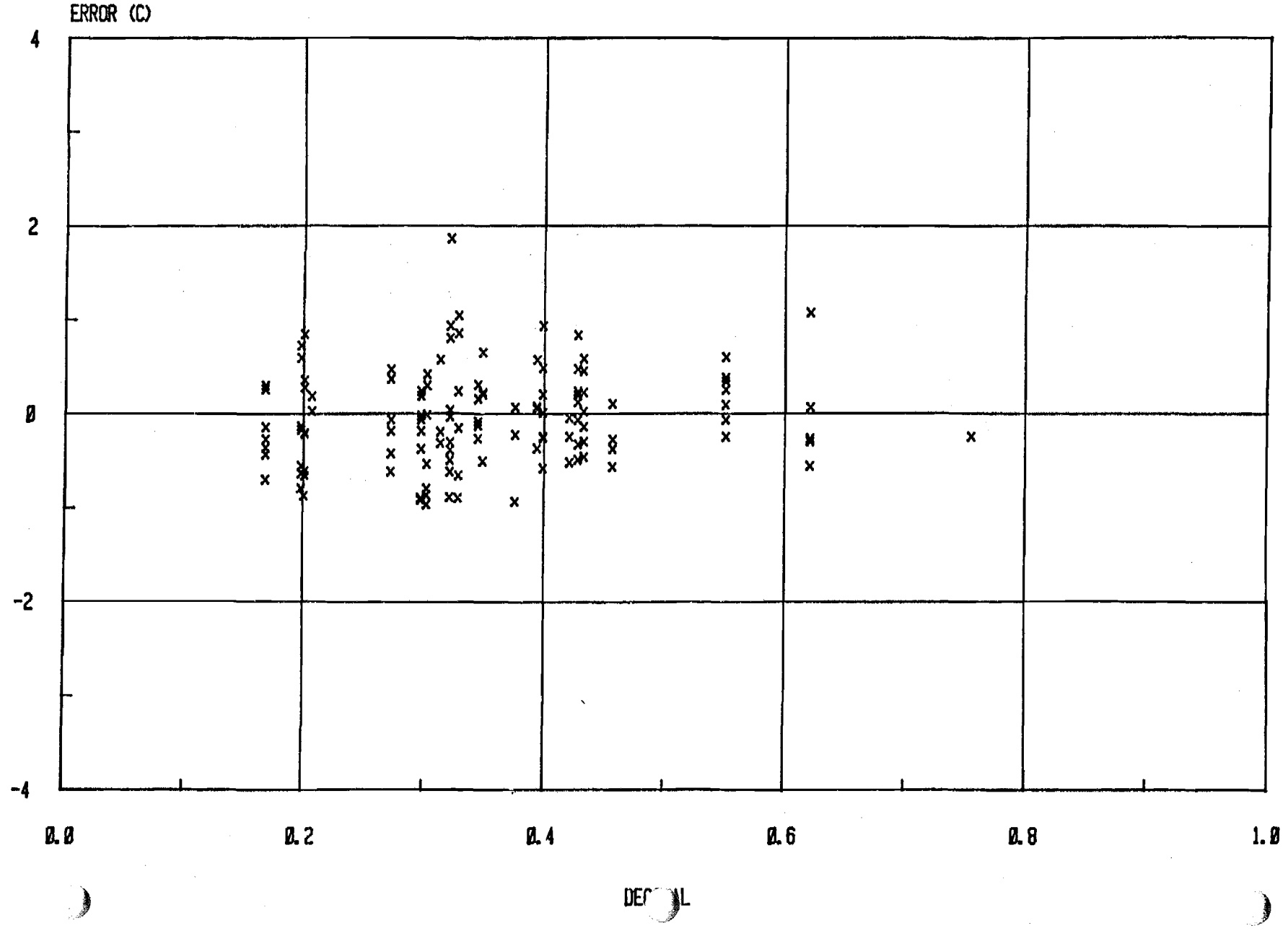
STREAM TEMPERATURE RESIDUALS

POSSIBLE SUNSHINE 1982



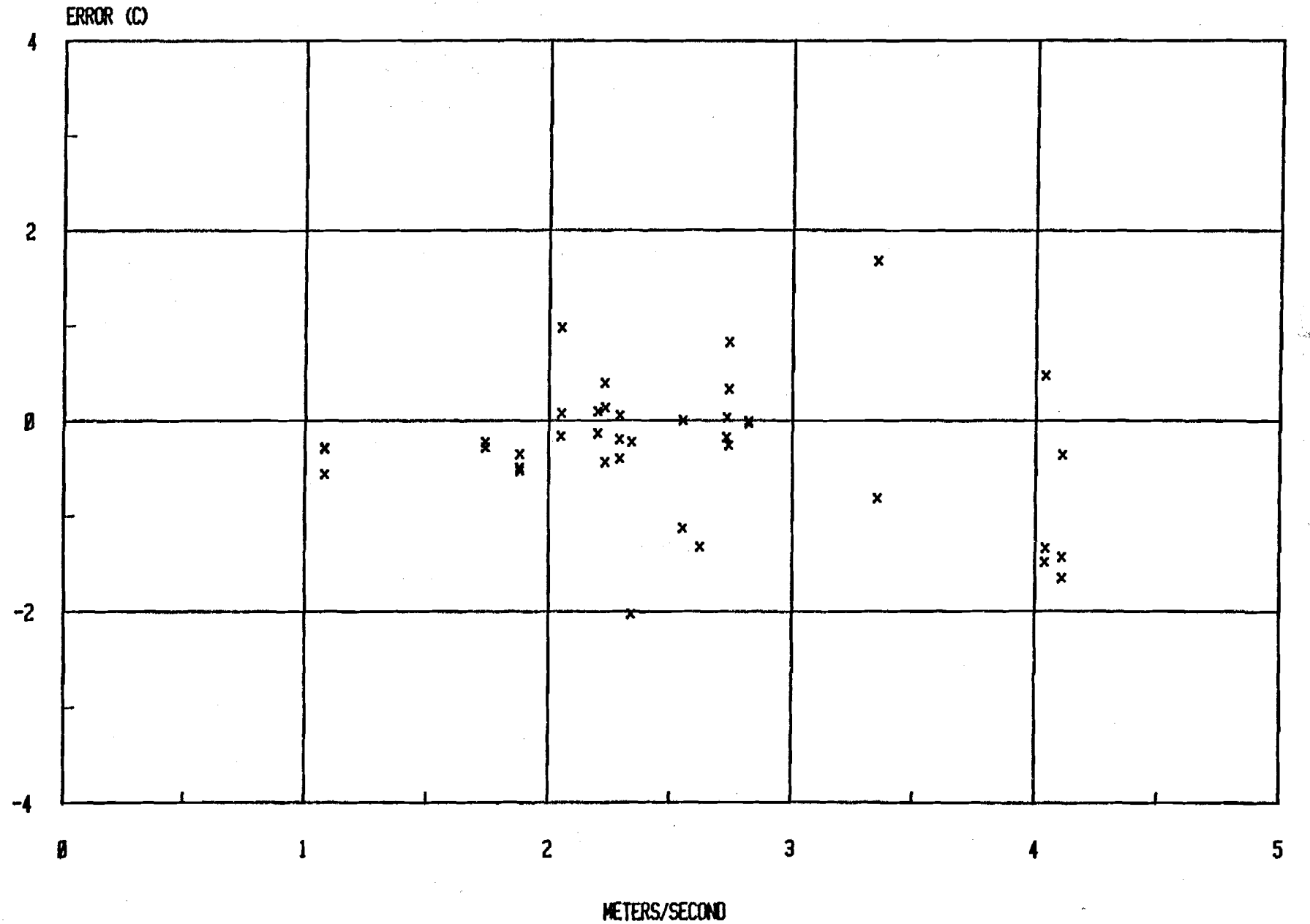
STREAM TEMPERATURE RESIDUALS

POSSIBLE SUNSHINE 1983



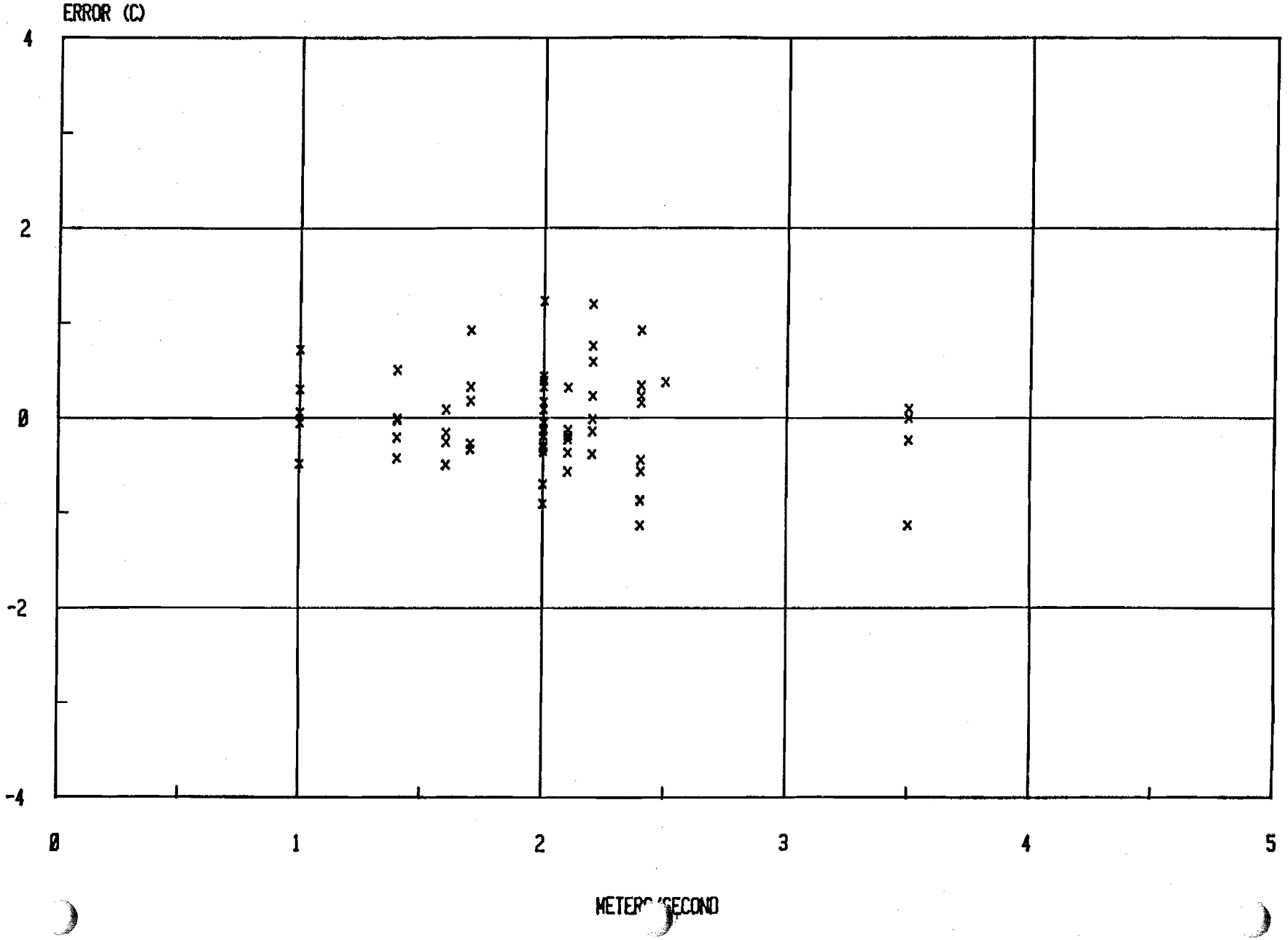
STREAM TEMPERATURE RESIDUALS

WIND SPEED 1981



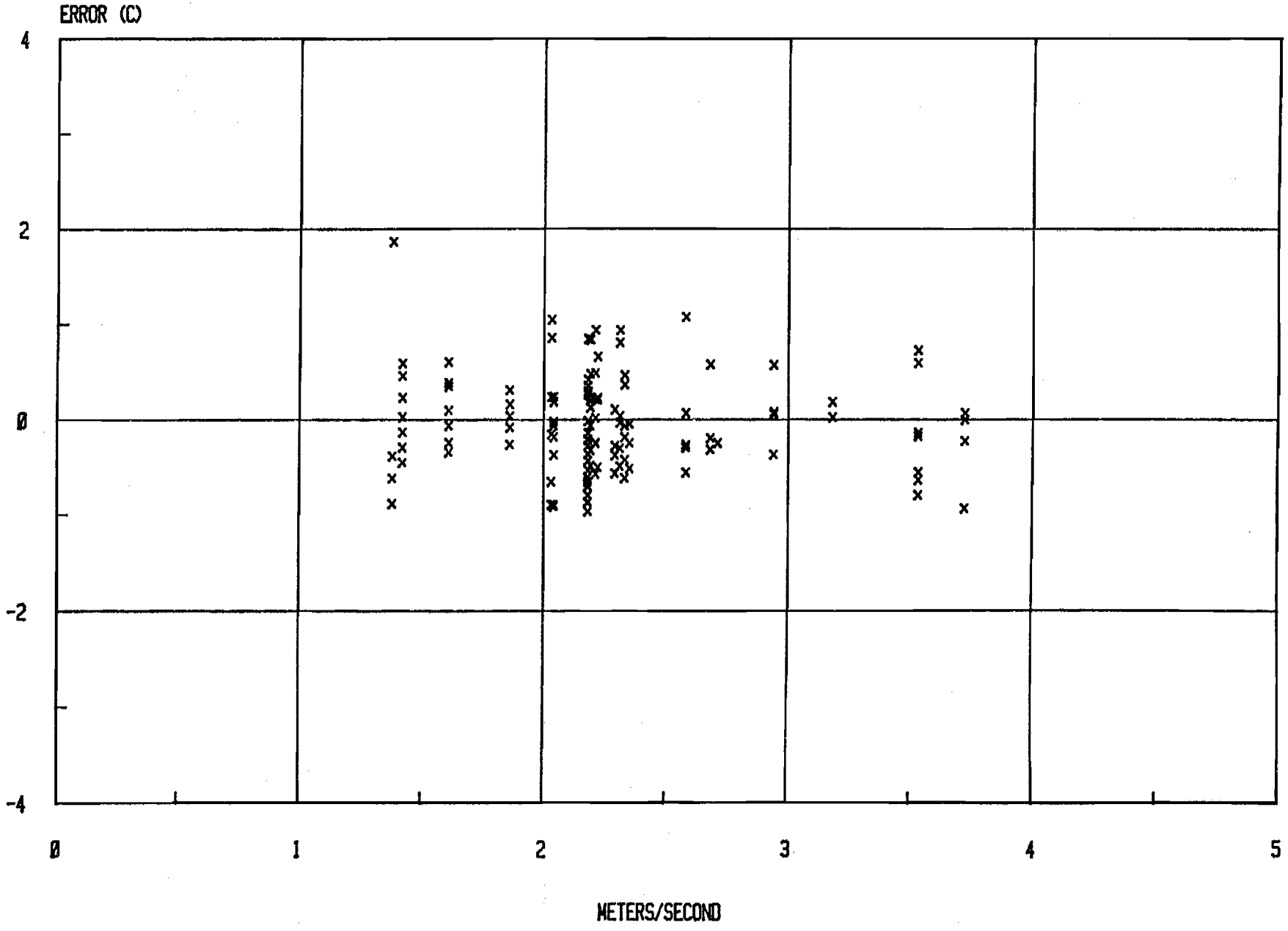
STREAM TEMPERATURE RESIDUALS

WIND SPEED 1982



STREAM TEMPERATURE RESIDUALS

WIND SPEED 1983

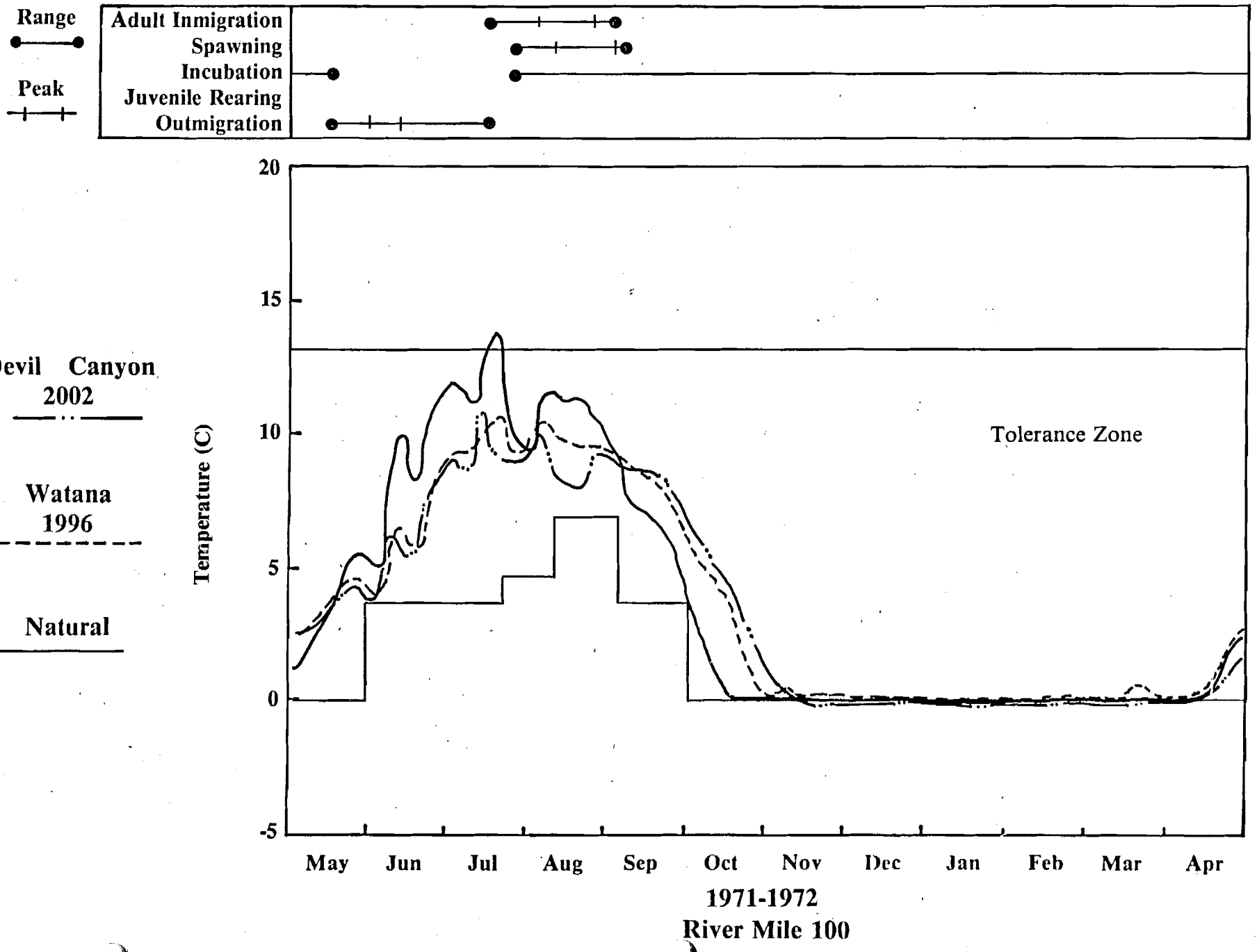


APPENDIX H

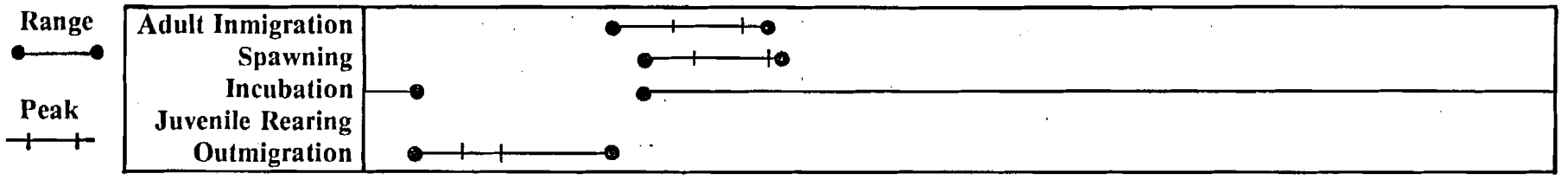
Temperature histories for river miles 100, 130 and 150 in relation to the five Pacific salmon life phase activities for natural, Watana filling, Watana-only and Watana/Devil Canyon operational scenarios.

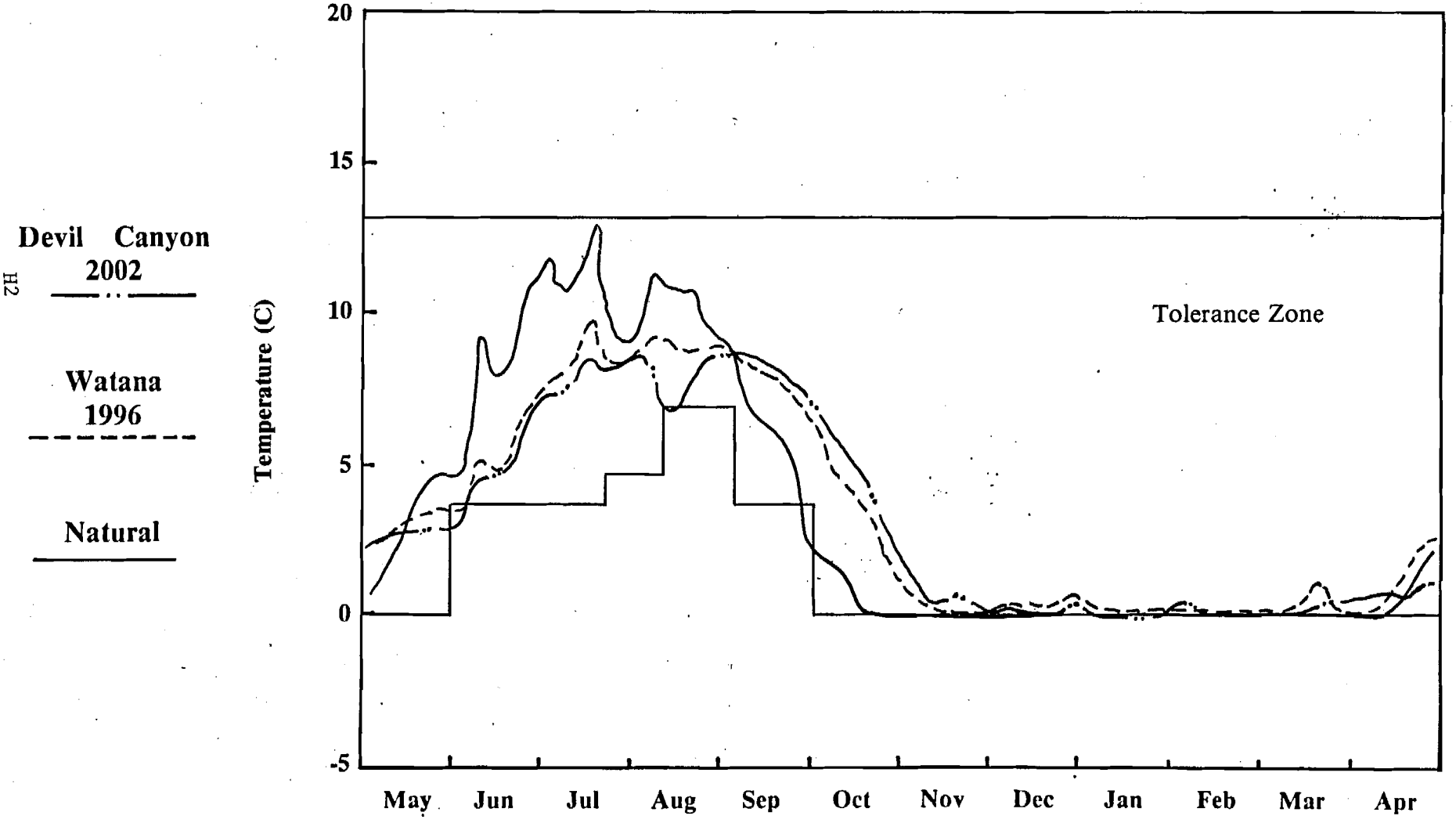
Appendix H. Temperature history plots for river miles 150, 130 and 100

PINK SALMON

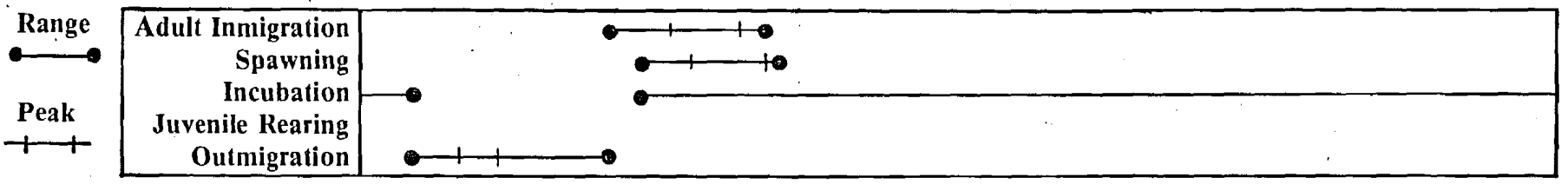

Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1971-1972
River Mile 100

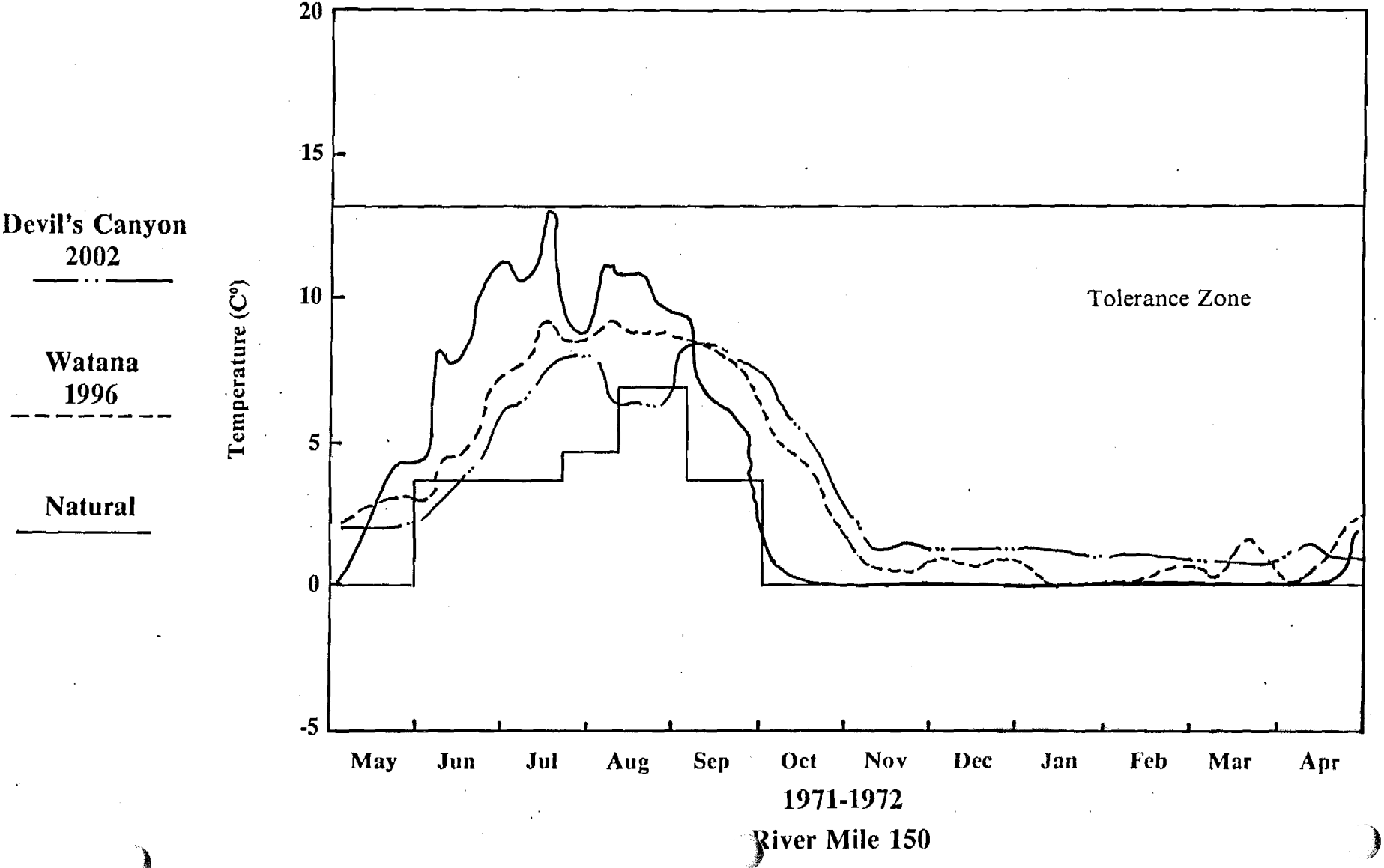
PINK SALMON


Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration


Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1971-1972
River Mile 130

PINK SALMON



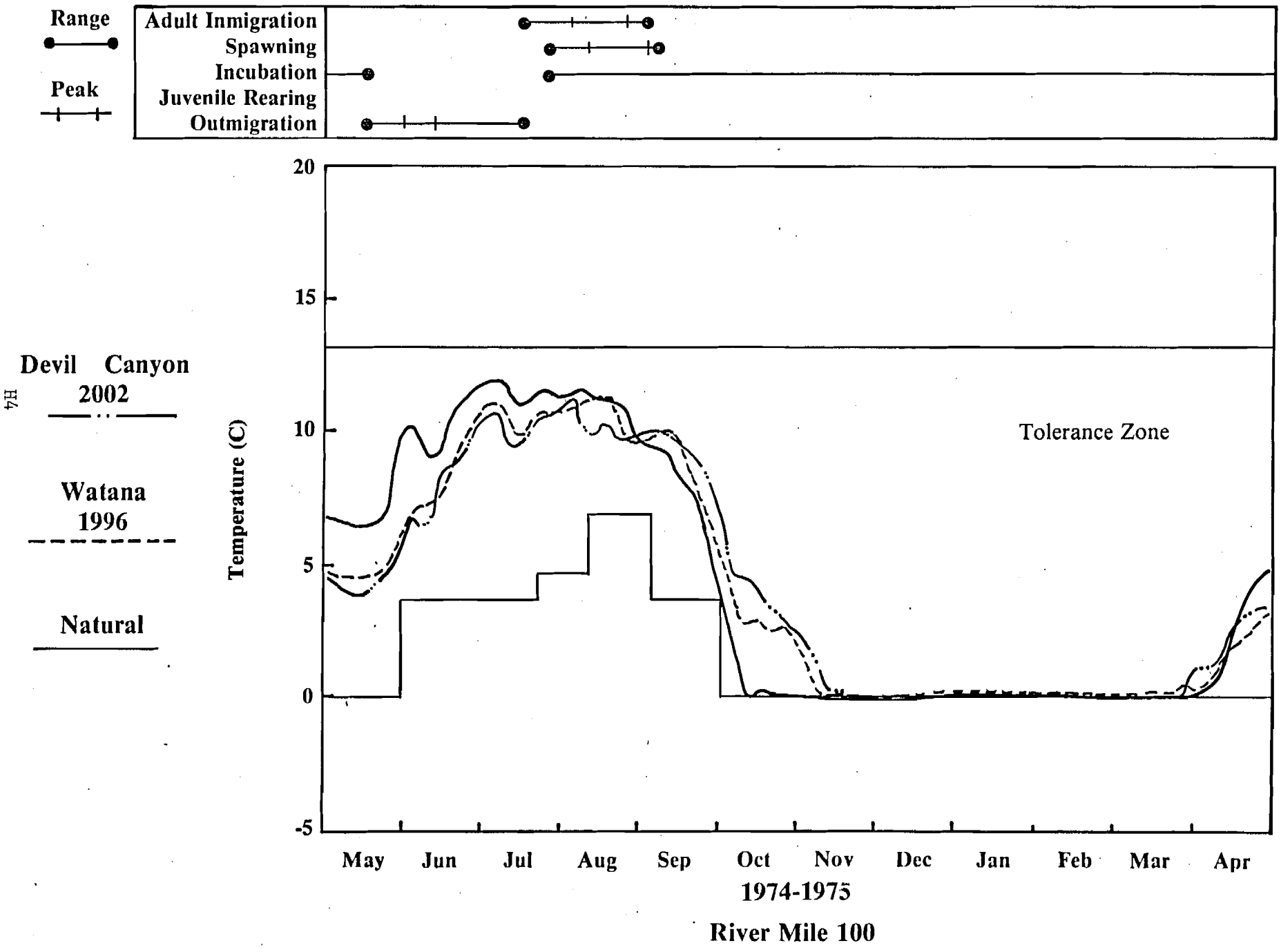


1971-1972

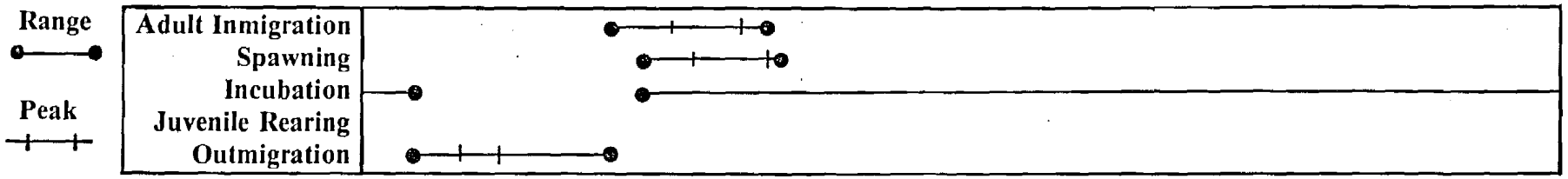
River Mile 150

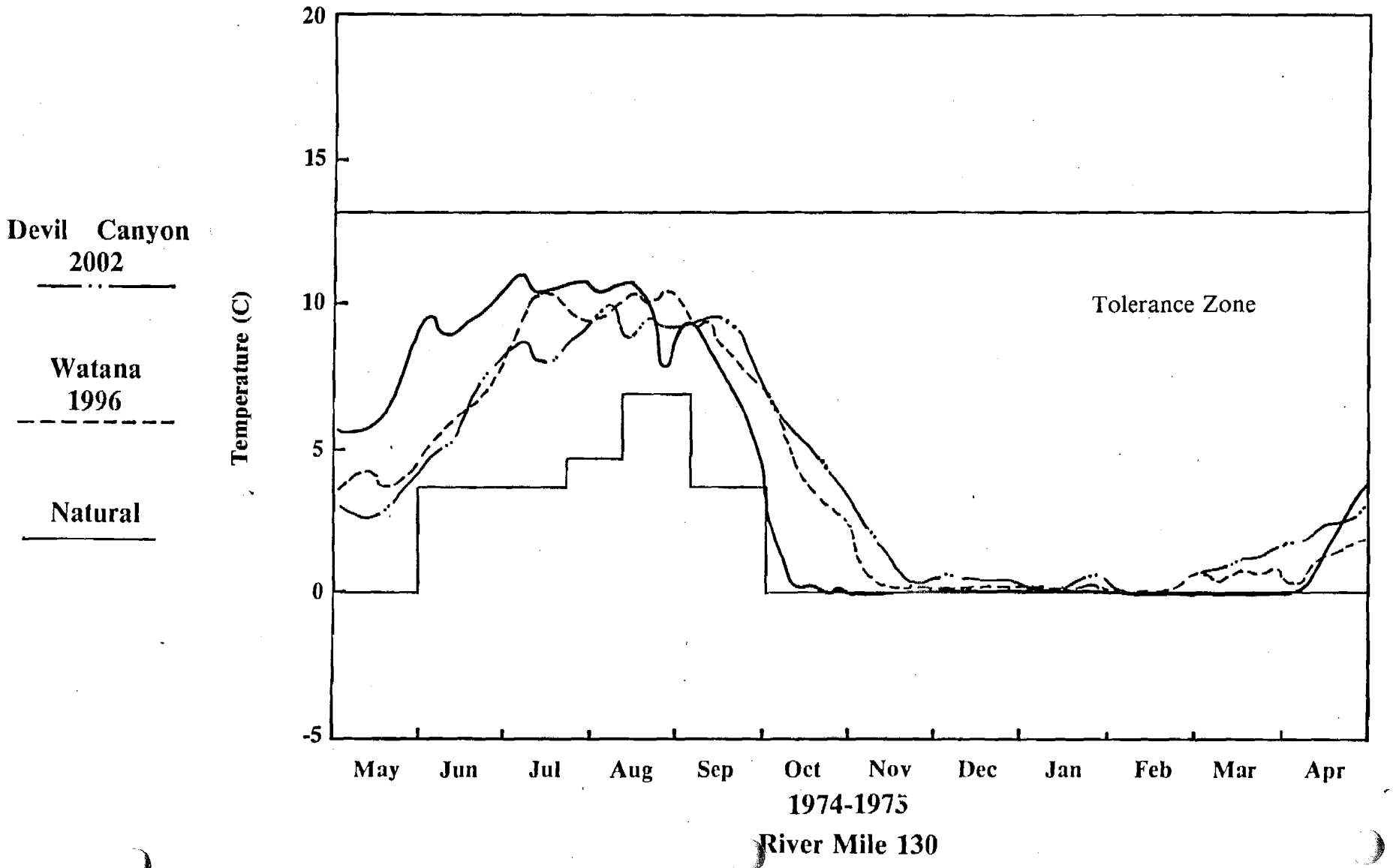
H3

PINK SALMON

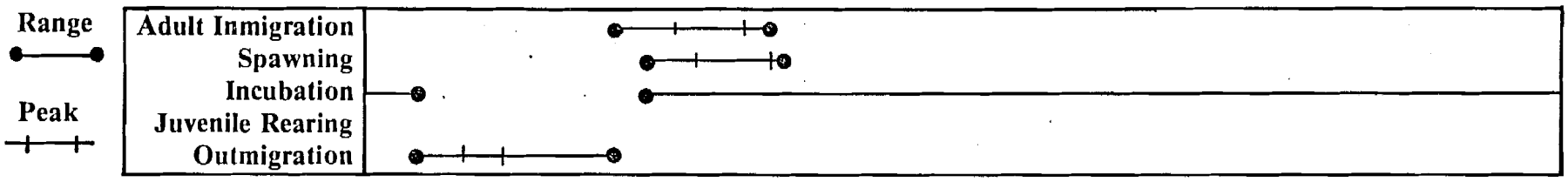

Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1974-1975
River Mile 100

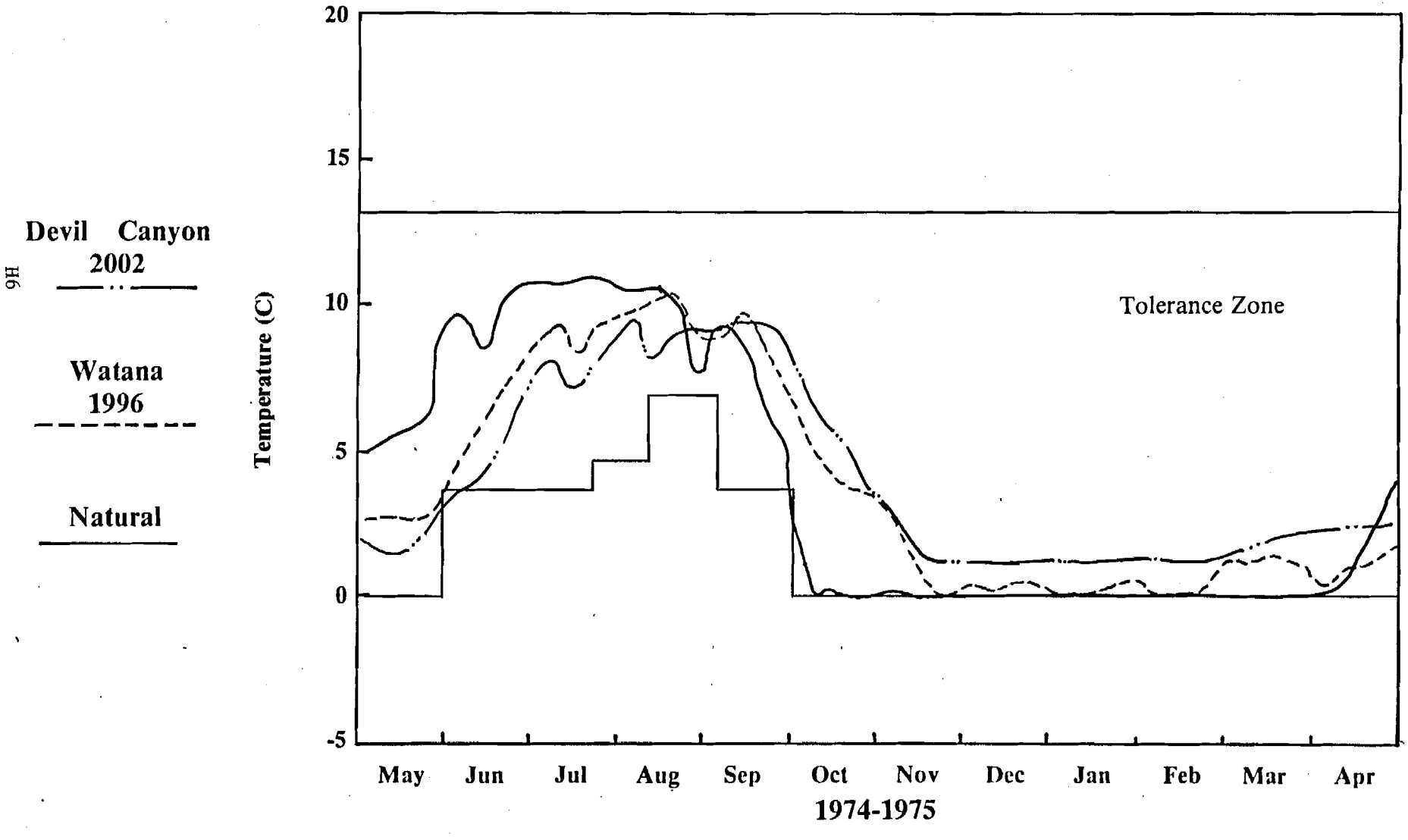
PINK SALMON


Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration


Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1974-1975
River Mile 130

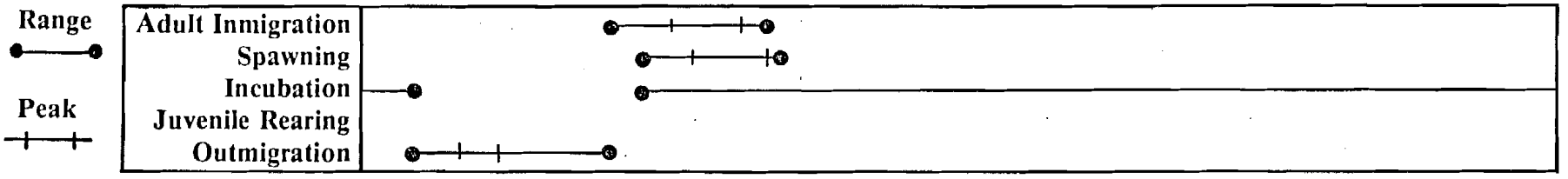
PINK SALMON

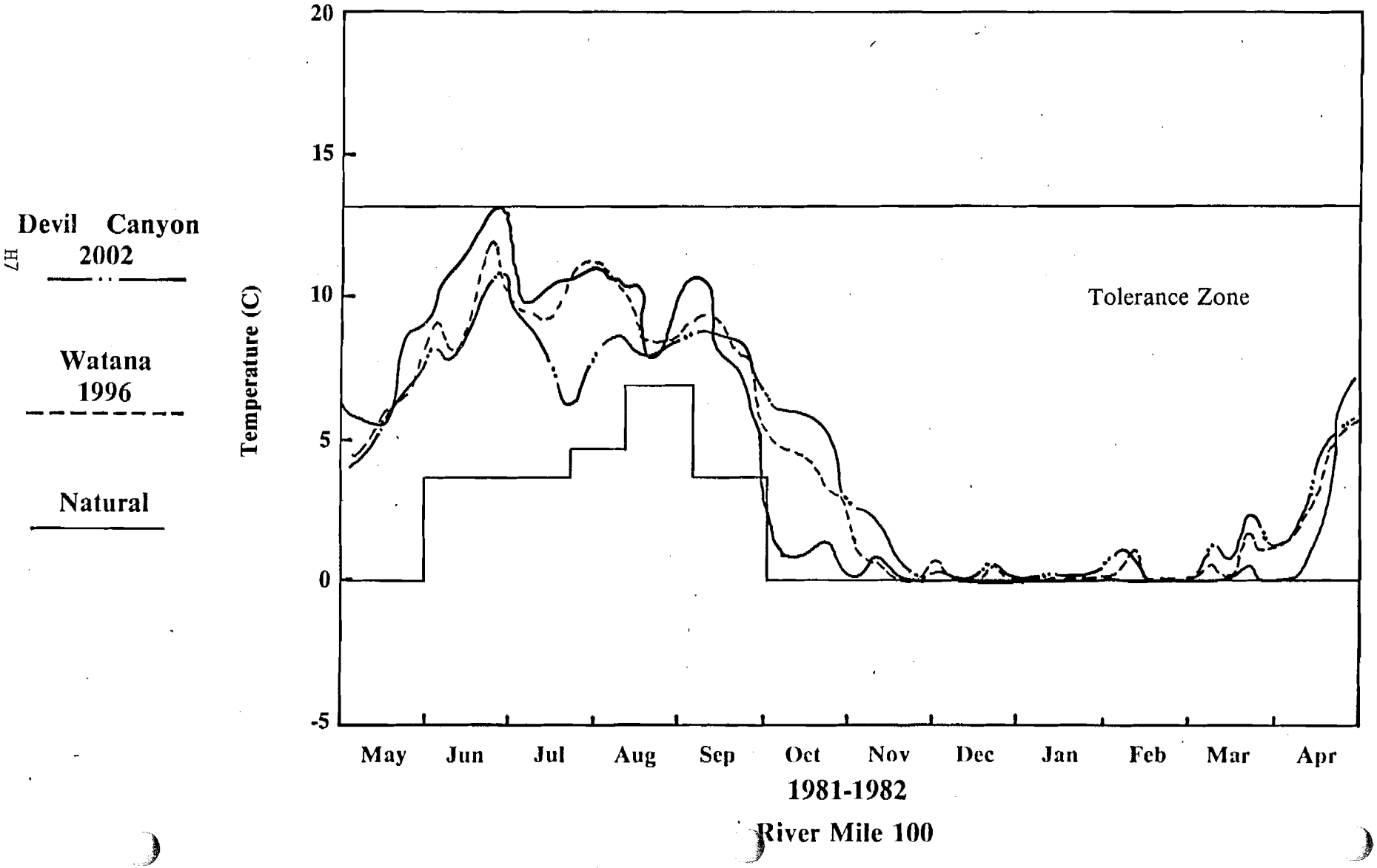




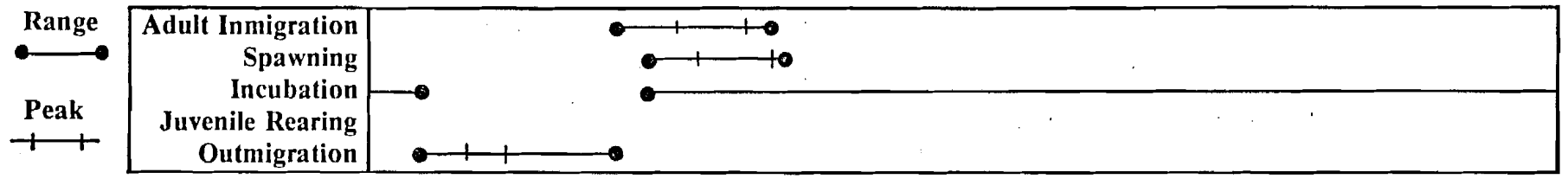
9H

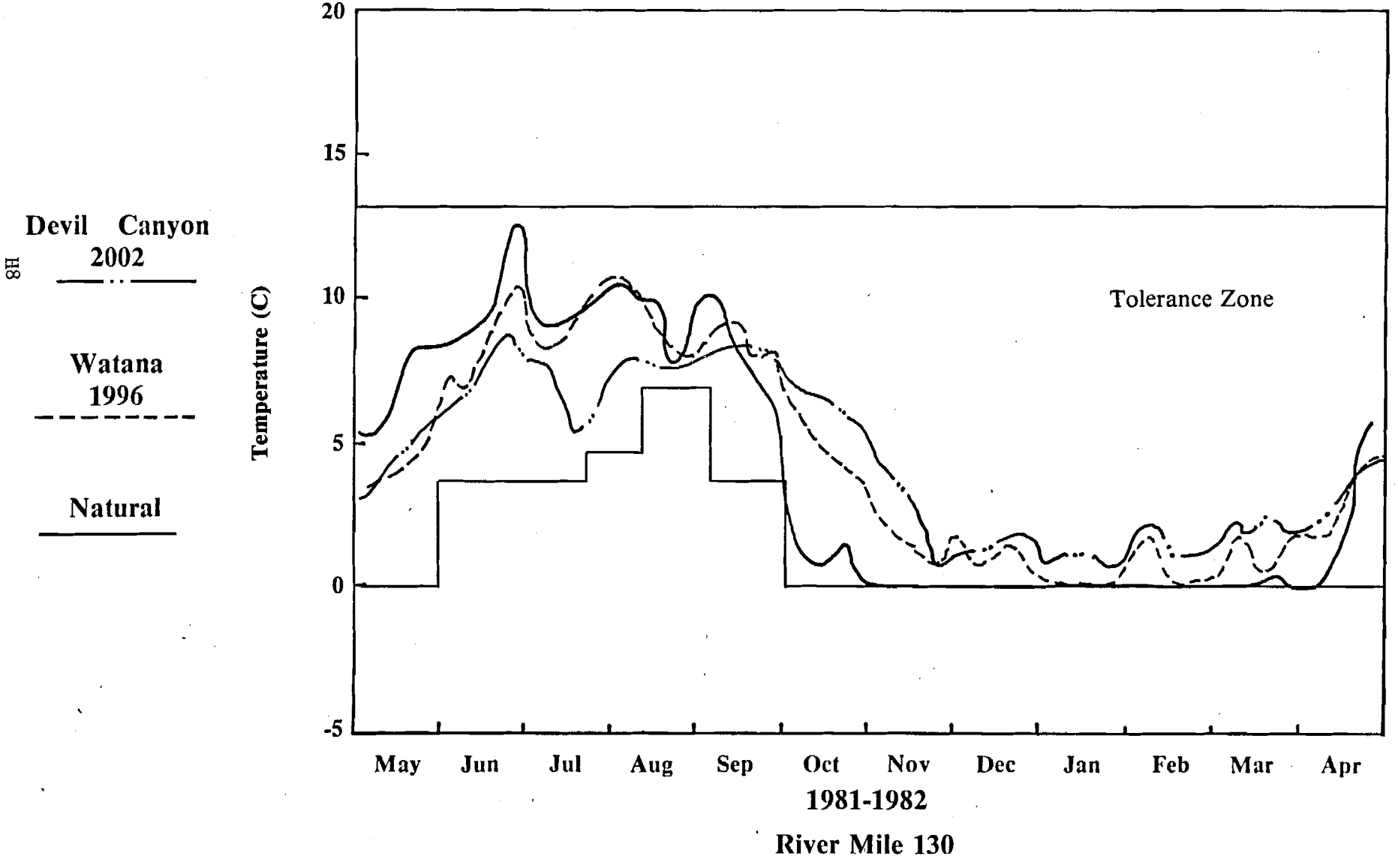
PINK SALMON


Range
Peak
Adult Immigration
Spawning
Incubation
Juvenile Rearing
Outmigration

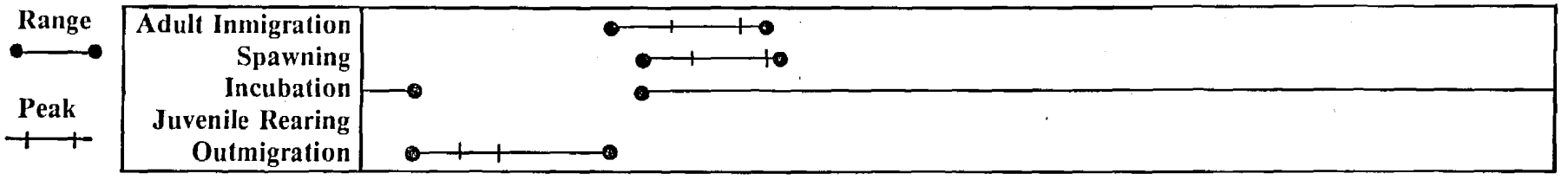

Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1981-1982
River Mile 100

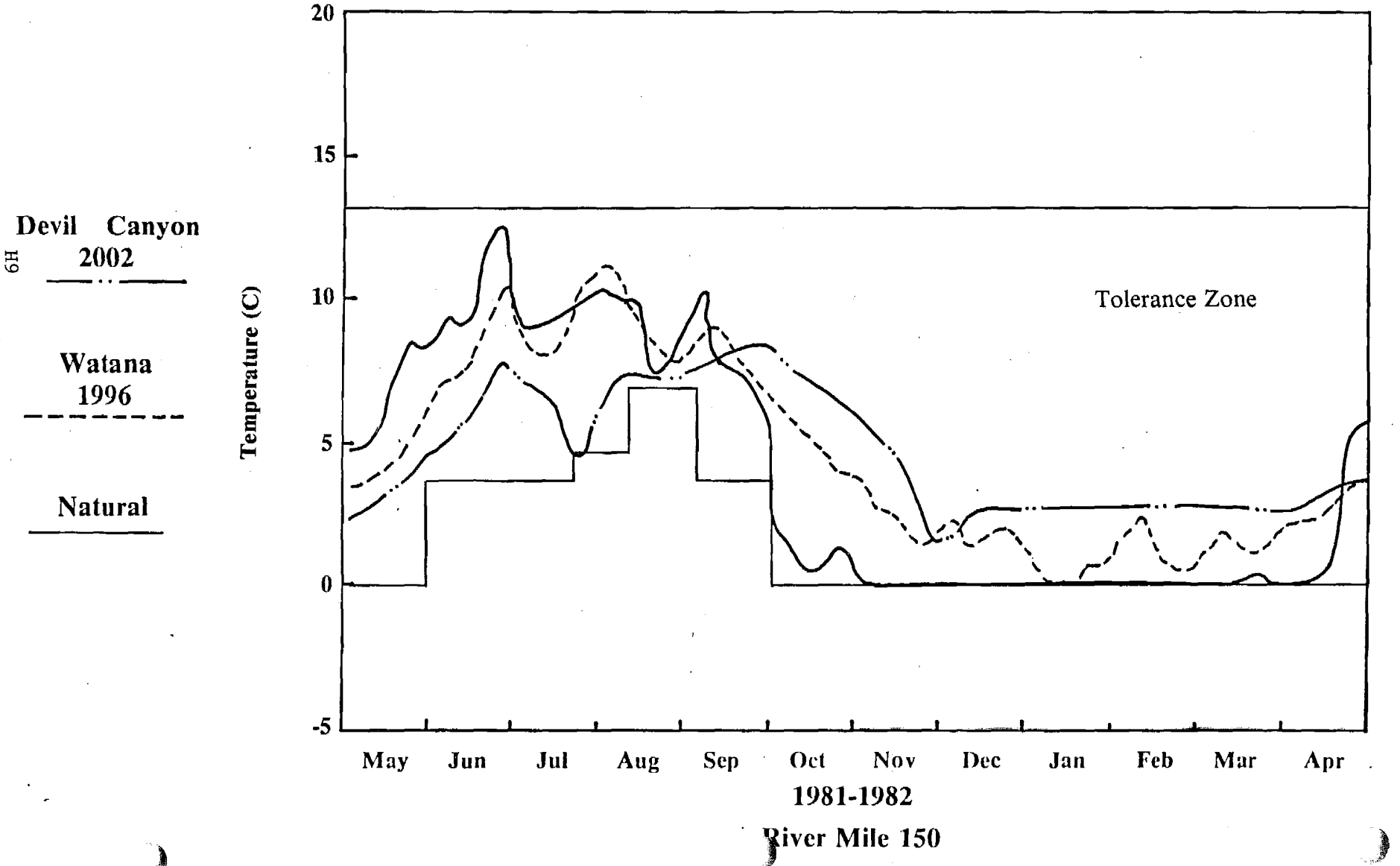
PINK SALMON

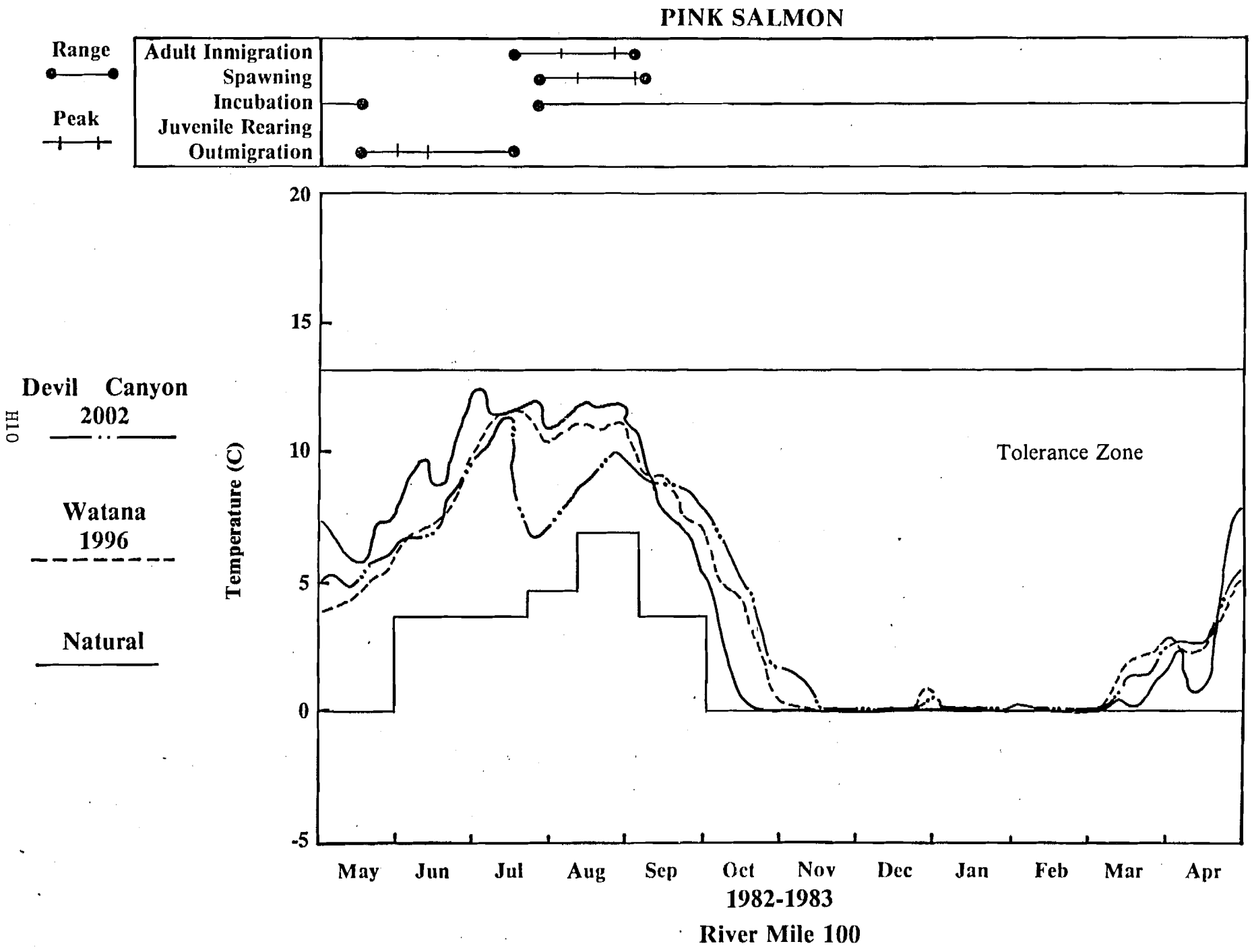

Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration

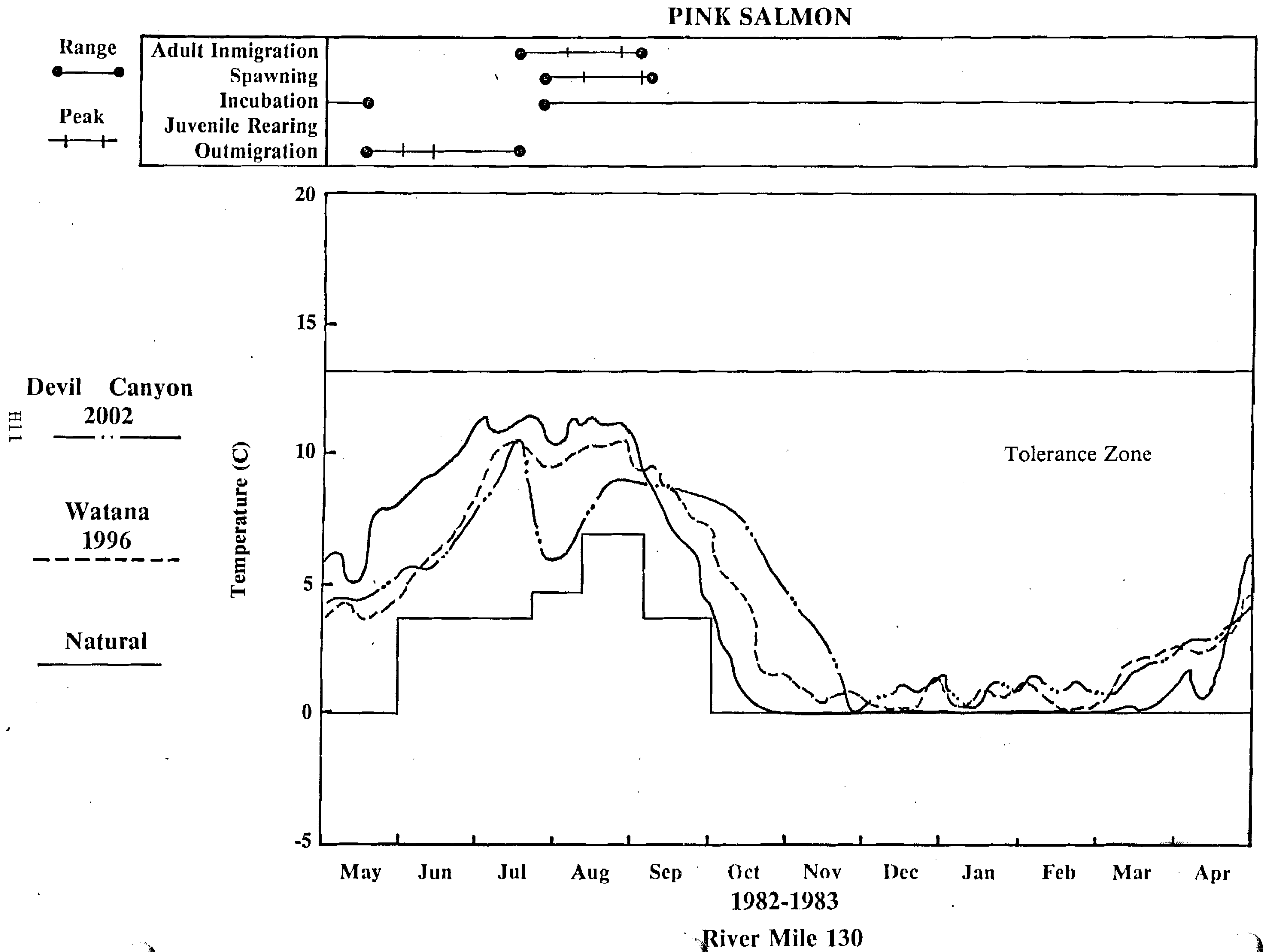

Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1981-1982
River Mile 130

PINK SALMON

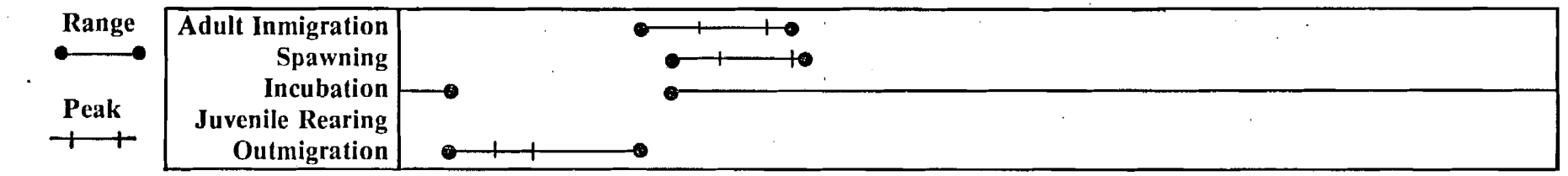

Range
Peak
Adult Immigration
Spawning
Incubation
Juvenile Rearing
Outmigration

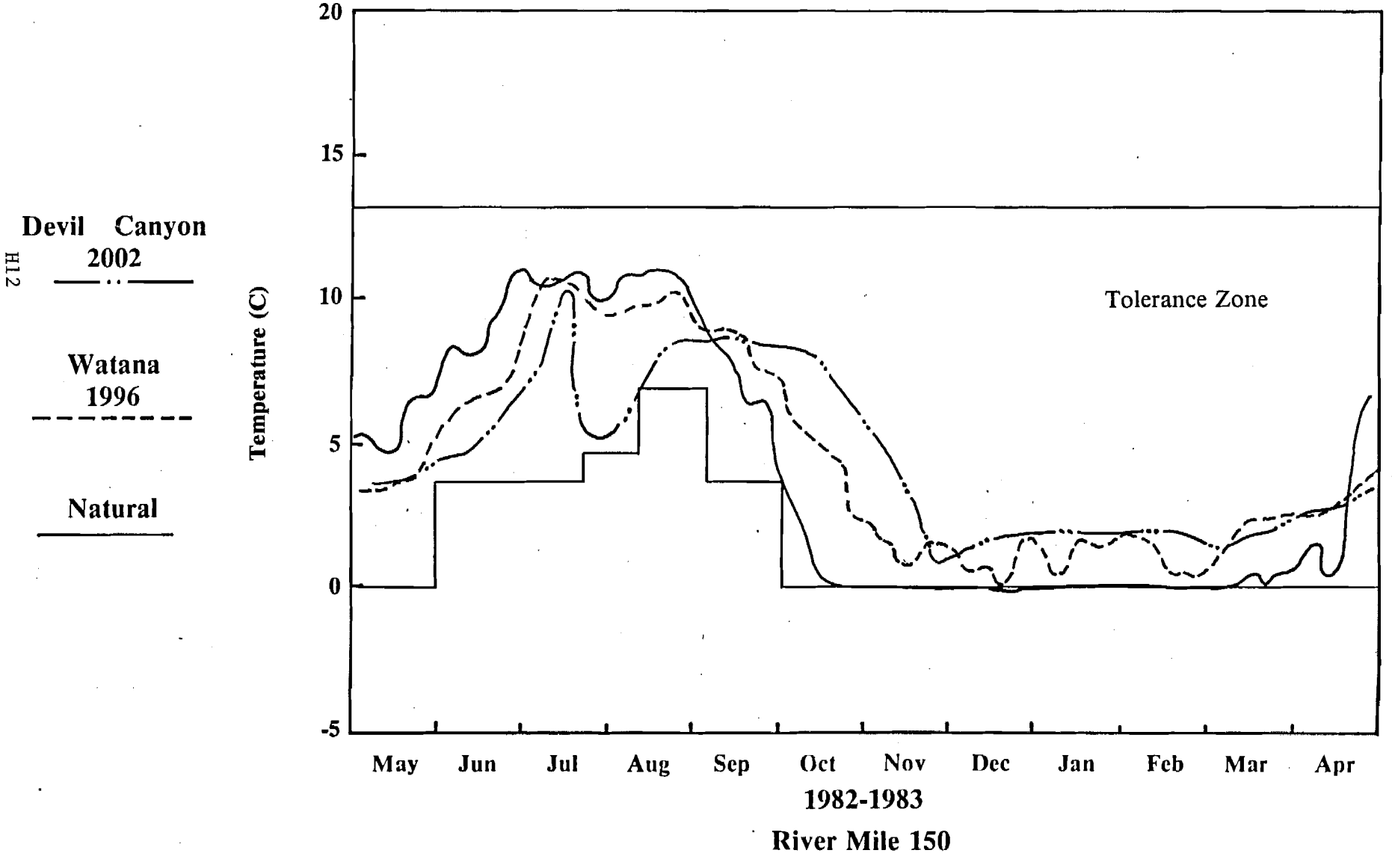

Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1981-1982
River Mile 150


PINK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
H10
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1982-1983
River Mile 100

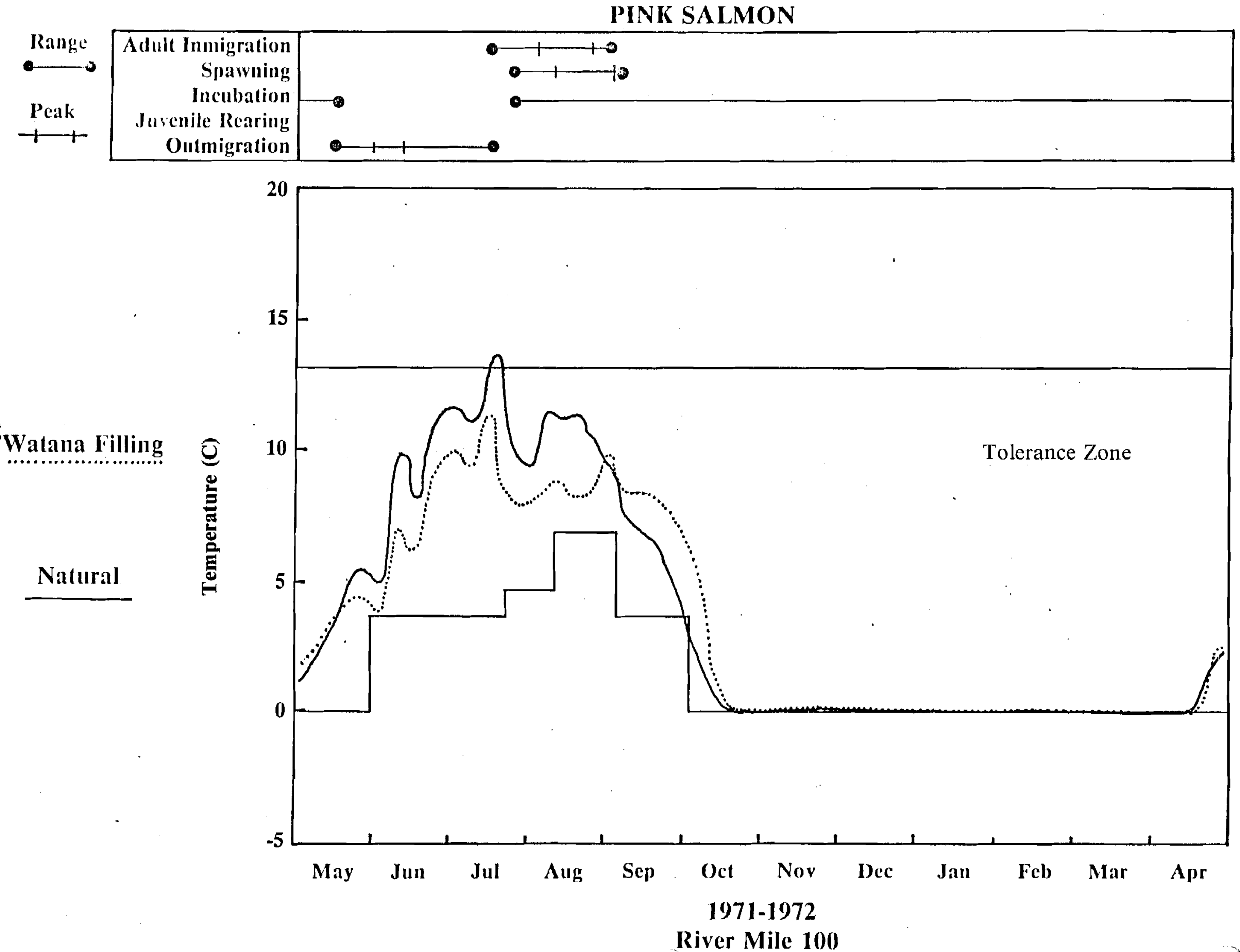

PINK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1982-1983
River Mile 130

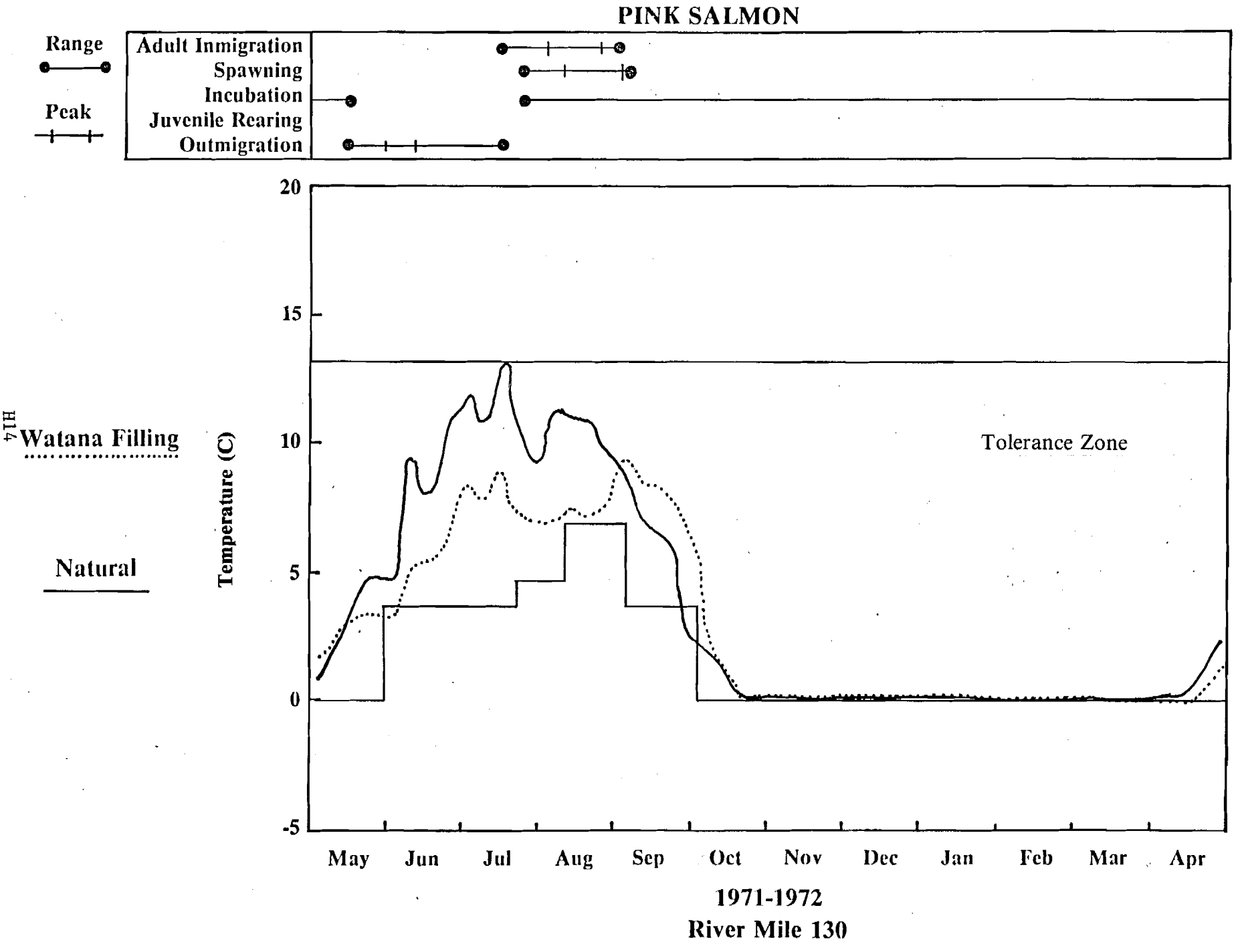
PINK SALMON

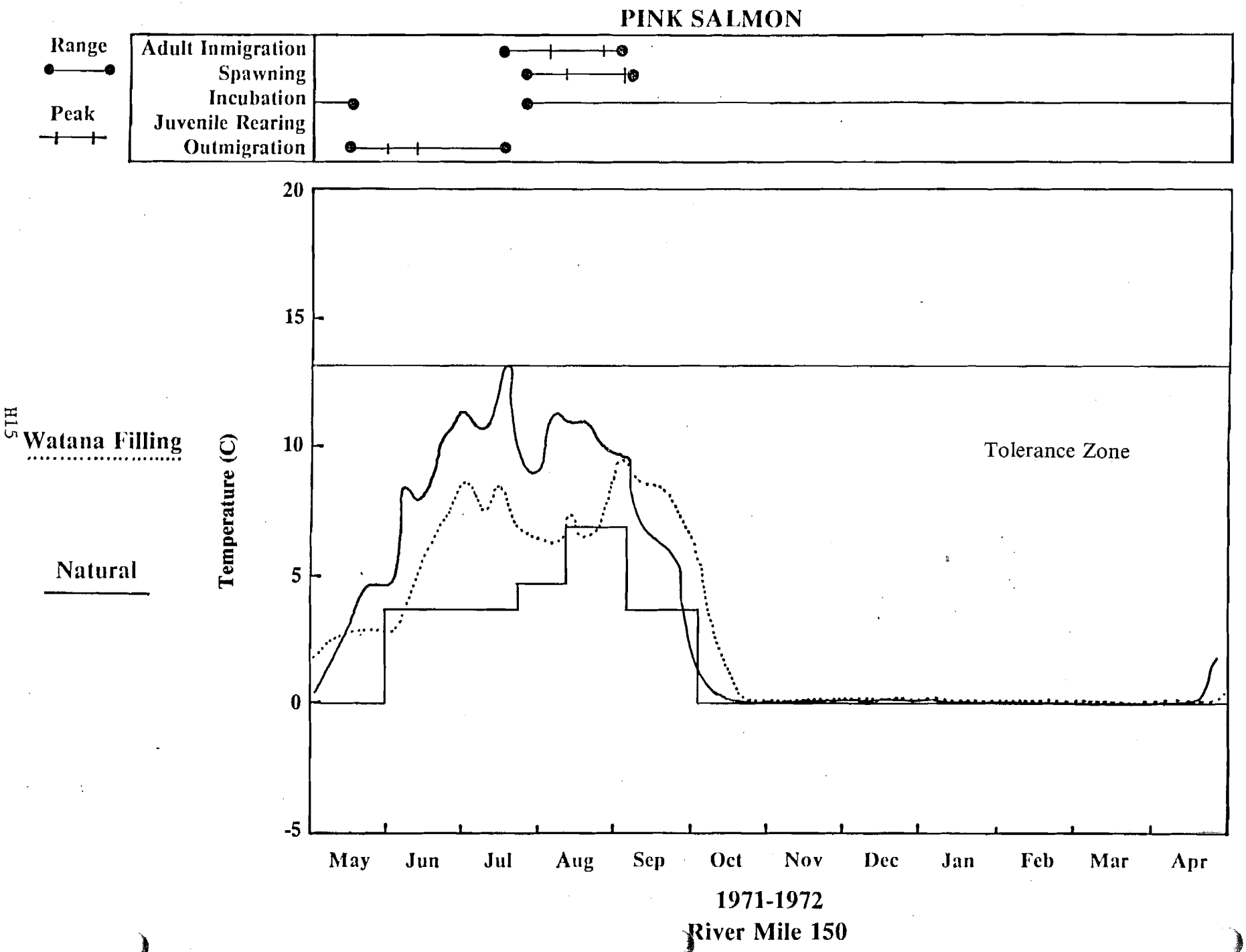

Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration

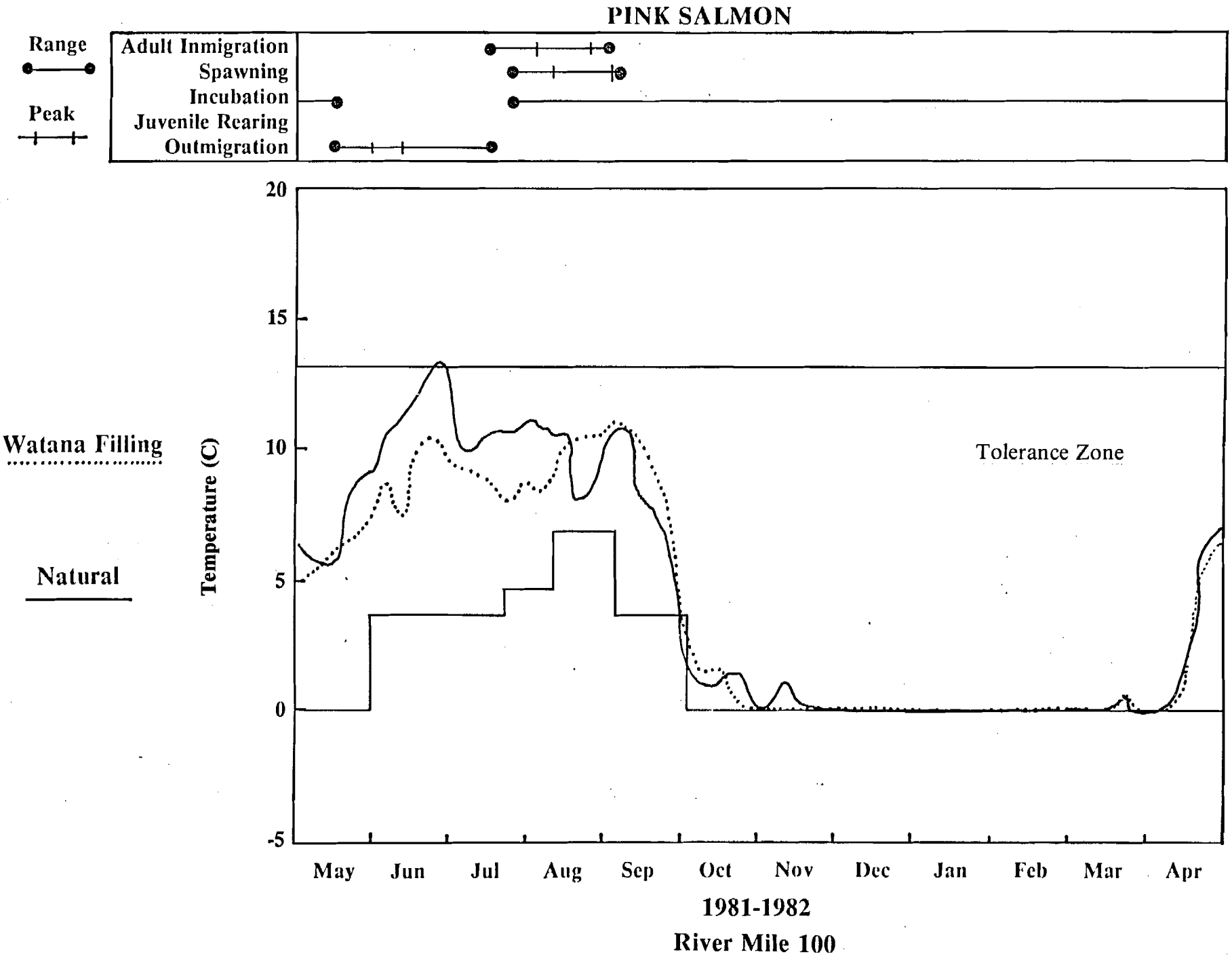

Devil Canyon
2002
Watana
1996
Natural
H12
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1982-1983
River Mile 150

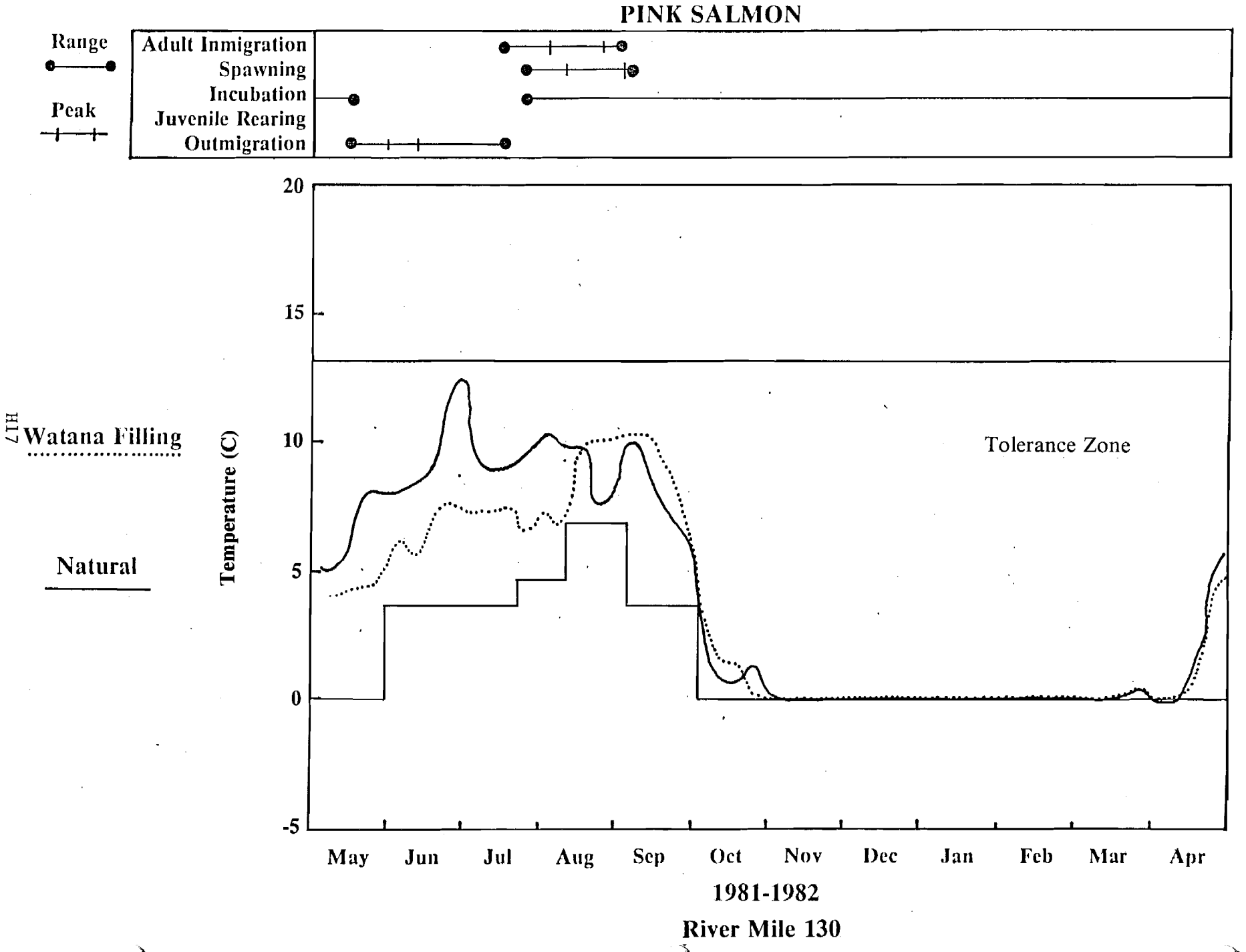
H13

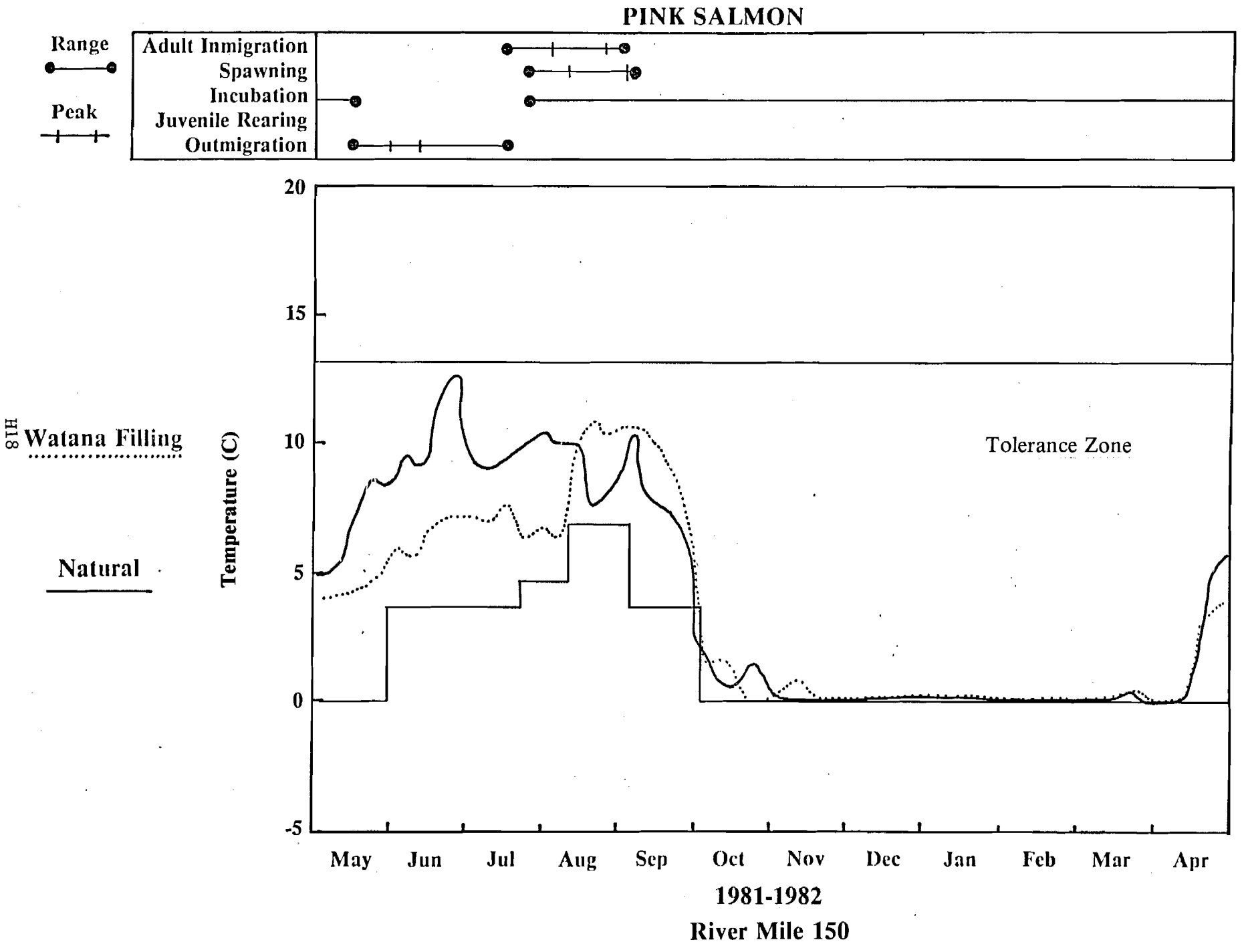

PINK SALMON
Range
Peak
Adult Immigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1971-1972
River Mile 100


PINK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1971-1972
River Mile 130


PINK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
15
10
5
0
-5
Temperature (C)
Watana Filling
Natural
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1971-1972
River Mile 150


PINK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1981-1982
River Mile 100


PINK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
15
10
5
0
-5
Temperature (C)
H17
Watana Filling
Natural
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1981-1982
River Mile 130


PINK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
15
10
5
0
-5
Temperature (C)
Tolerance Zone
Watana Filling
H18
Natural
May
Jun
Jul
Aug
Sep
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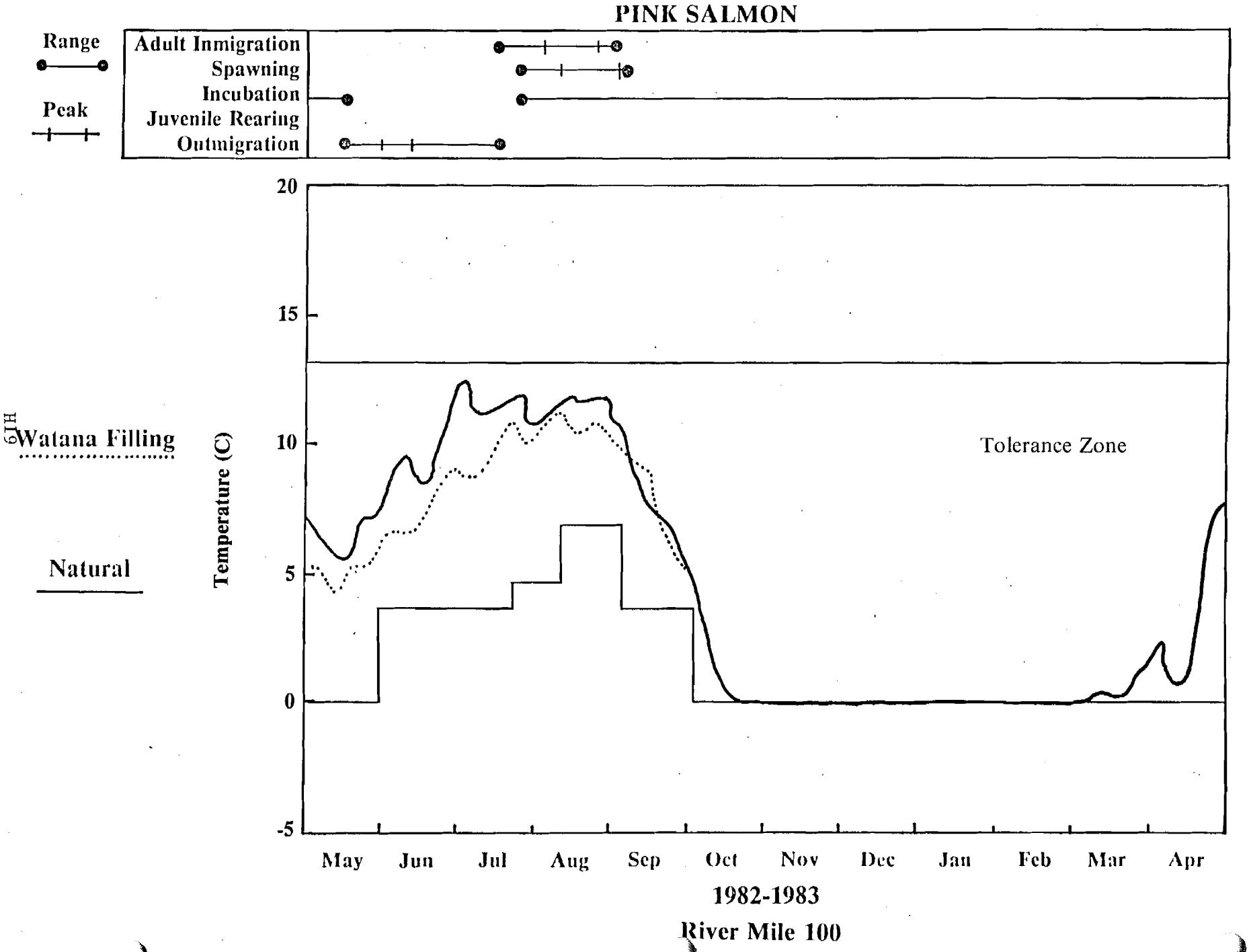
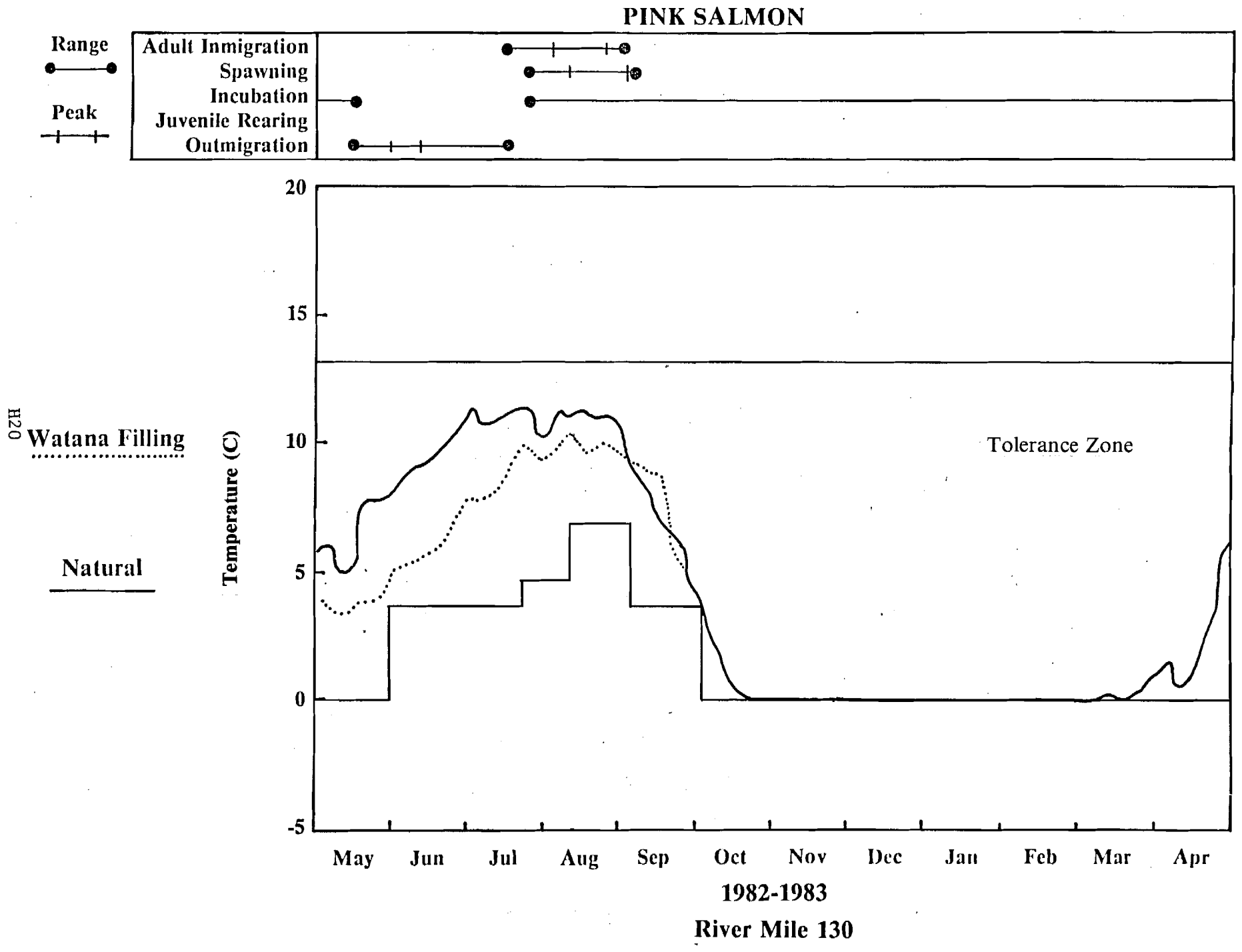
Jan
Feb
Mar
Apr
1981-1982
River Mile 150


PINK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
15
10
5
0
-5
Temperature (C)
Watana Filling
Natural
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1982-1983
River Mile 100


PINK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
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10
5
0
-5
Temperature (C)
H20
Watana Filling
Natural
Tolerance Zone
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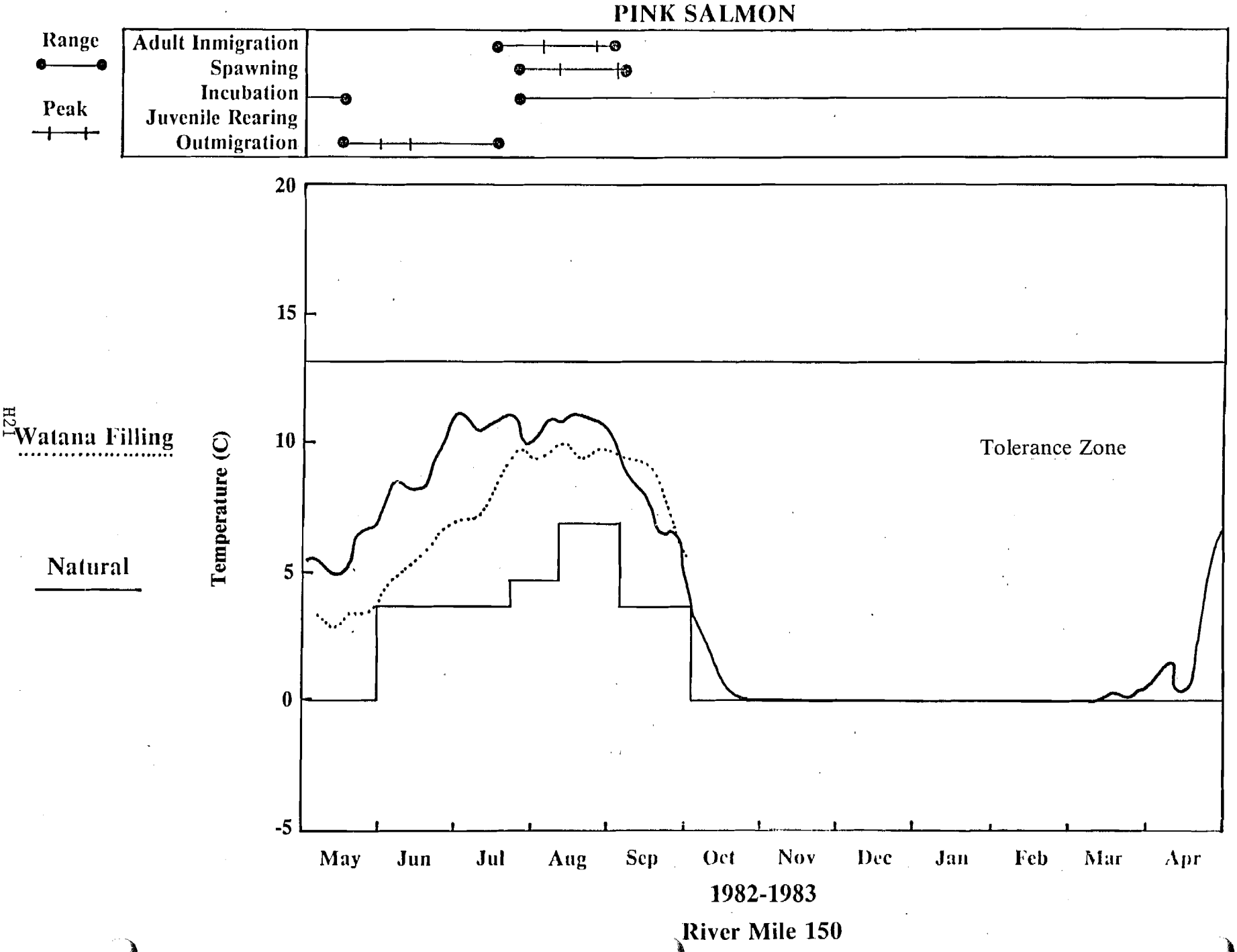
Feb
Mar
Apr
1982-1983
River Mile 130


PINK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
15
10
5
0
-5
Temperature (C)
H21
Watana Filling
Natural
Tolerance Zone
May
Jun
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Aug
Sep
Oct
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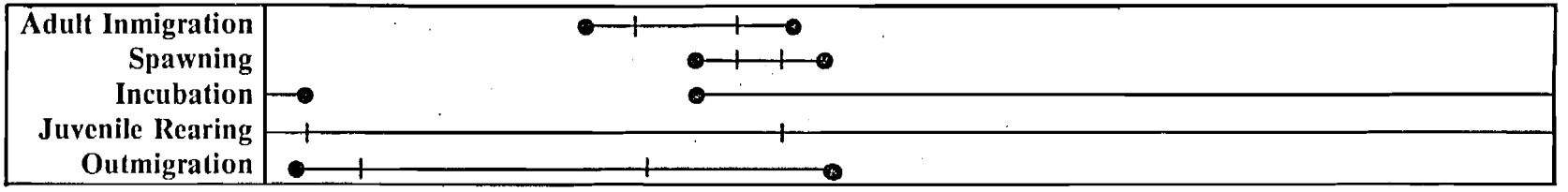
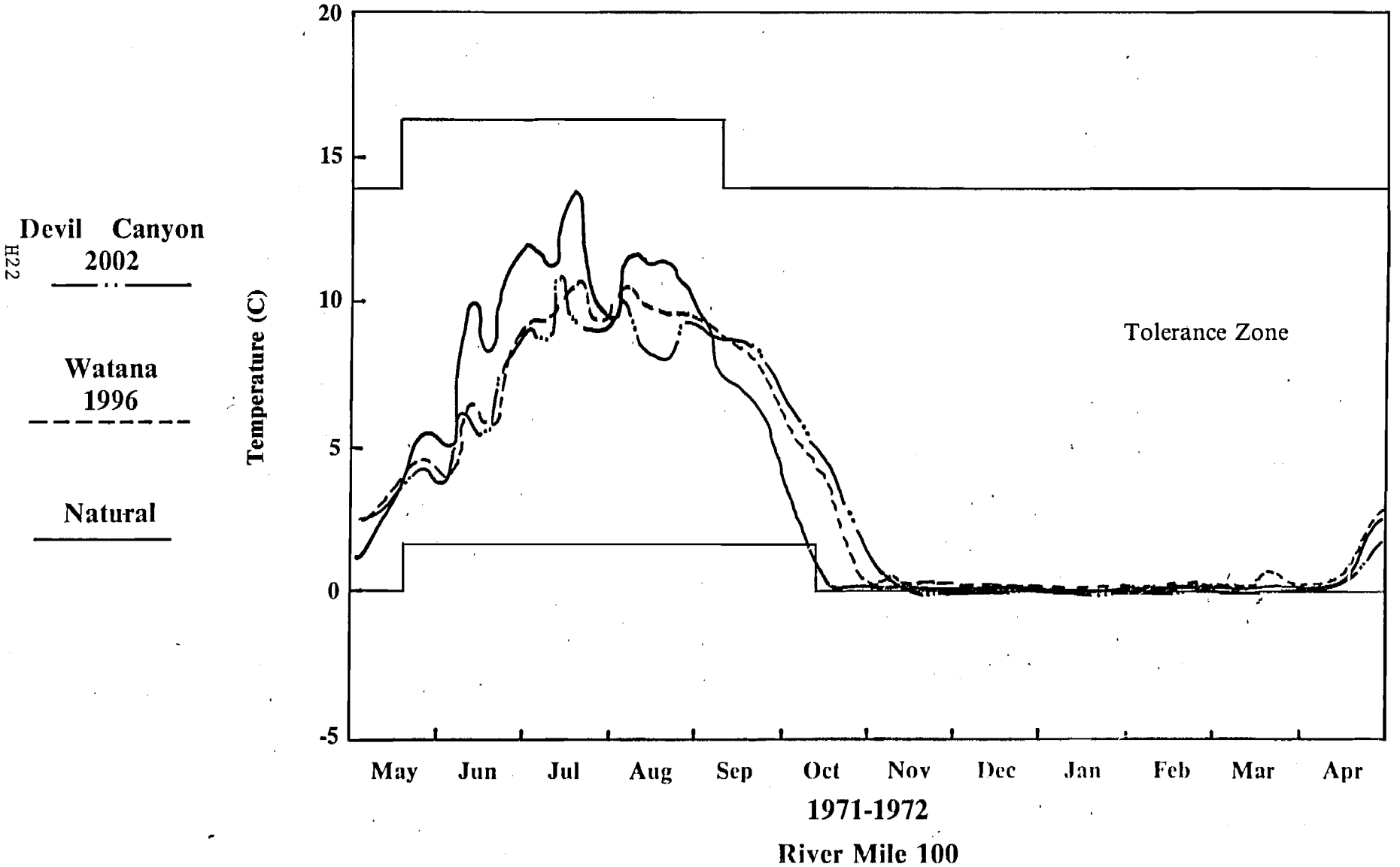
Dec
Jan
Feb
Mar
Apr
1982-1983
River Mile 150

COHO SALMON


Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration


Devil Canyon
2002
Watana
1996
Natural
H22
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
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Aug
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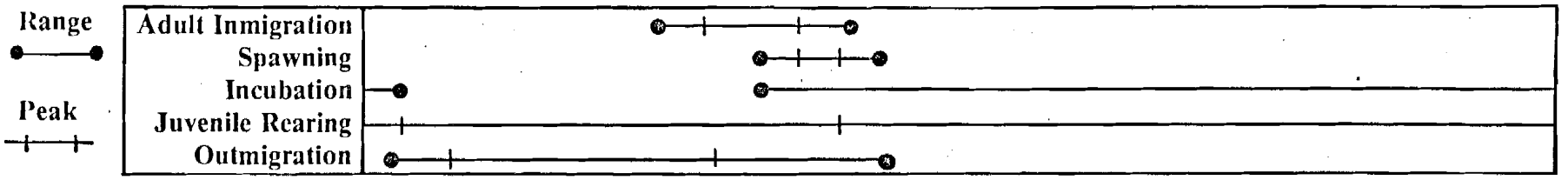
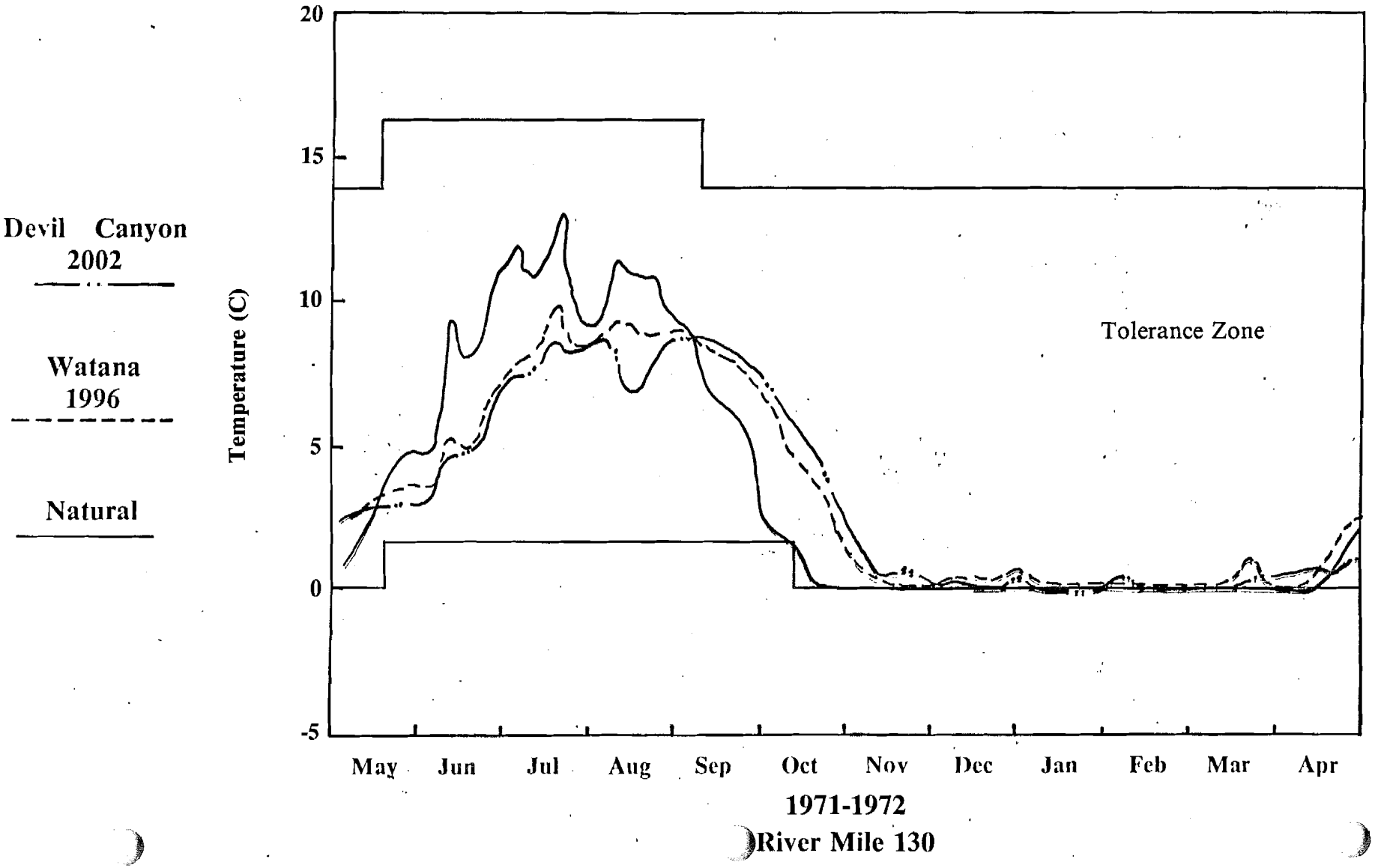
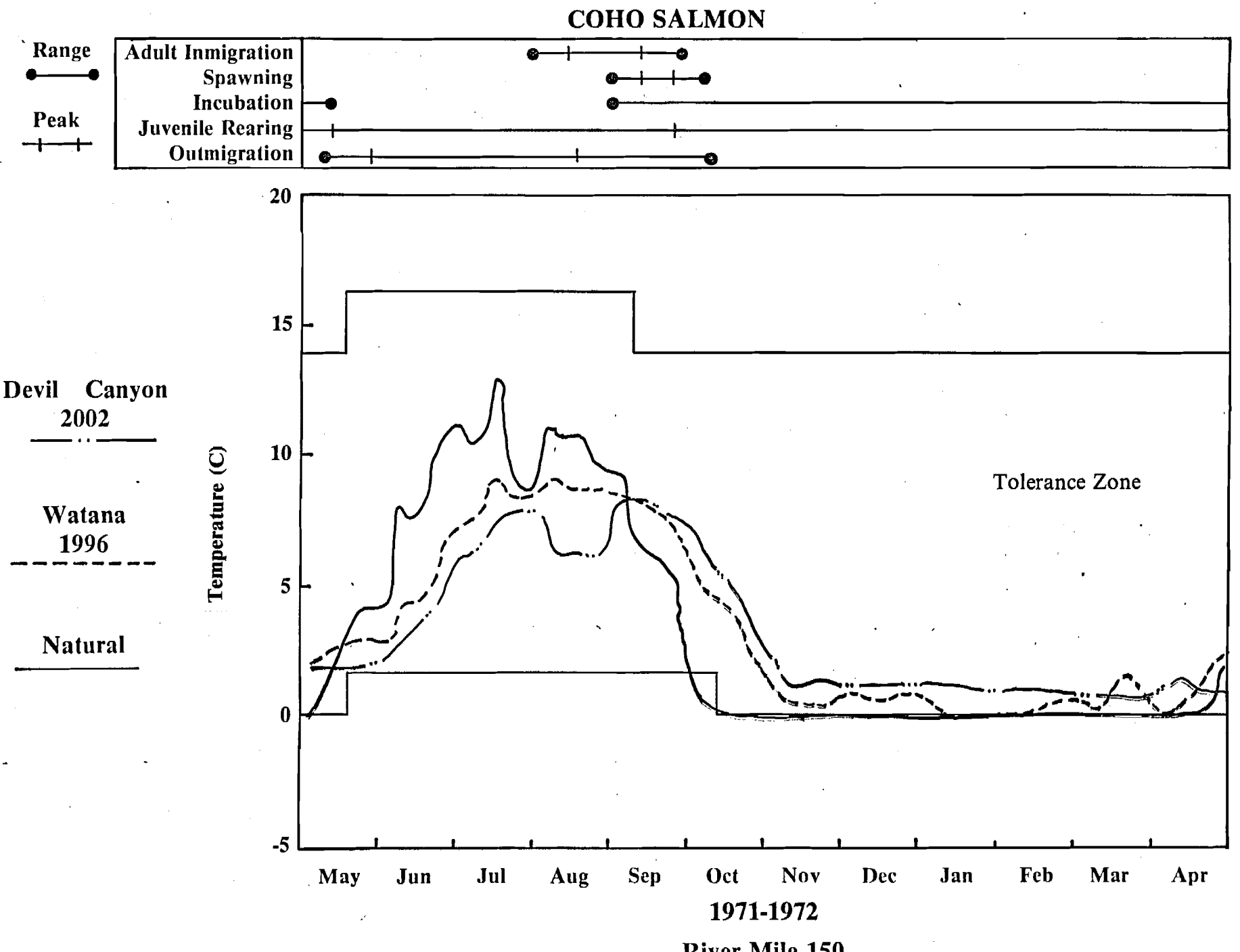
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1971-1972
River Mile 100

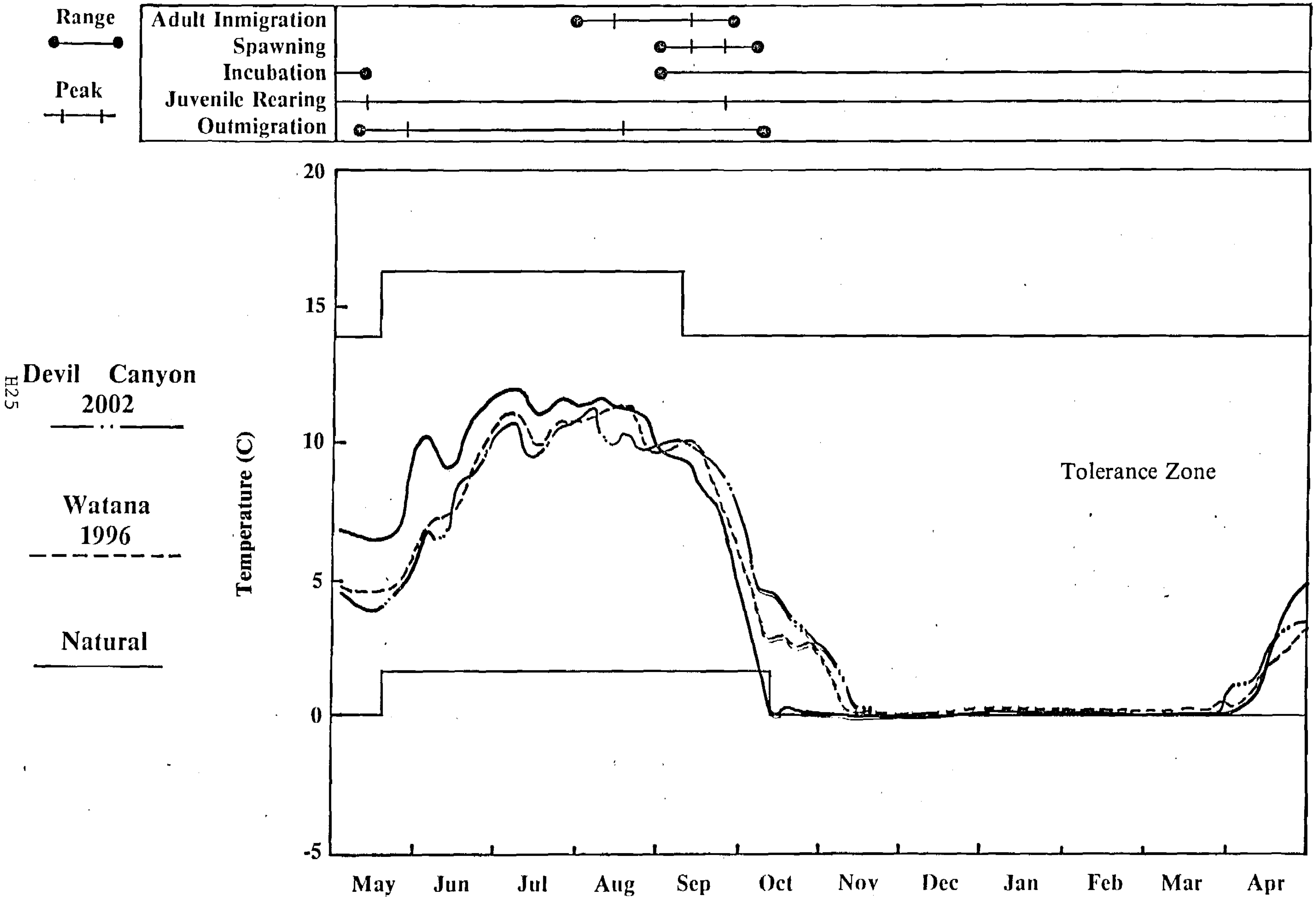
COHO SALMON


Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration


Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1971-1972
River Mile 130


COHO SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1971-1972
River Mile 150

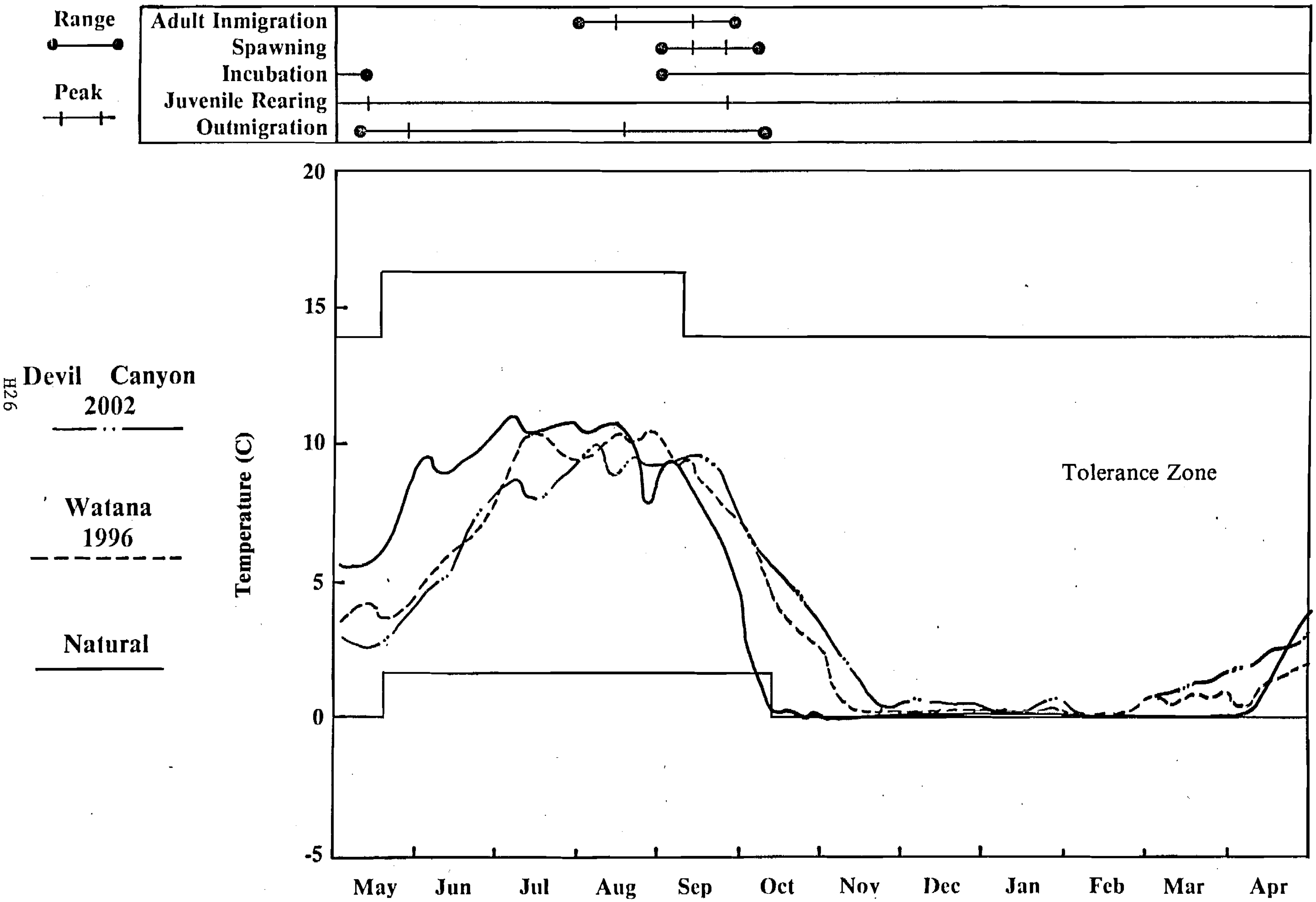
COHO SALMON



1974-1975

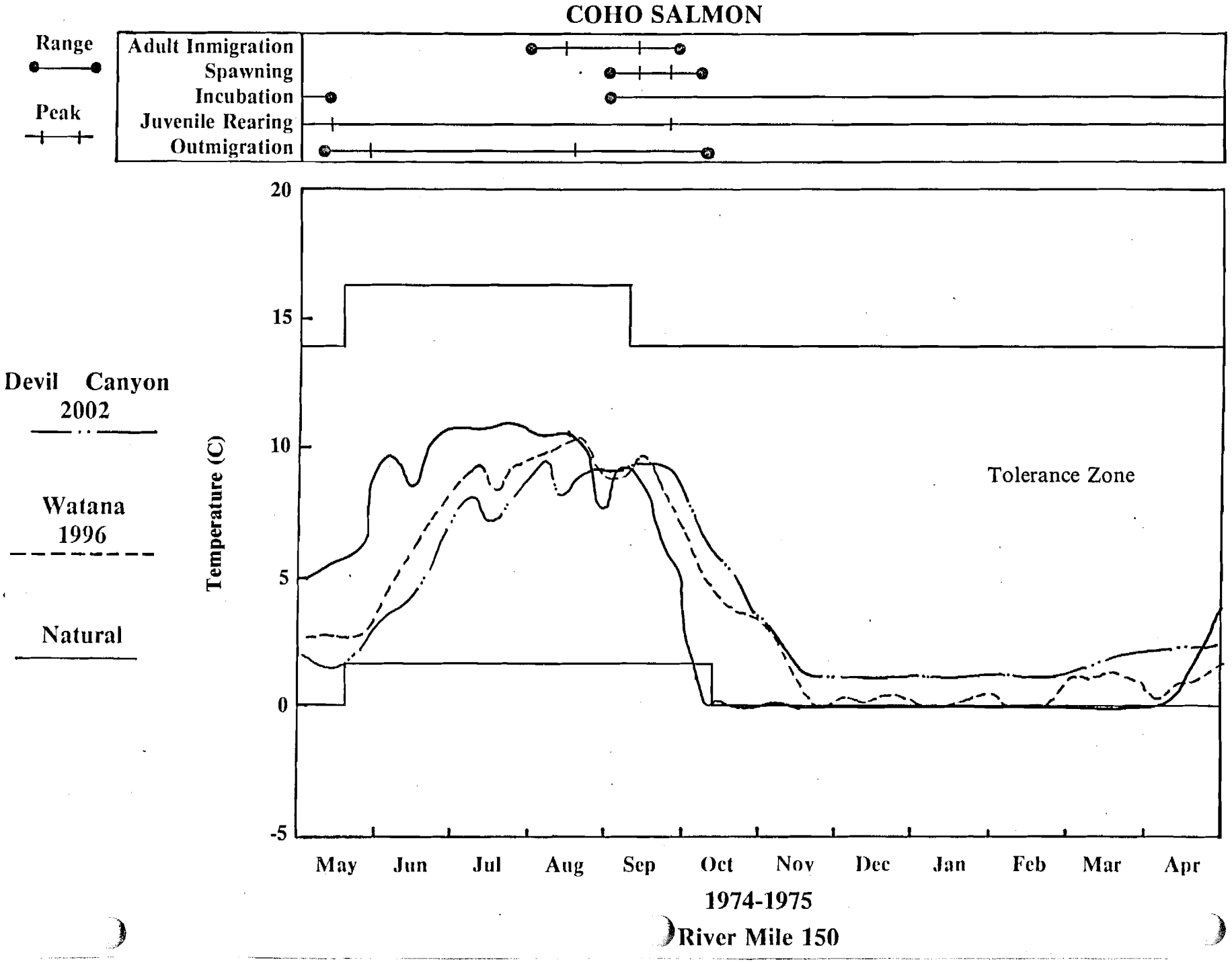
River Mile 100

COHO SALMON



1974-1975

River Mile 130


COHO SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
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-5
Tolerance Zone
May
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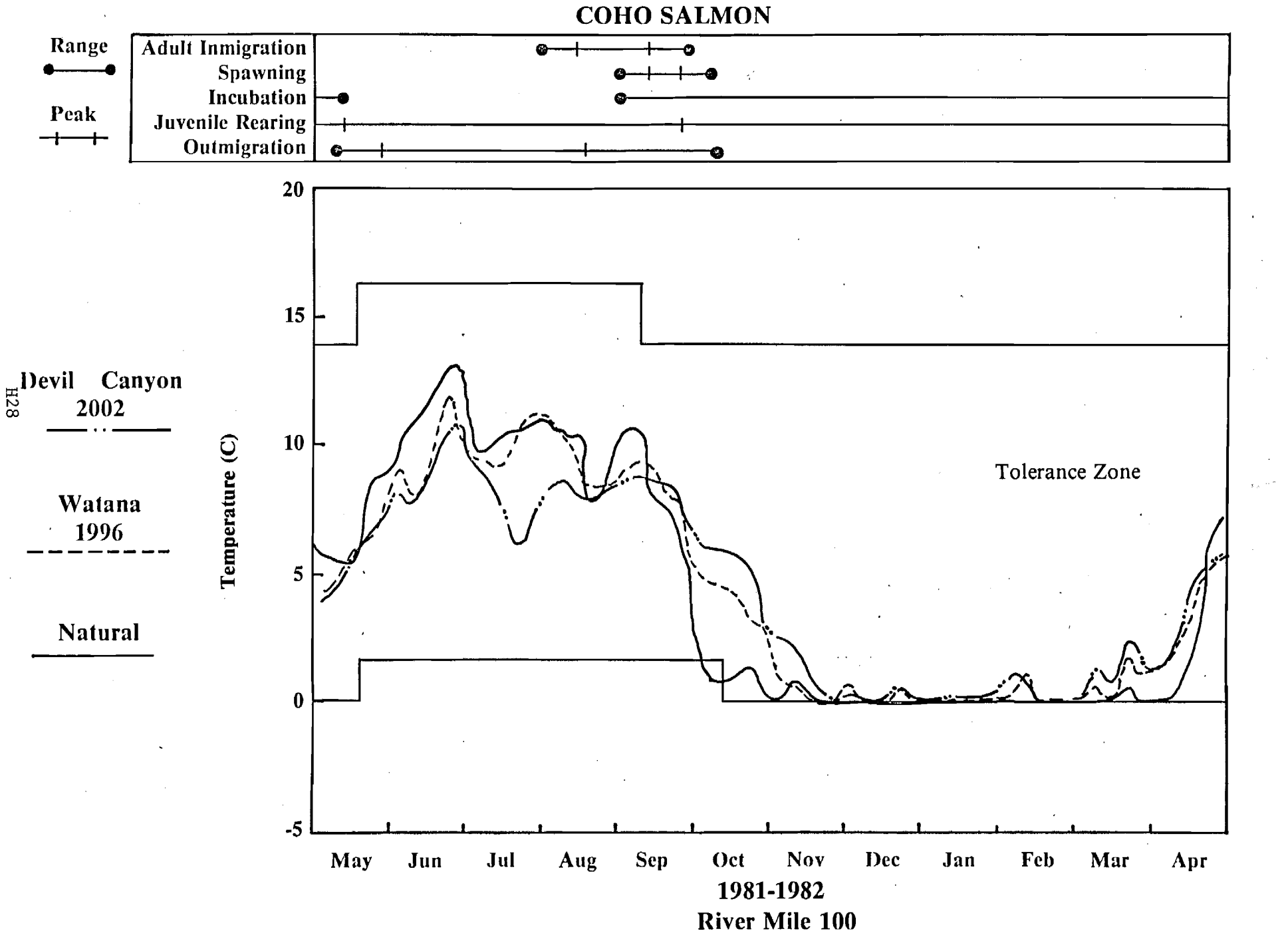
Dec
Jan
Feb
Mar
Apr
1974-1975
River Mile 150


COHO SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
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0
-5
Tolerance Zone
May
Jun
Jul
Aug
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Oct
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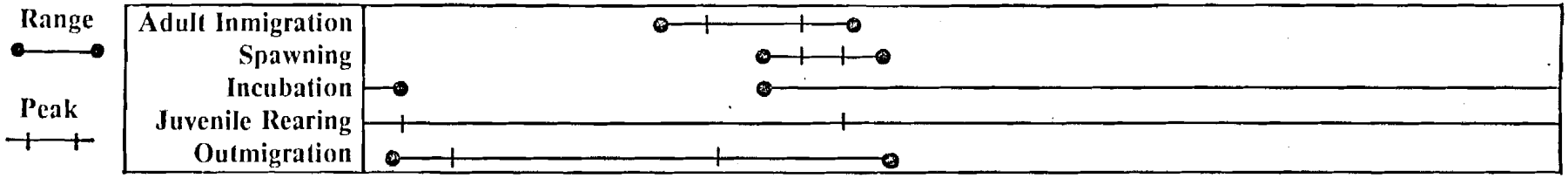
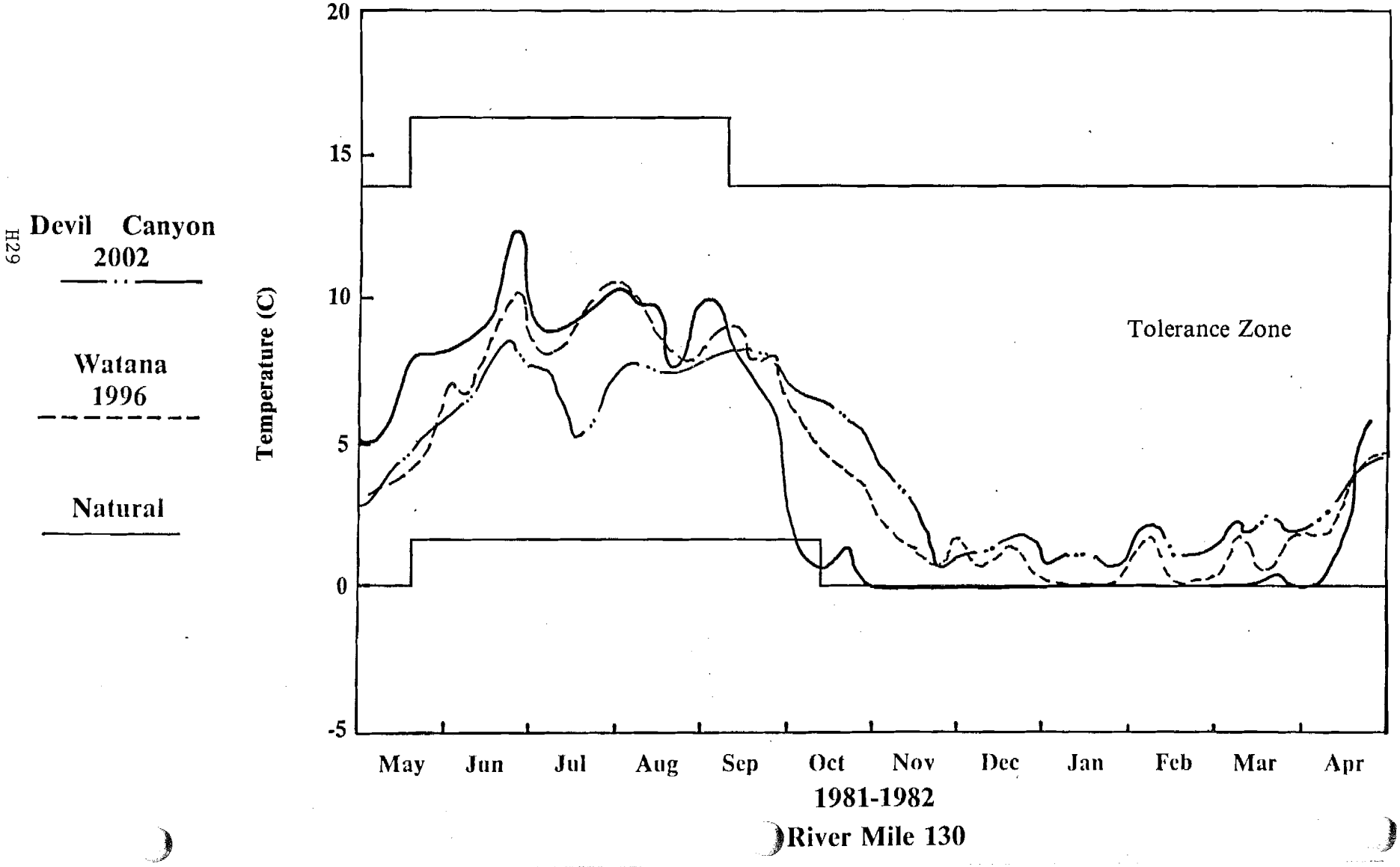
Dec
Jan
Feb
Mar
Apr
1981-1982
River Mile 100

COHO SALMON


Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration


Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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15
10
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Tolerance Zone
May
Jun
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Dec
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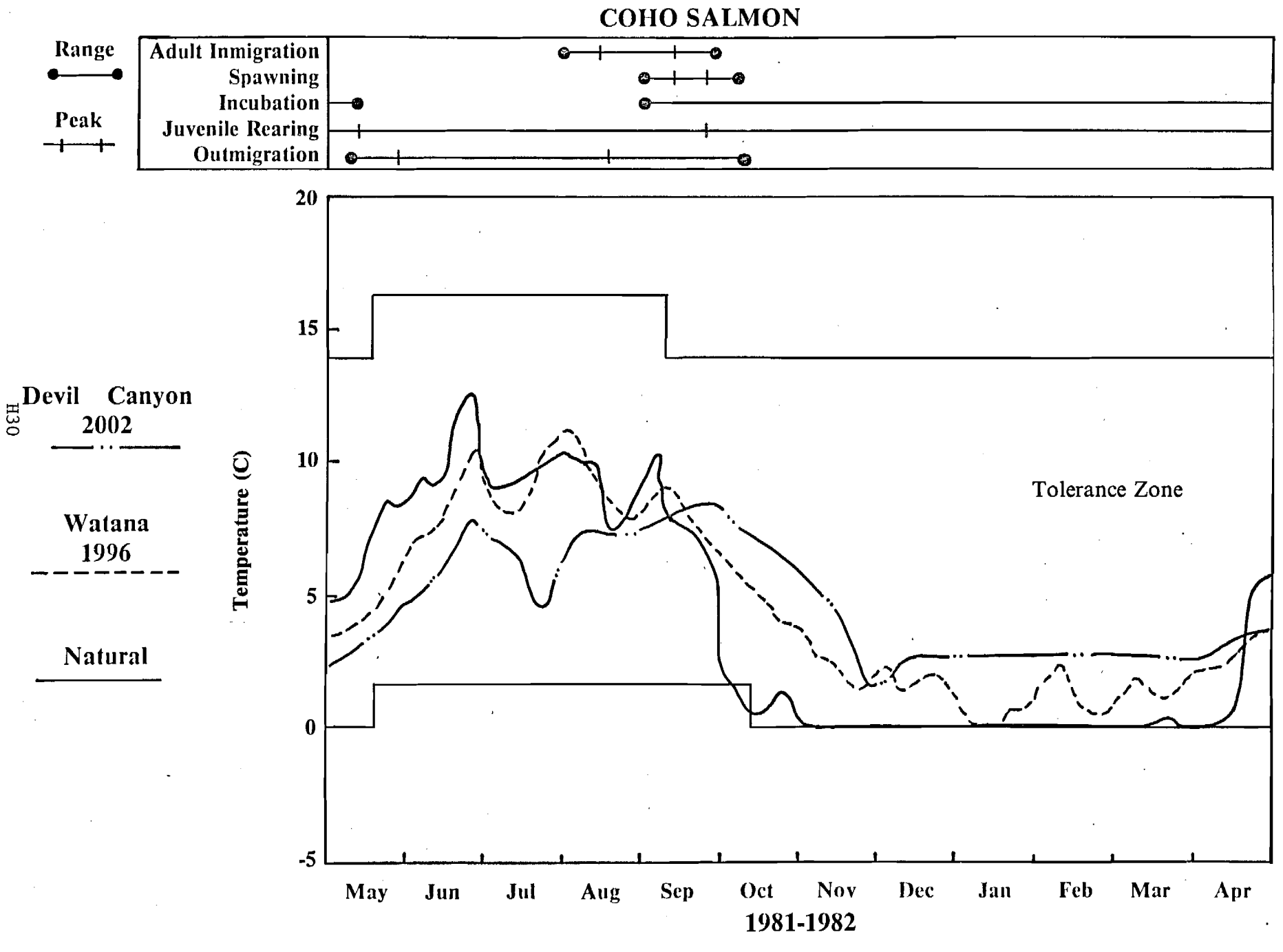
Mar
Apr
1981-1982
River Mile 130


COHO SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
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0
-5
Tolerance Zone
May
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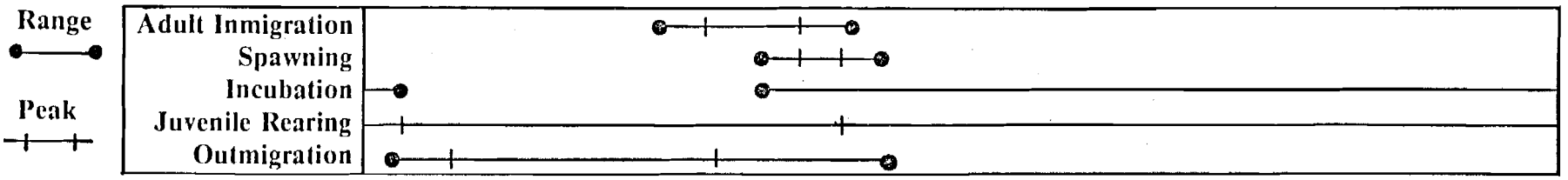
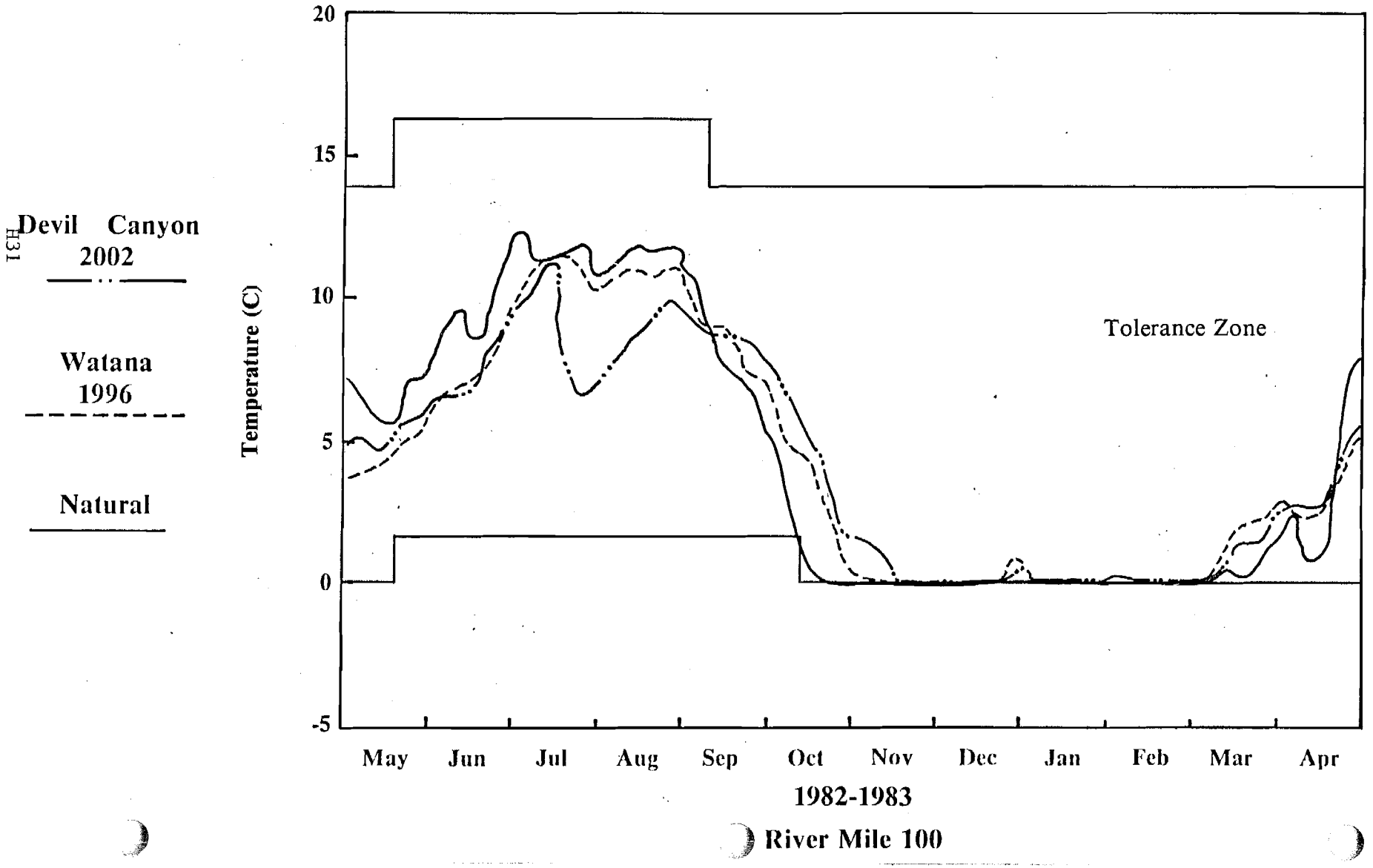
Mar
Apr
1981-1982
River Mile 150
H30

COHO SALMON


Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration


Devil Canyon
2002
Watana
1996
Natural
H31
Temperature (C)
20
15
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Tolerance Zone
May
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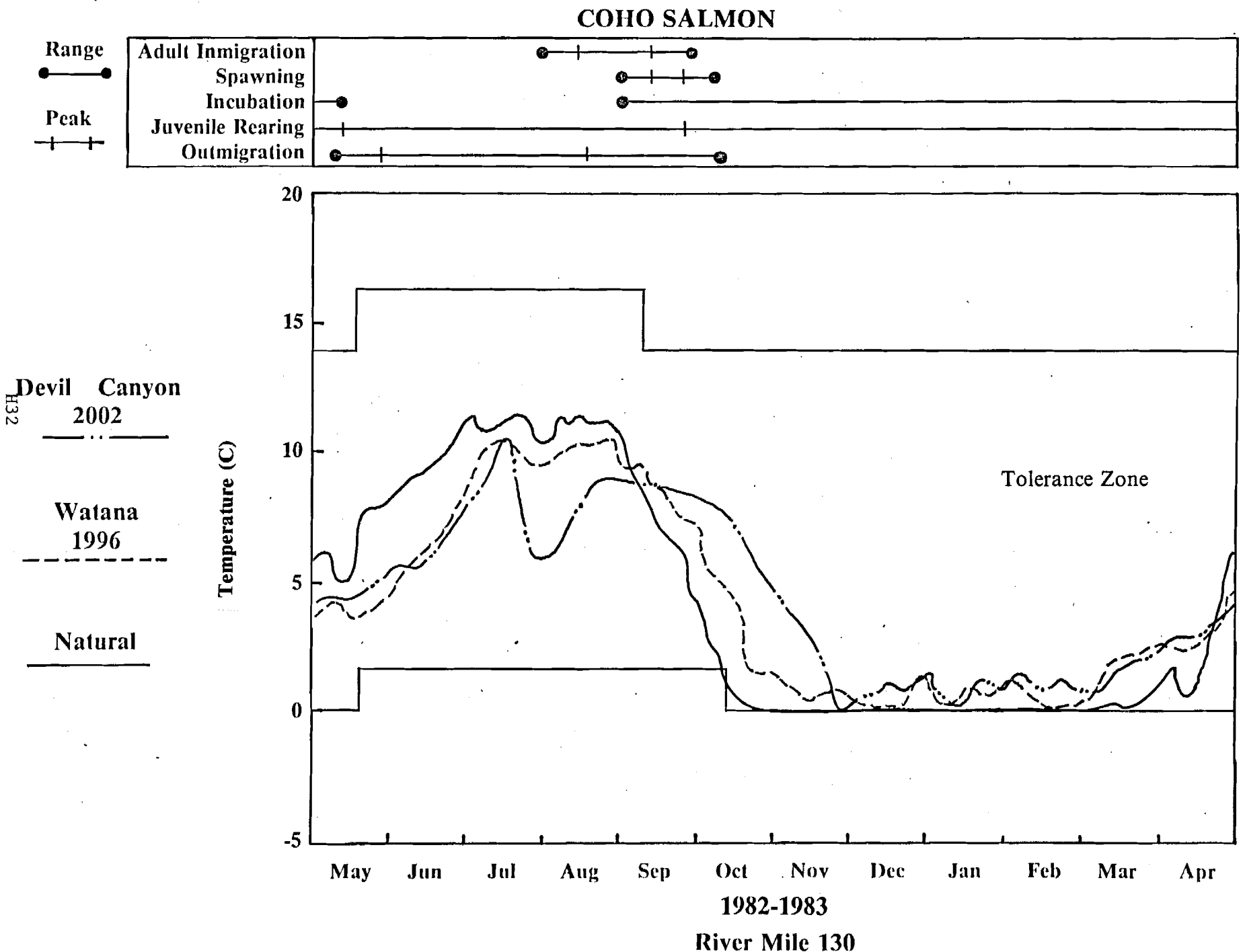
Dec
Jan
Feb
Mar
Apr
1982-1983
River Mile 100


COHO SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
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-5
Tolerance Zone
May
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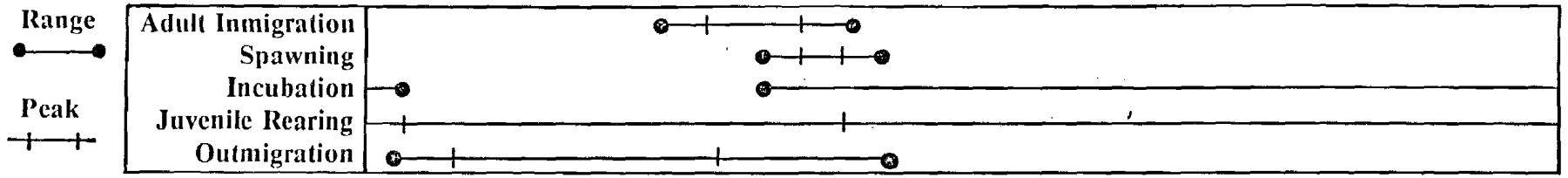
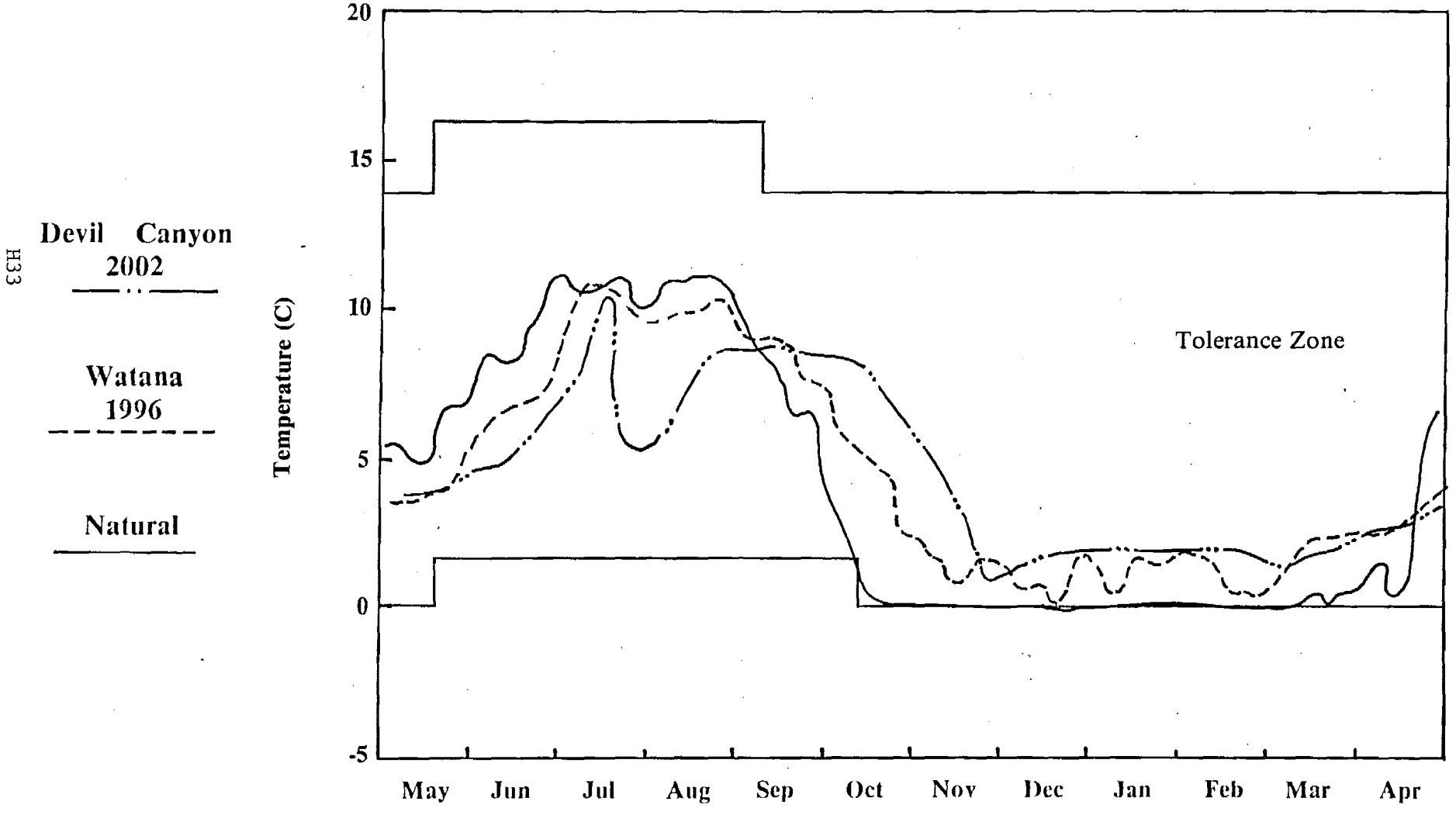
Feb
Mar
Apr
1982-1983
River Mile 130

COHO SALMON


Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration


Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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Tolerance Zone
May
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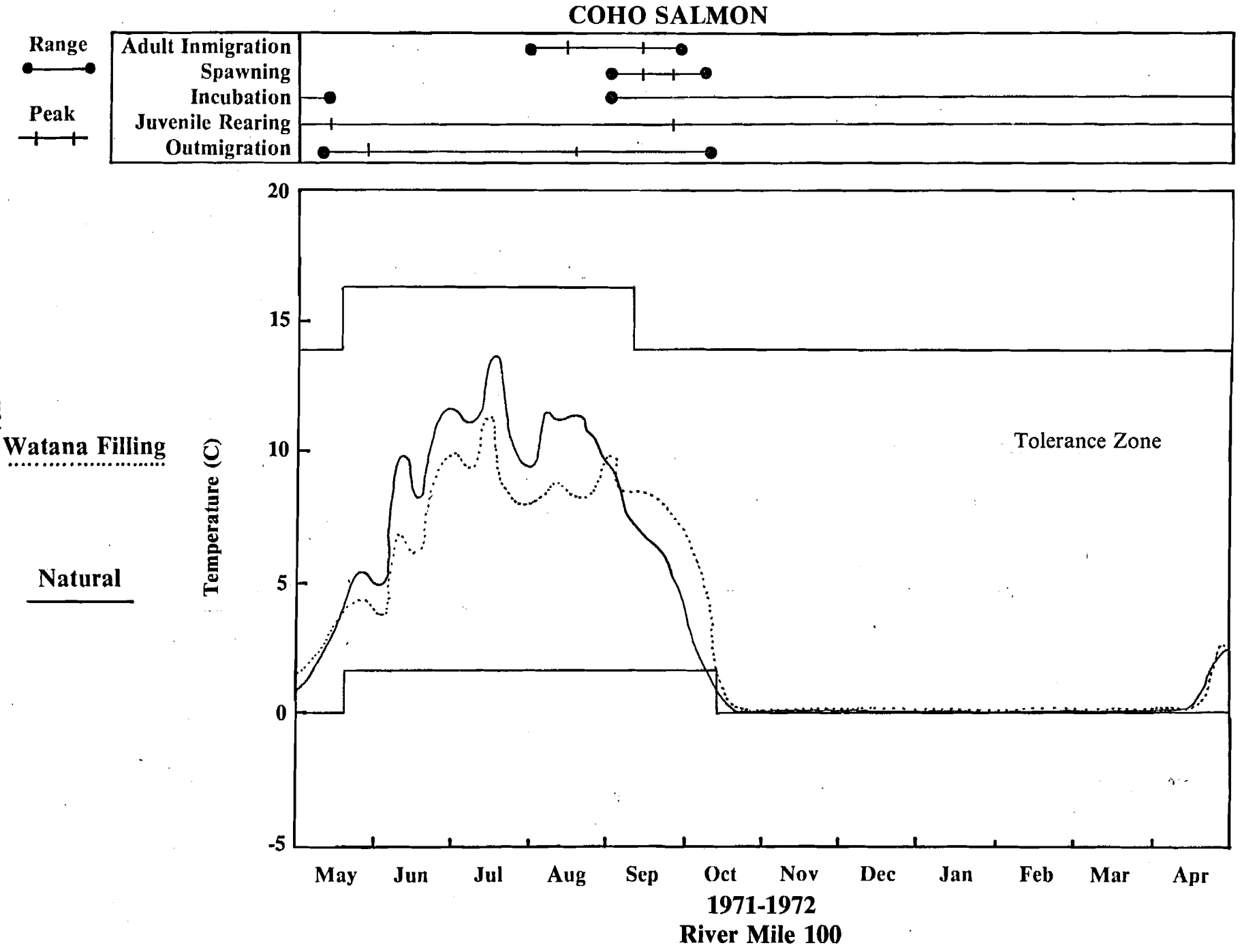
Apr
1982-1983
River Mile 150


COHO SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
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Tolerance Zone
May
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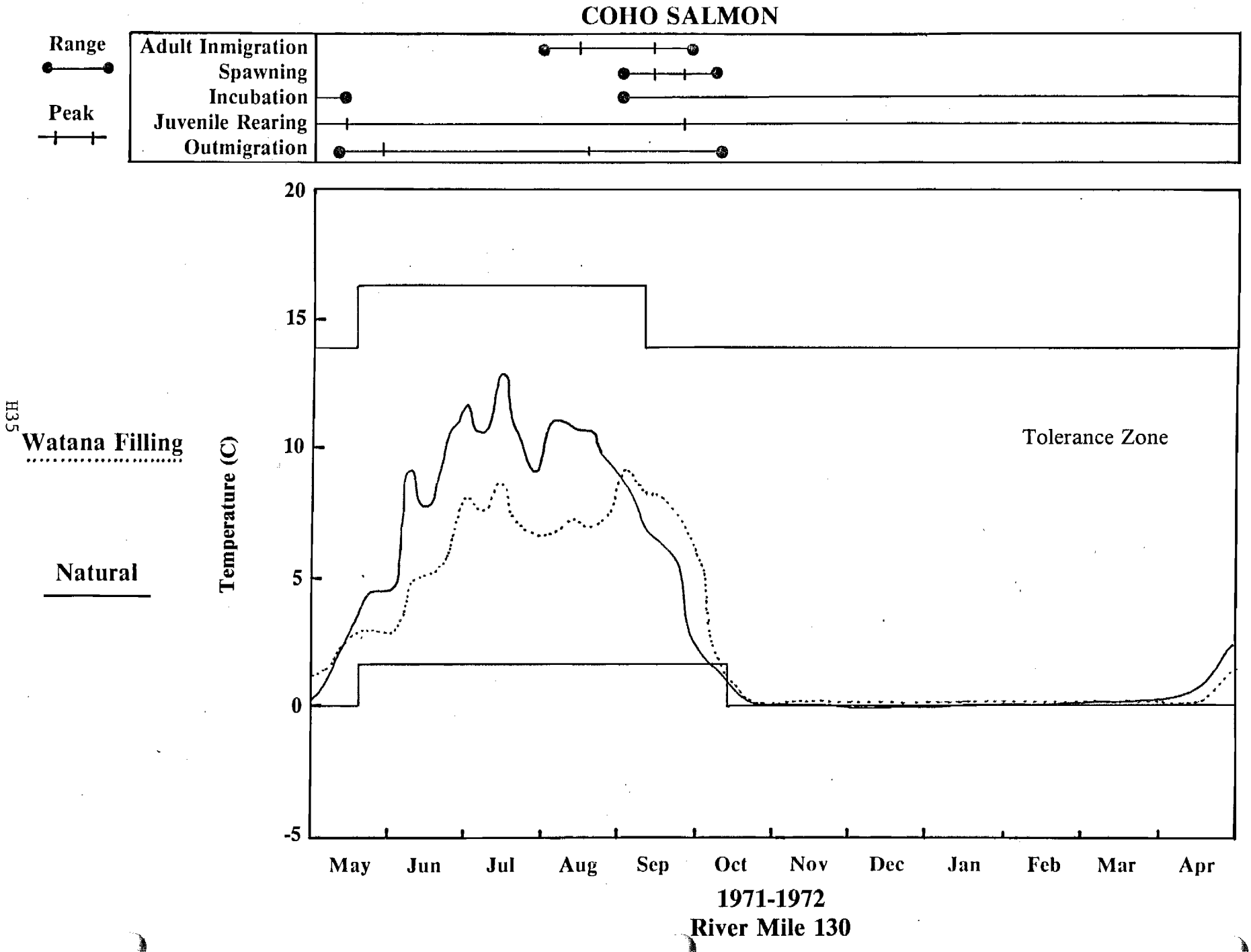
Jan
Feb
Mar
Apr
1971-1972
River Mile 100


COHO SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
15
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-5
Temperature (C)
Watana Filling
Natural
Tolerance Zone
May
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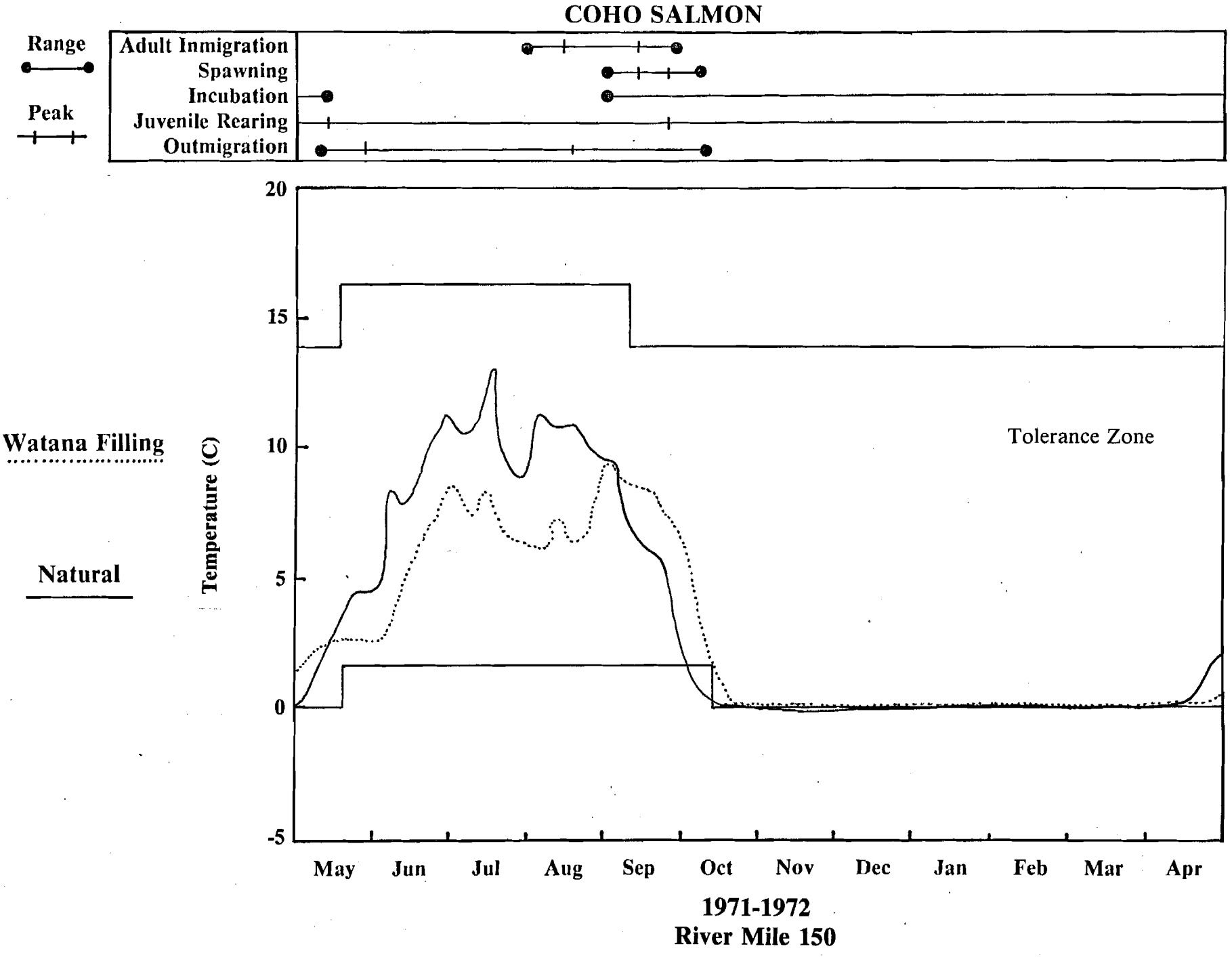
Apr
1971-1972
River Mile 130


COHO SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
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Tolerance Zone
May
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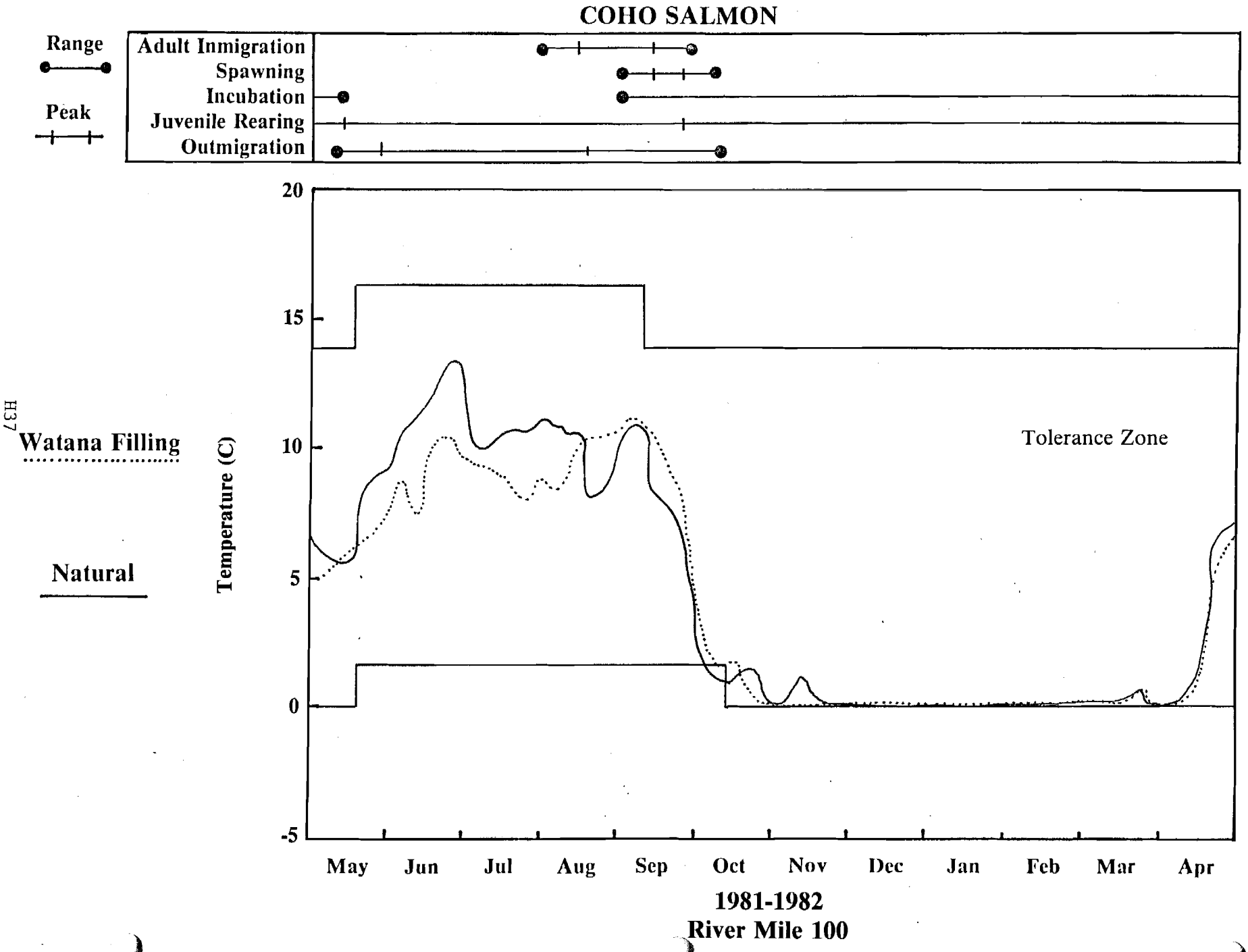
Apr
1971-1972
River Mile 150


COHO SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
15
10
5
0
-5
Temperature (C)
Watana Filling
Natural
Tolerance Zone
May
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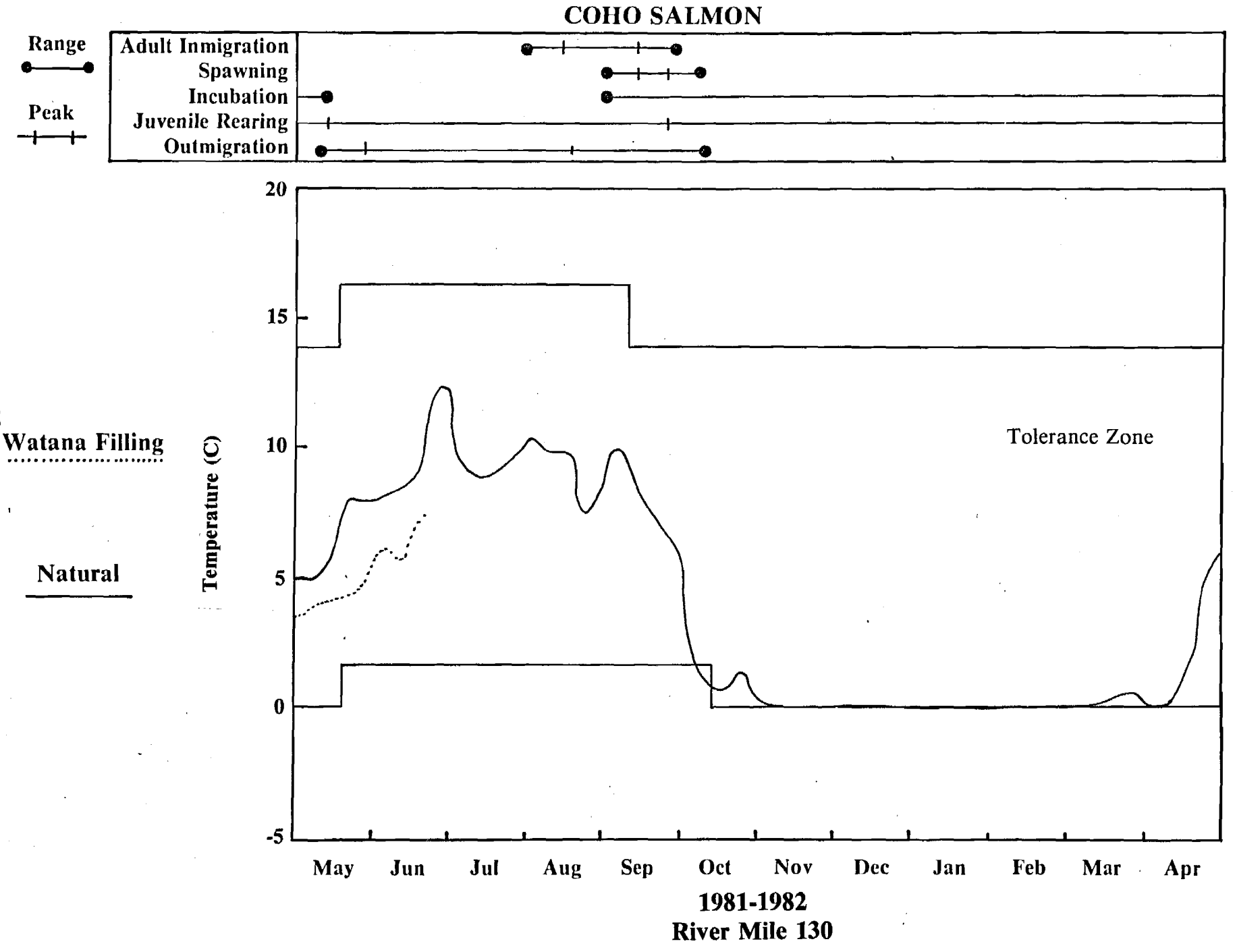
Mar
Apr
1981-1982
River Mile 100


COHO SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
15
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-5
Temperature (C)
Watana Filling
Natural
Tolerance Zone
May
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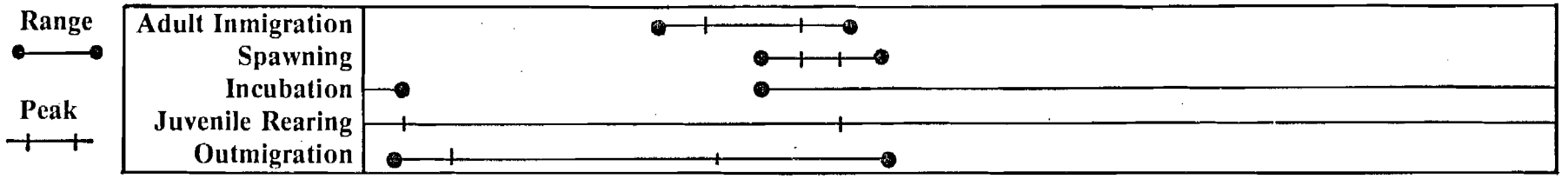
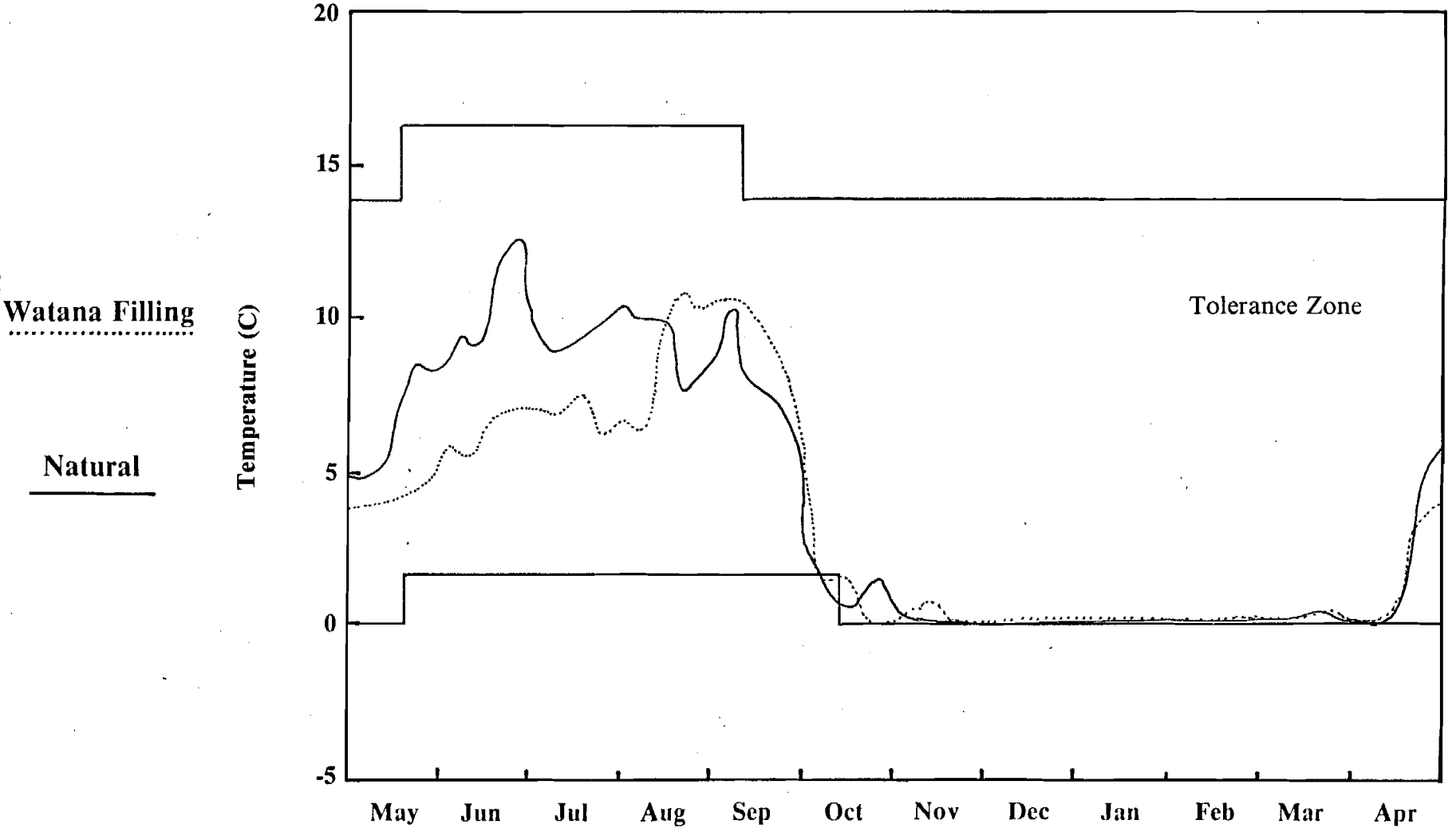
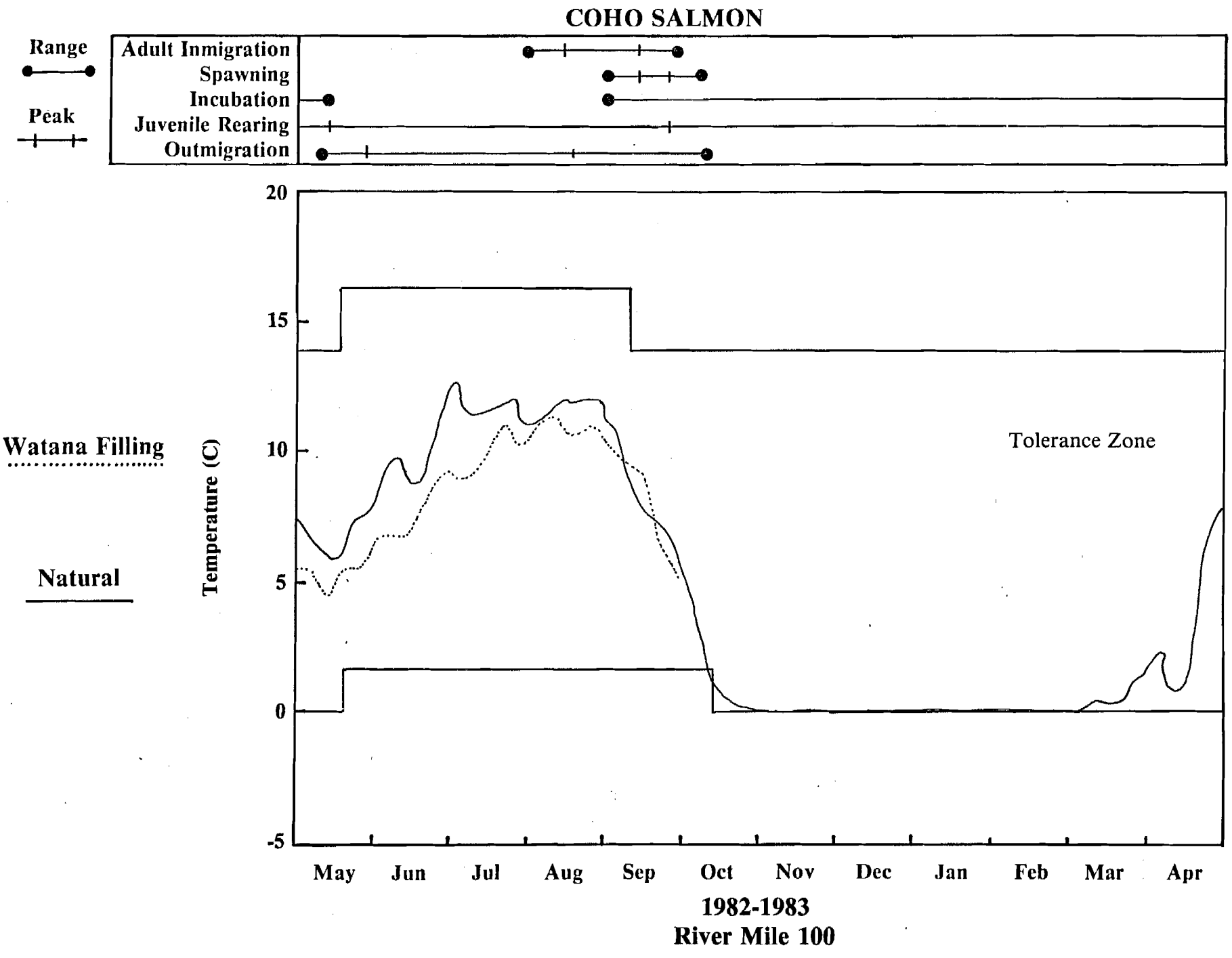
Apr
1981-1982
River Mile 130

COHO SALMON





1981-1982
River Mile 150


COHO SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
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-5
Tolerance Zone
May
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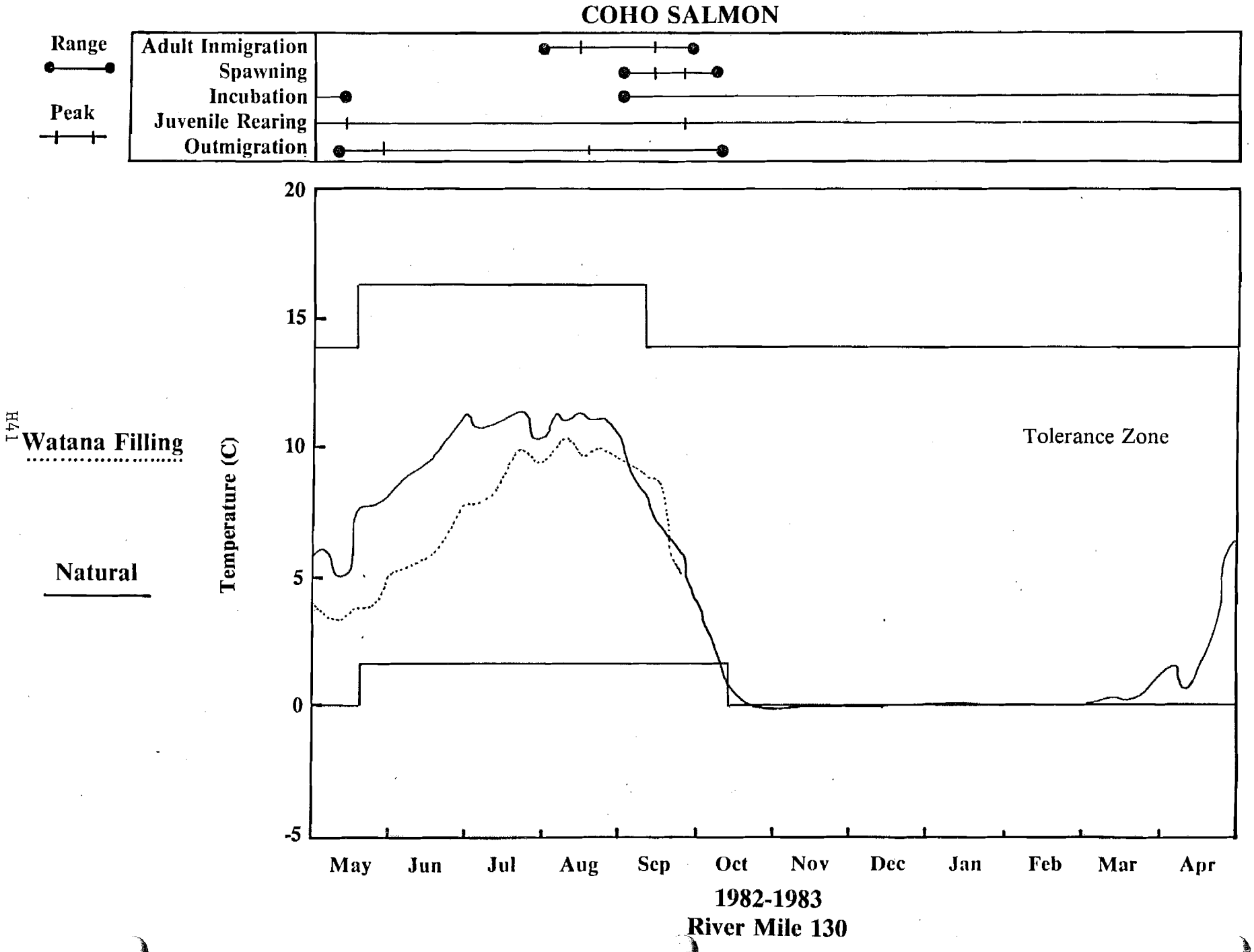
Mar
Apr
1982-1983
River Mile 100


COHO SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
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-5
Tolerance Zone
May
Jun
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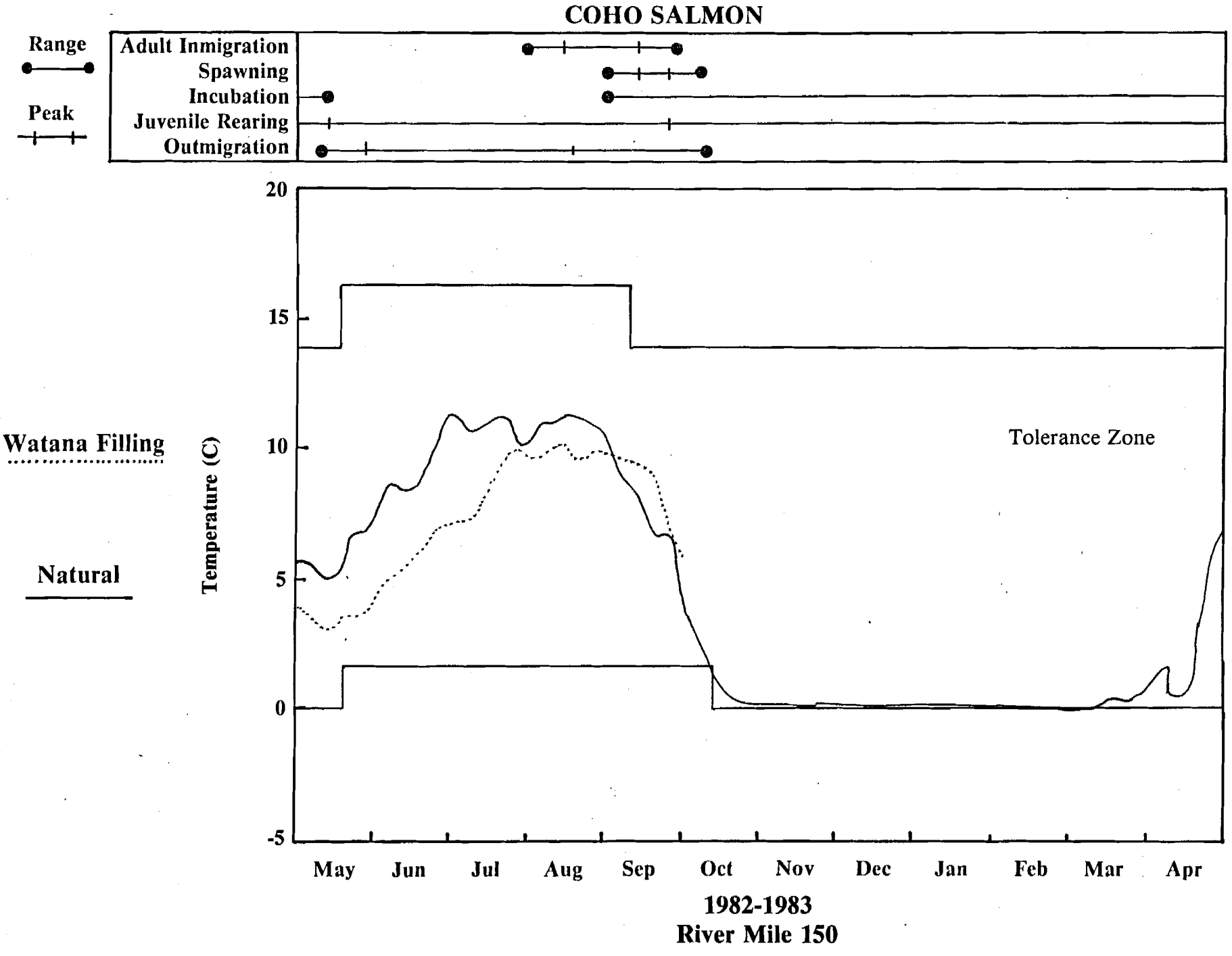
Mar
Apr
1982-1983
River Mile 130


COHO SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
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-5
Tolerance Zone
May
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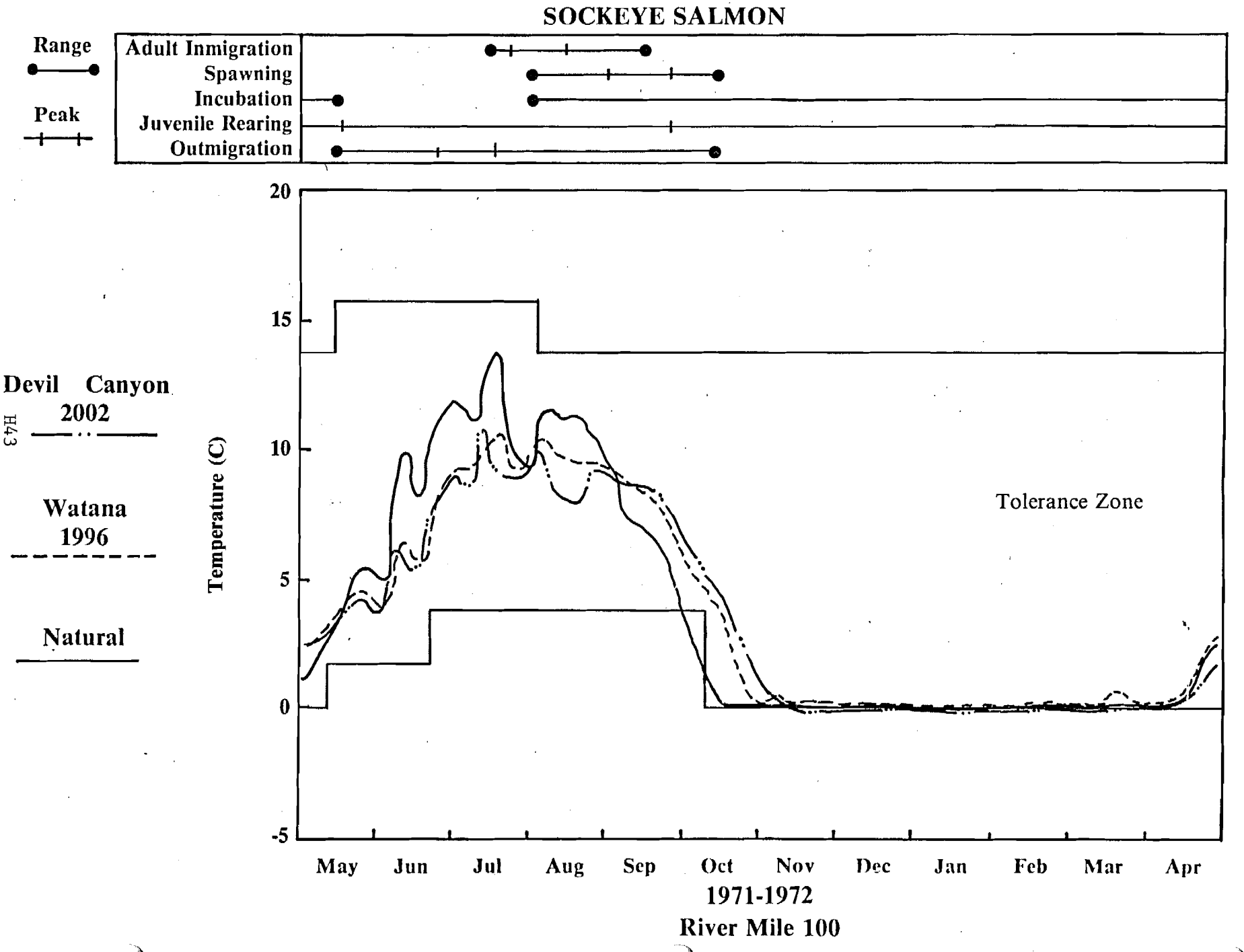
Feb
Mar
Apr
1982-1983
River Mile 150


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
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-5
Tolerance Zone
May
Jun
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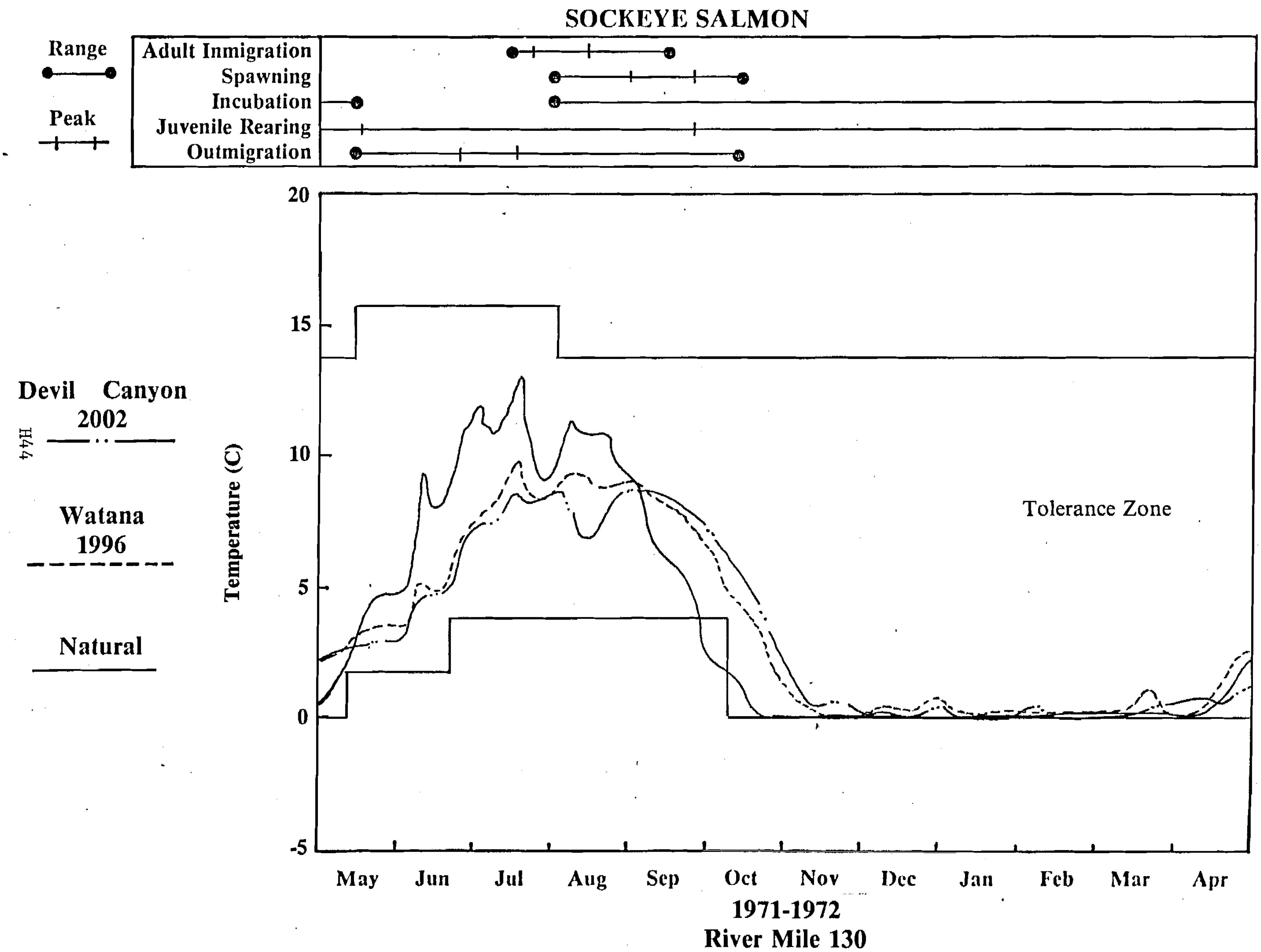
Nov
Dec
Jan
Feb
Mar
Apr
1971-1972
River Mile 100


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
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-5
Tolerance Zone
May
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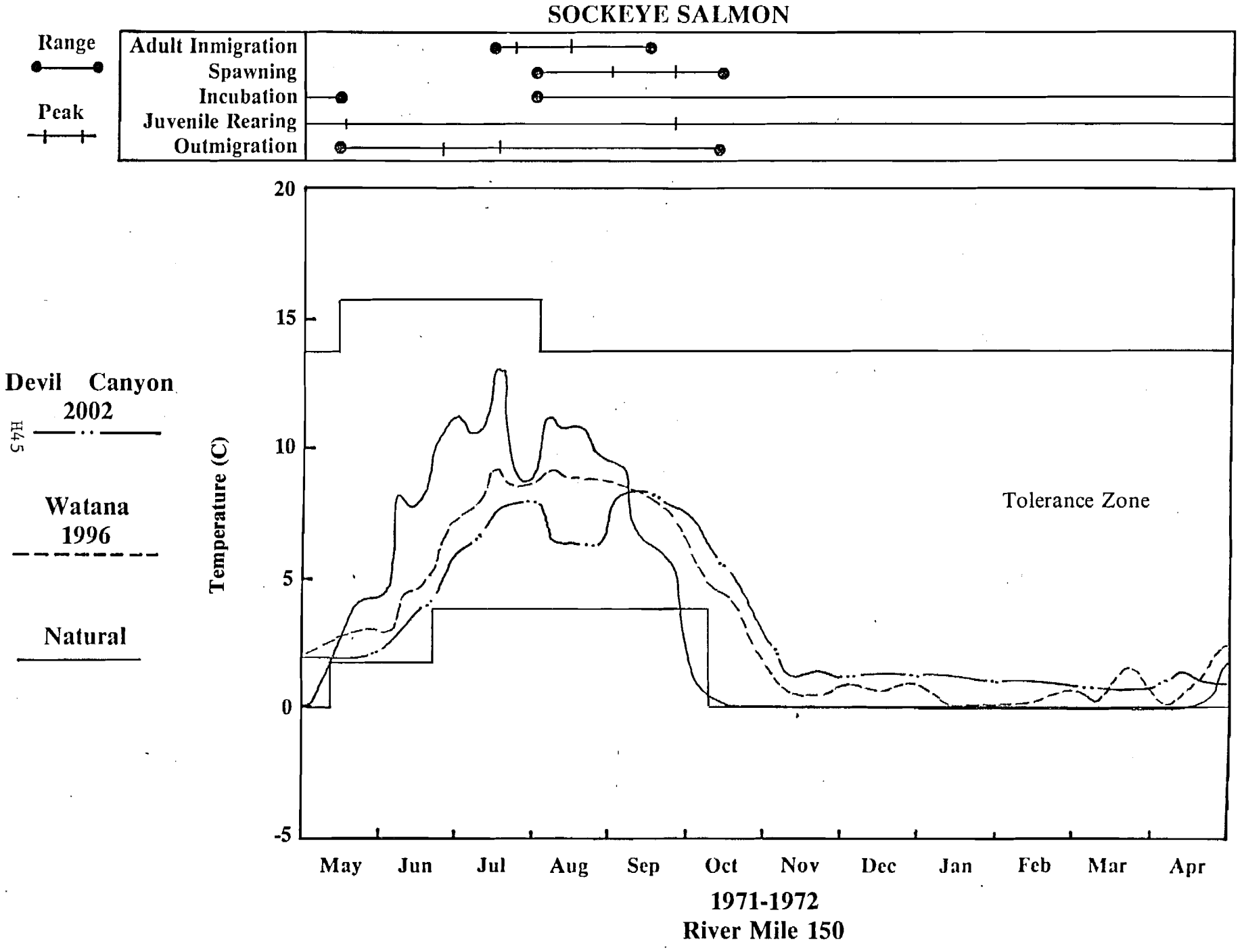
Apr
1971-1972
River Mile 130


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
H45
Watana
1996
Natural
Temperature (C)
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-5
Tolerance Zone
May
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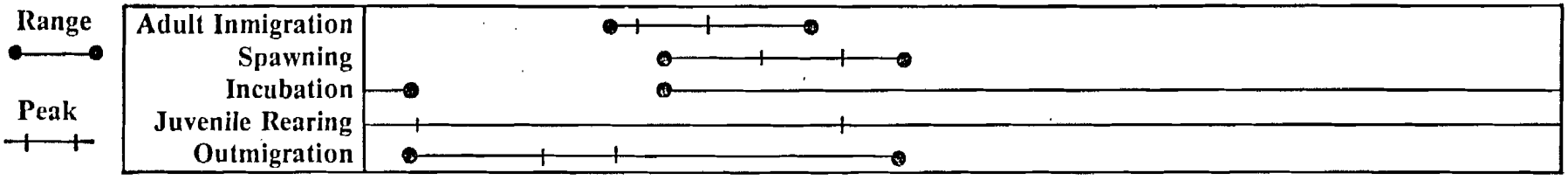
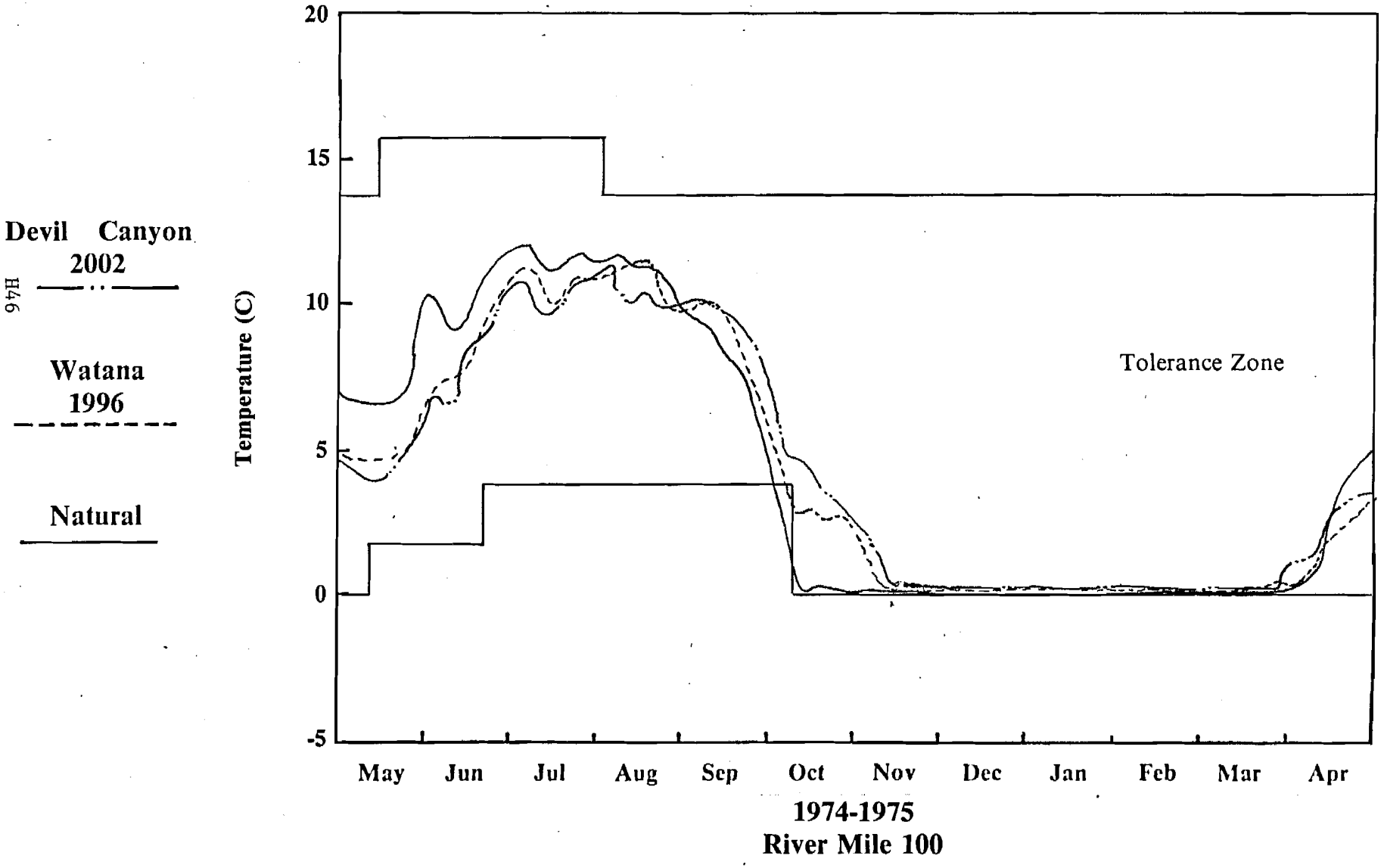
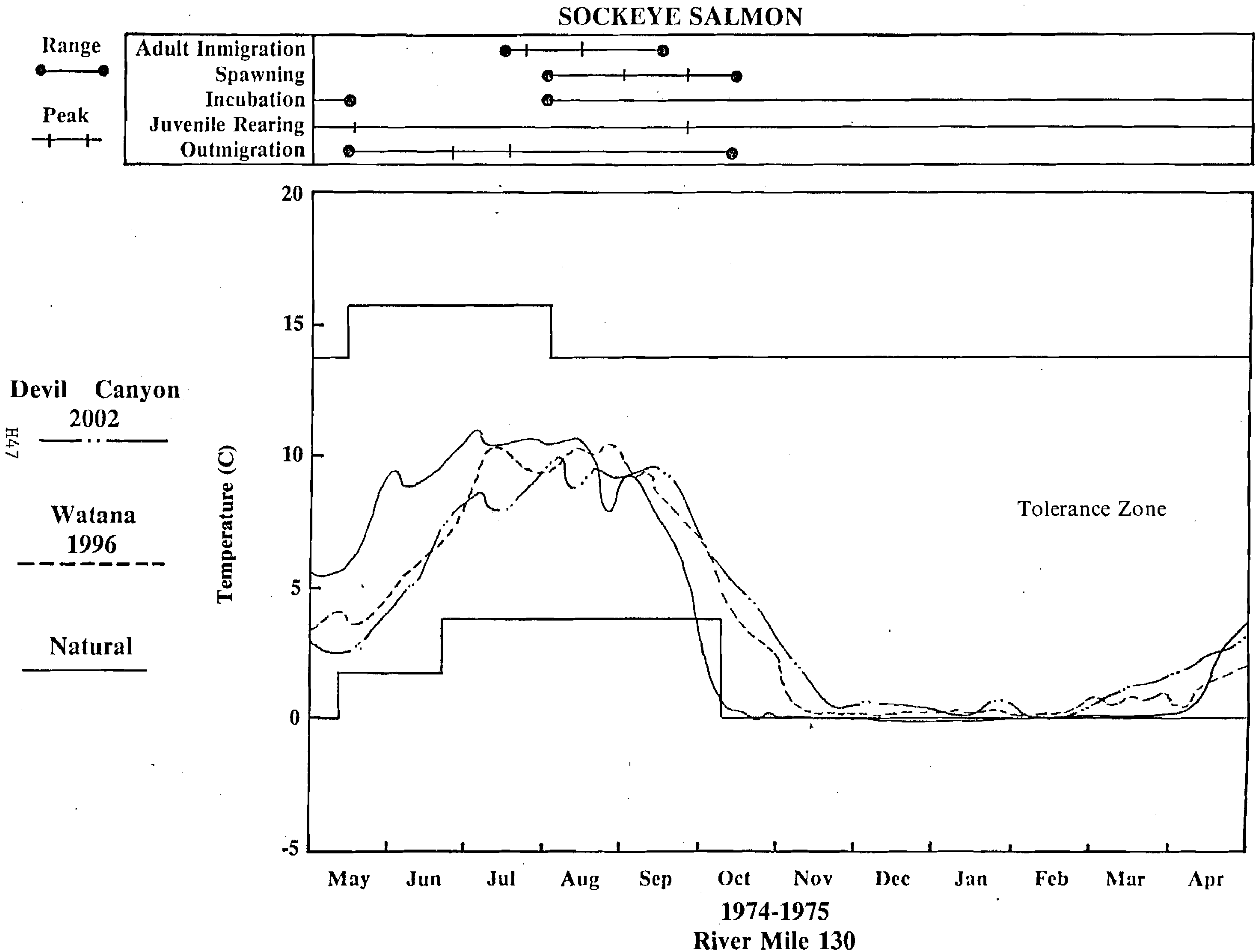
Jan
Feb
Mar
Apr
1971-1972
River Mile 150

SOCKEYE SALMON





1974-1975
River Mile 100



SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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Tolerance Zone
May
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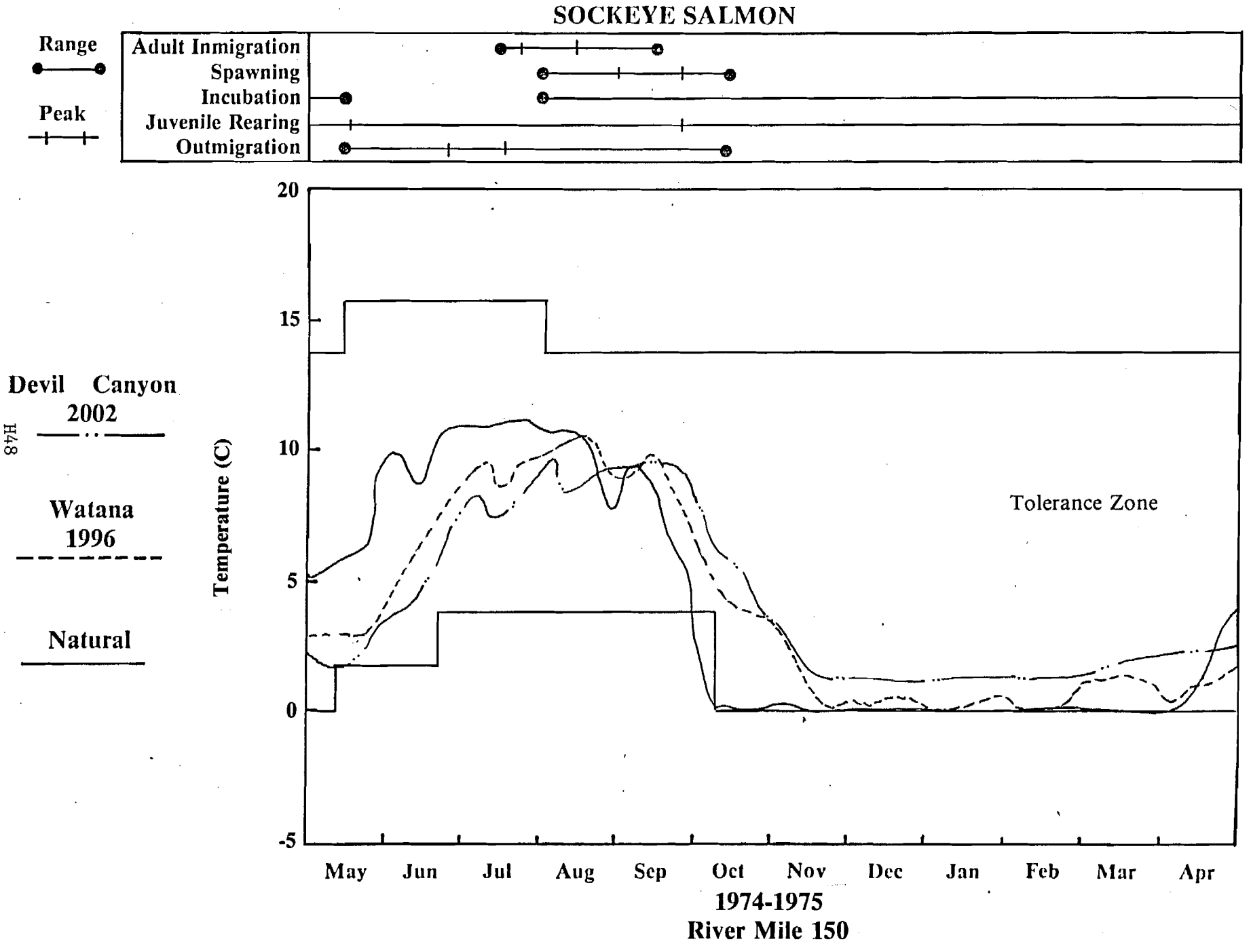
Apr
1974-1975
River Mile 130

H47


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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-5
Tolerance Zone
May
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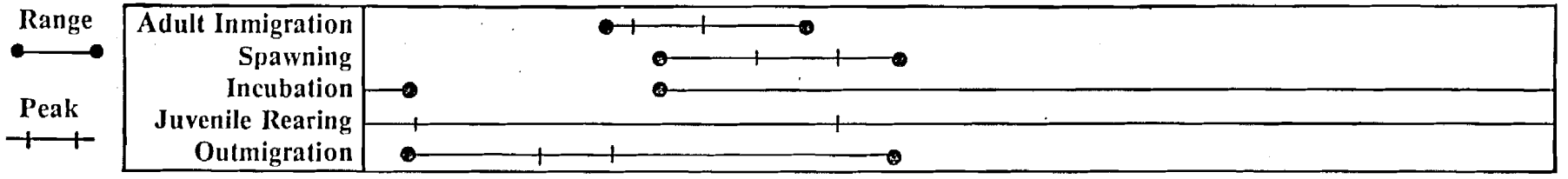
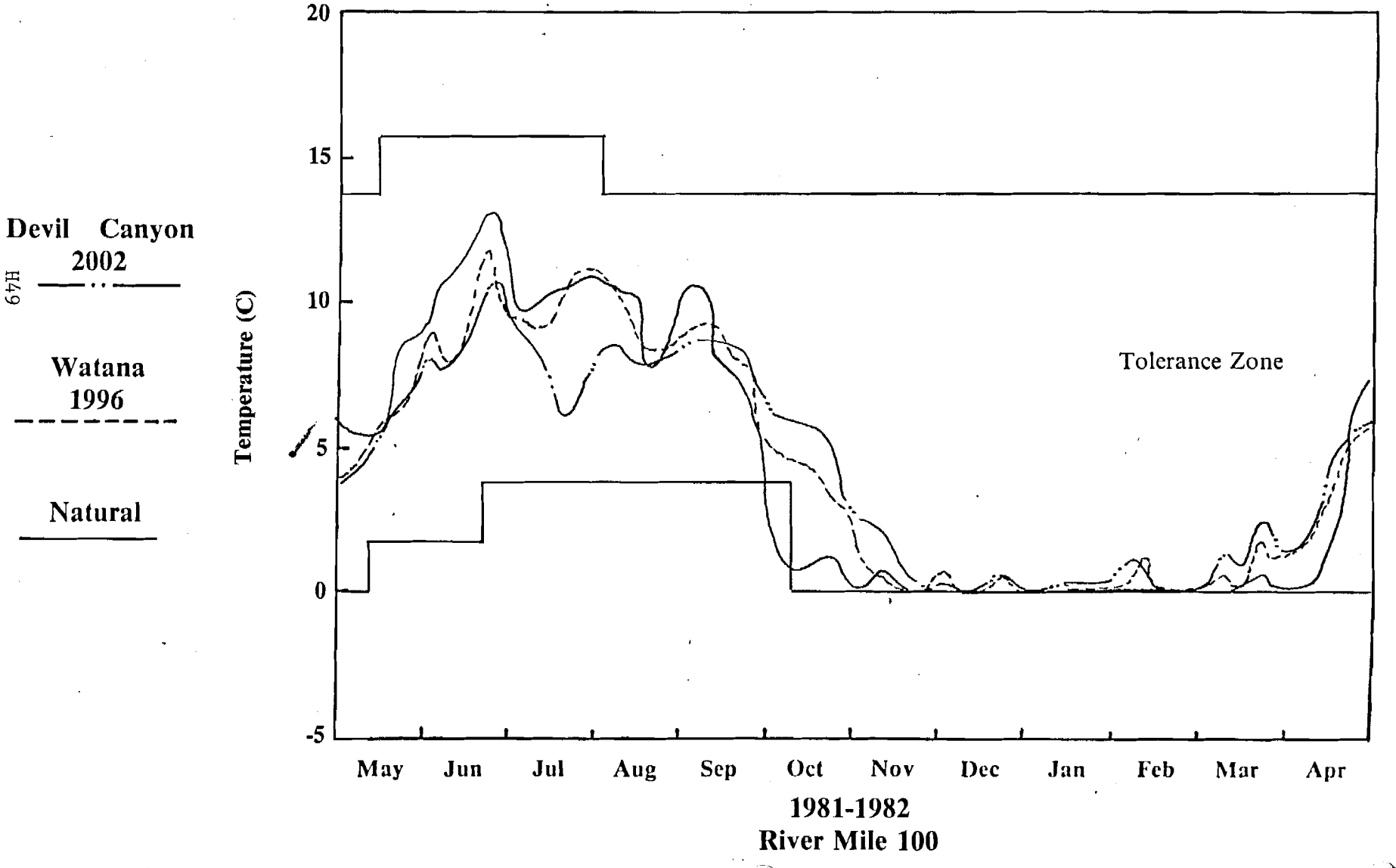
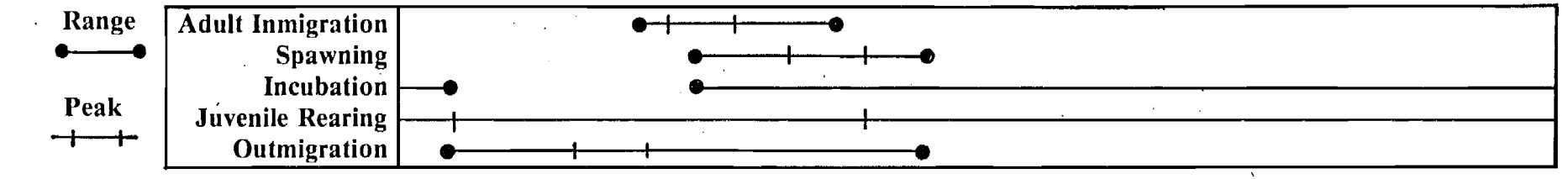
Feb
Mar
Apr
1974-1975
River Mile 150

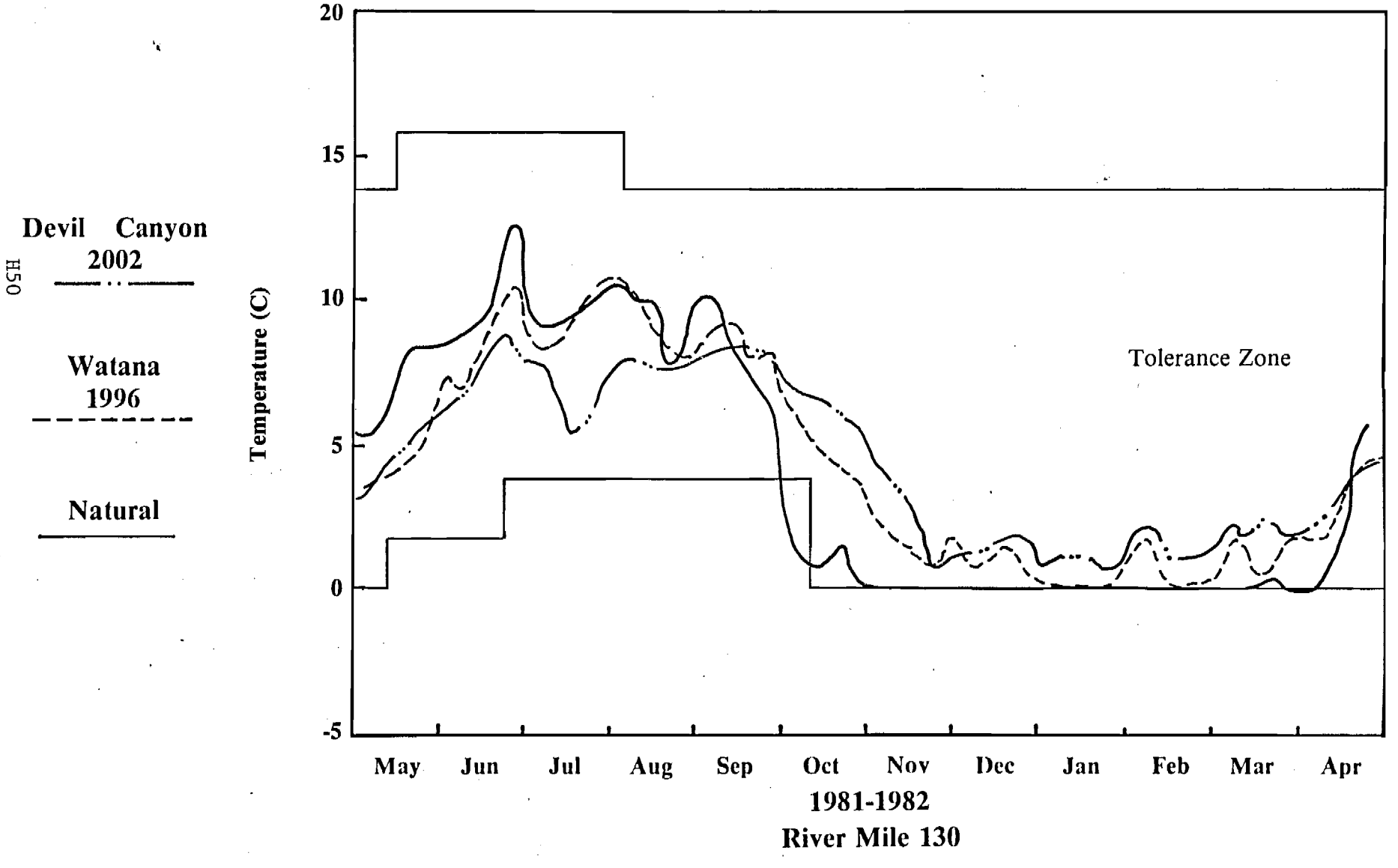
SOCKEYE SALMON

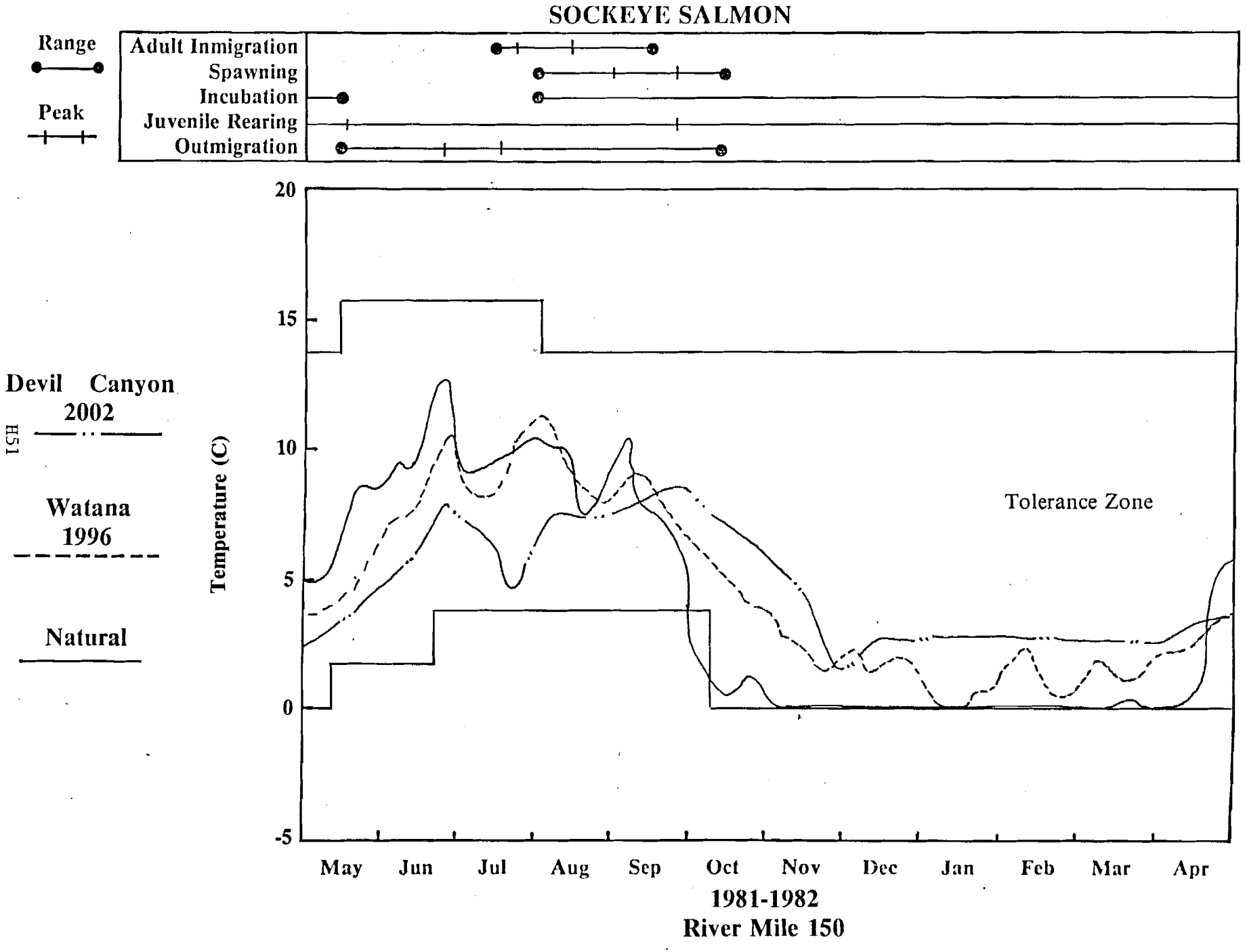


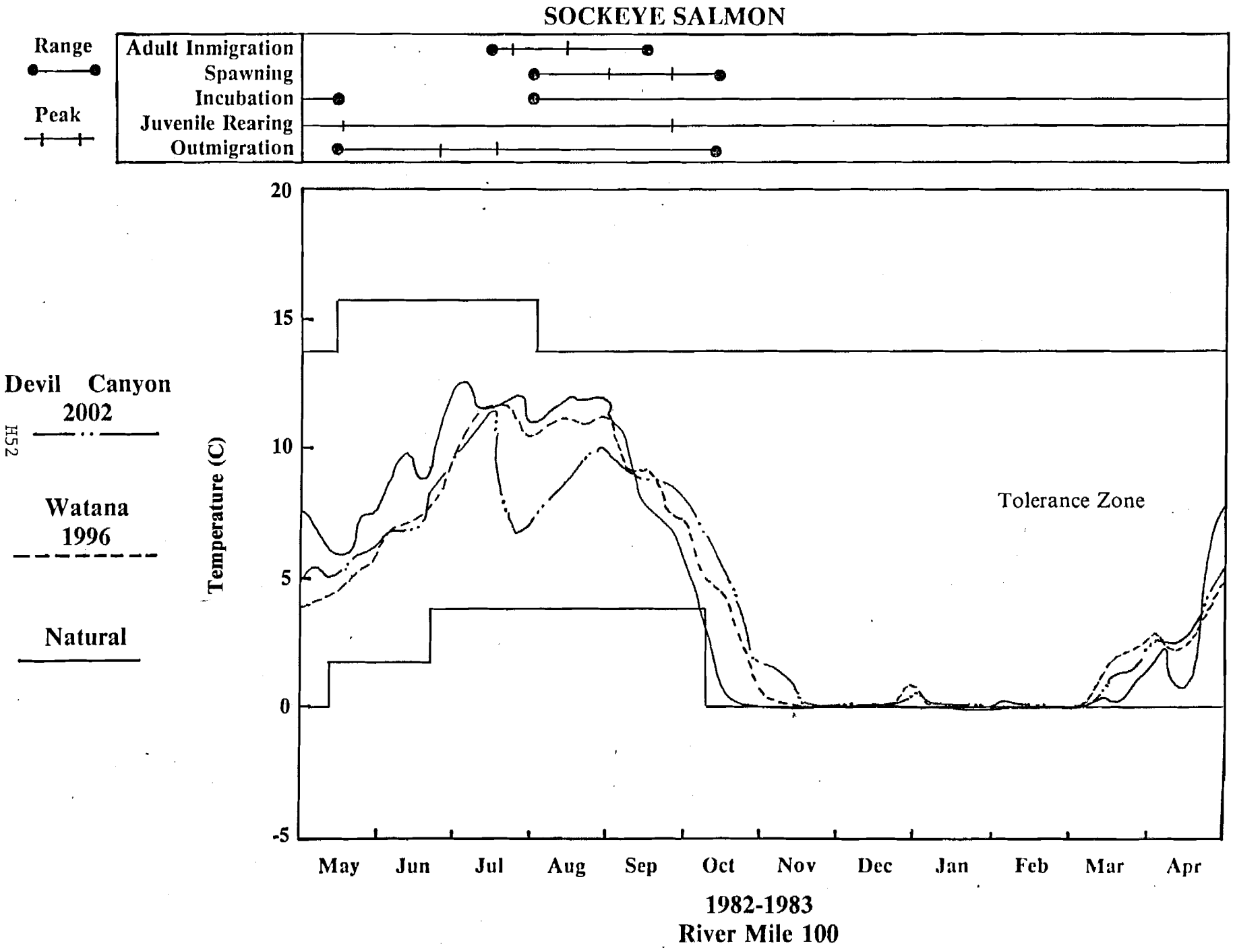


SOCKEYE SALMON






SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
H51
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1981-1982
River Mile 150


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
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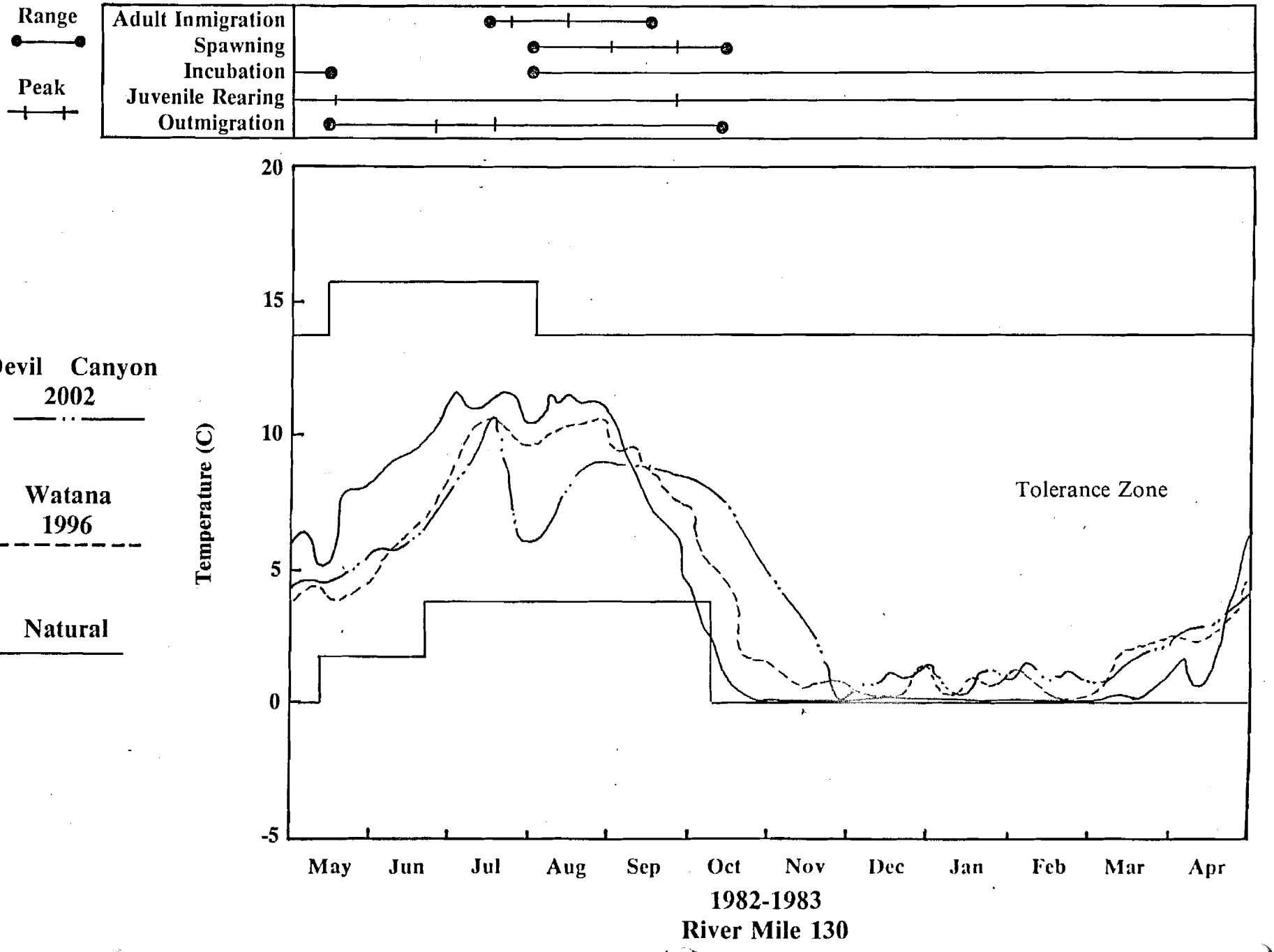
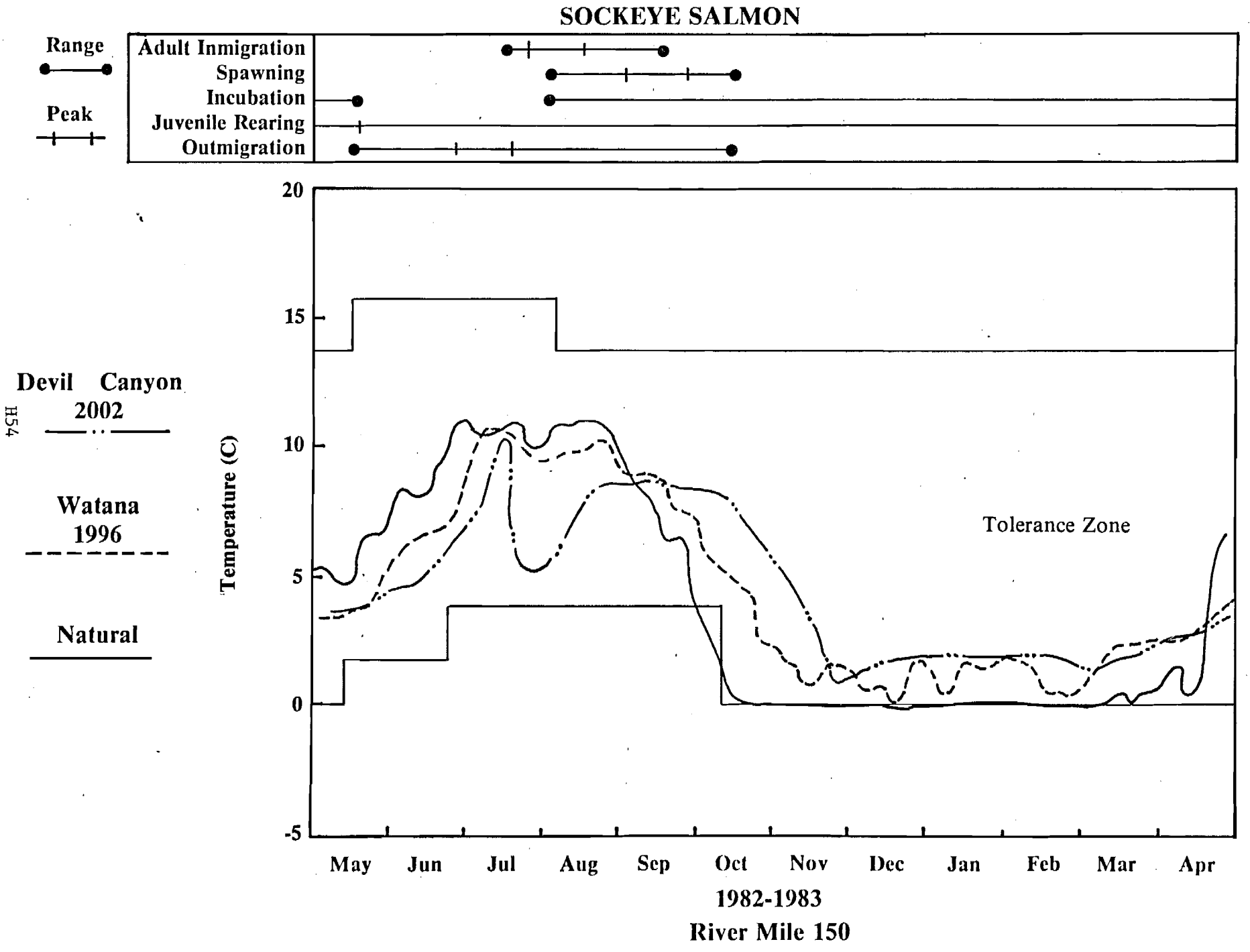
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1982-1983
River Mile 100

H52

SOCKEYE SALMON



H53


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
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0
-5
Tolerance Zone
May
Jun
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Oct
Nov
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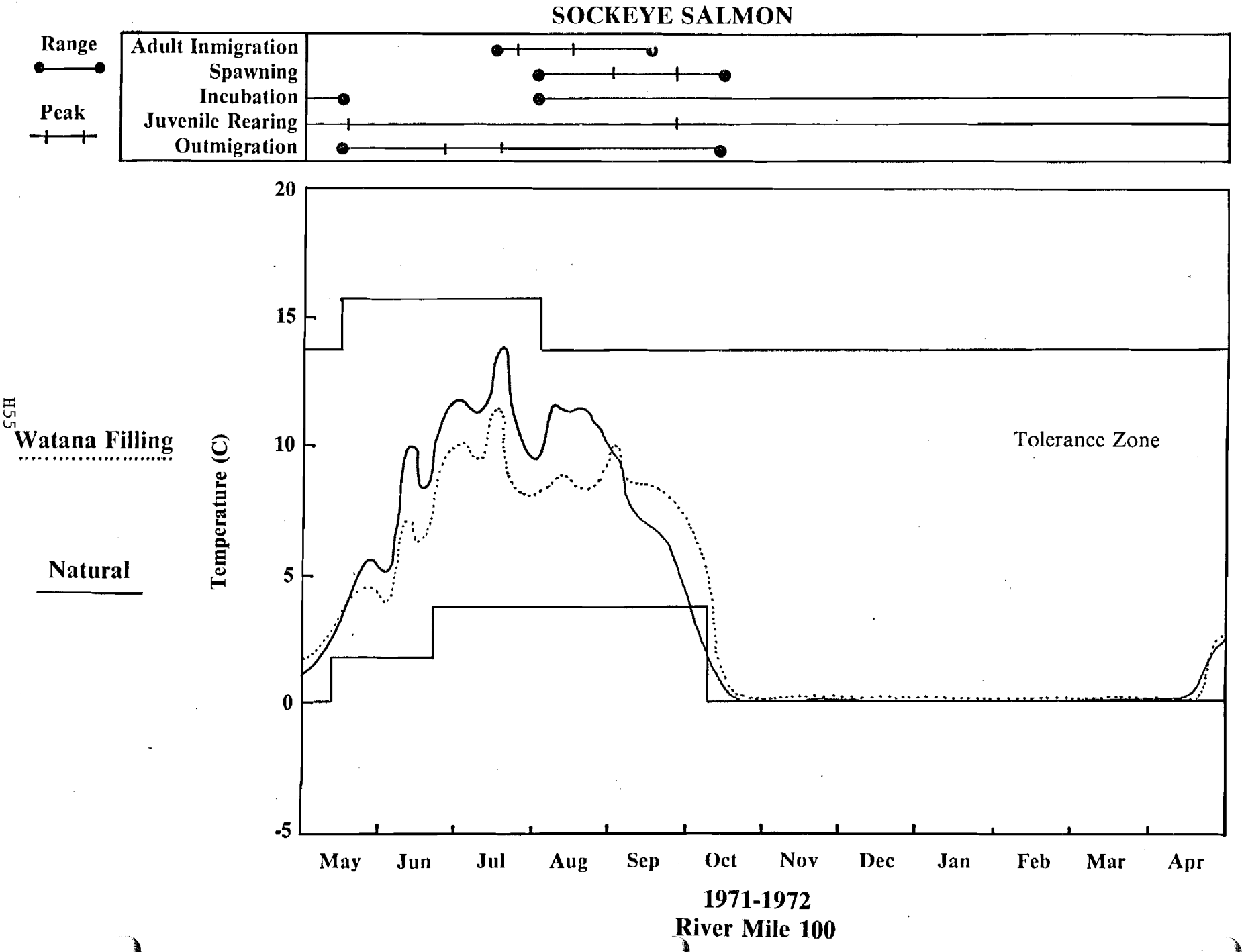
Feb
Mar
Apr
1982-1983
River Mile 150


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
10
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-5
Tolerance Zone
May
Jun
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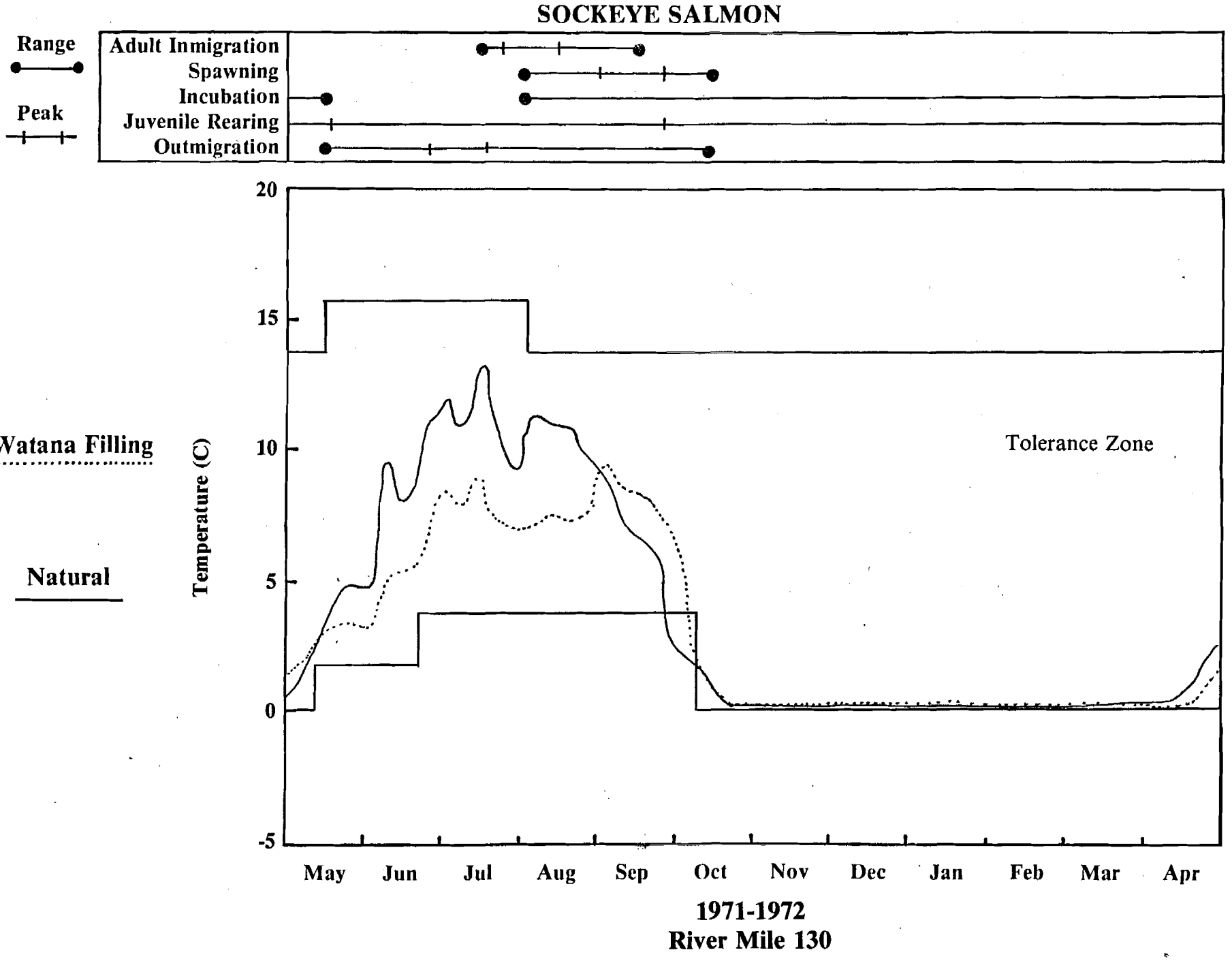
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1971-1972
River Mile 100


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
15
10
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-5
Temperature (C)
Watana Filling
Natural
Tolerance Zone
May
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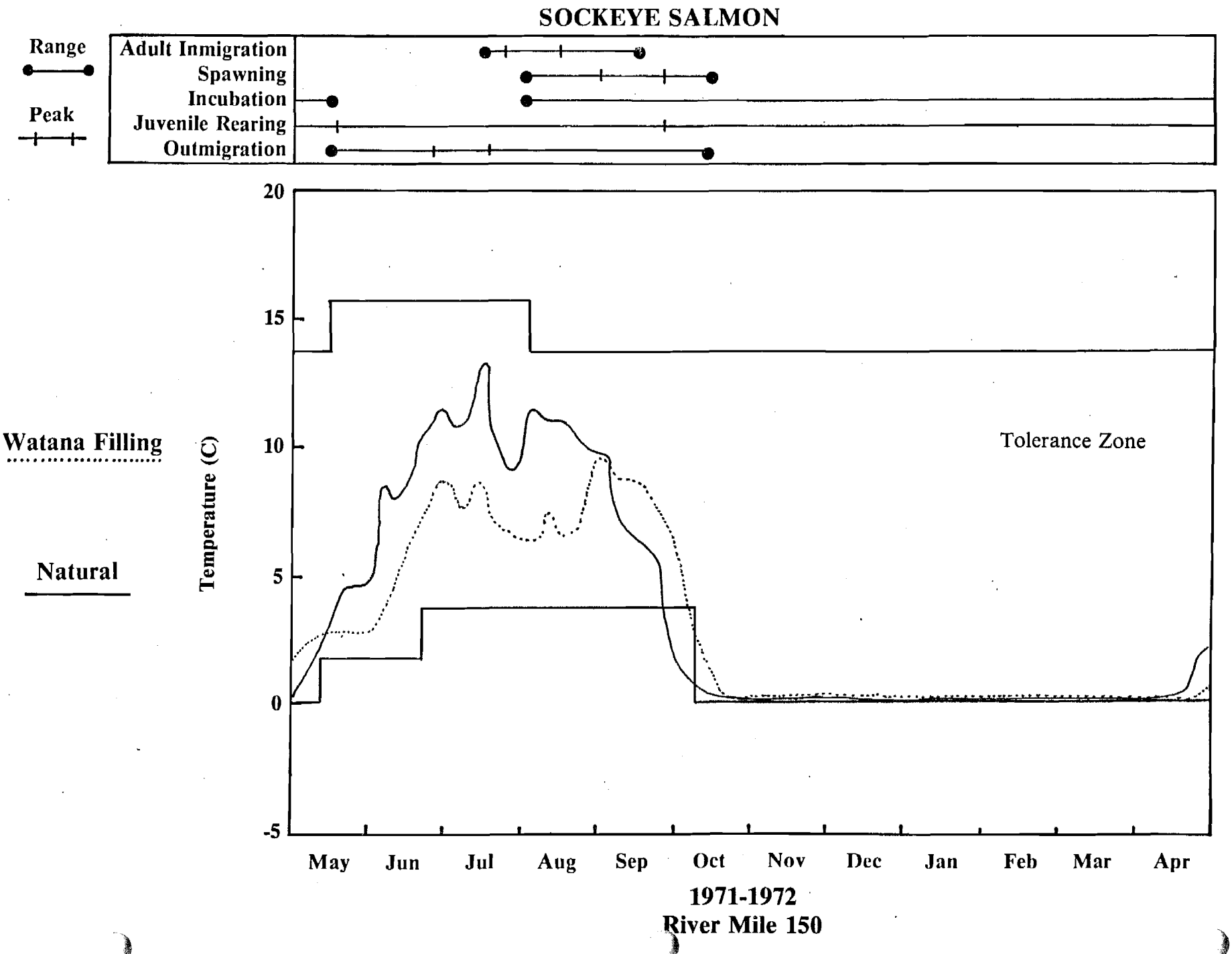
Apr
1971-1972
River Mile 130


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
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Tolerance Zone
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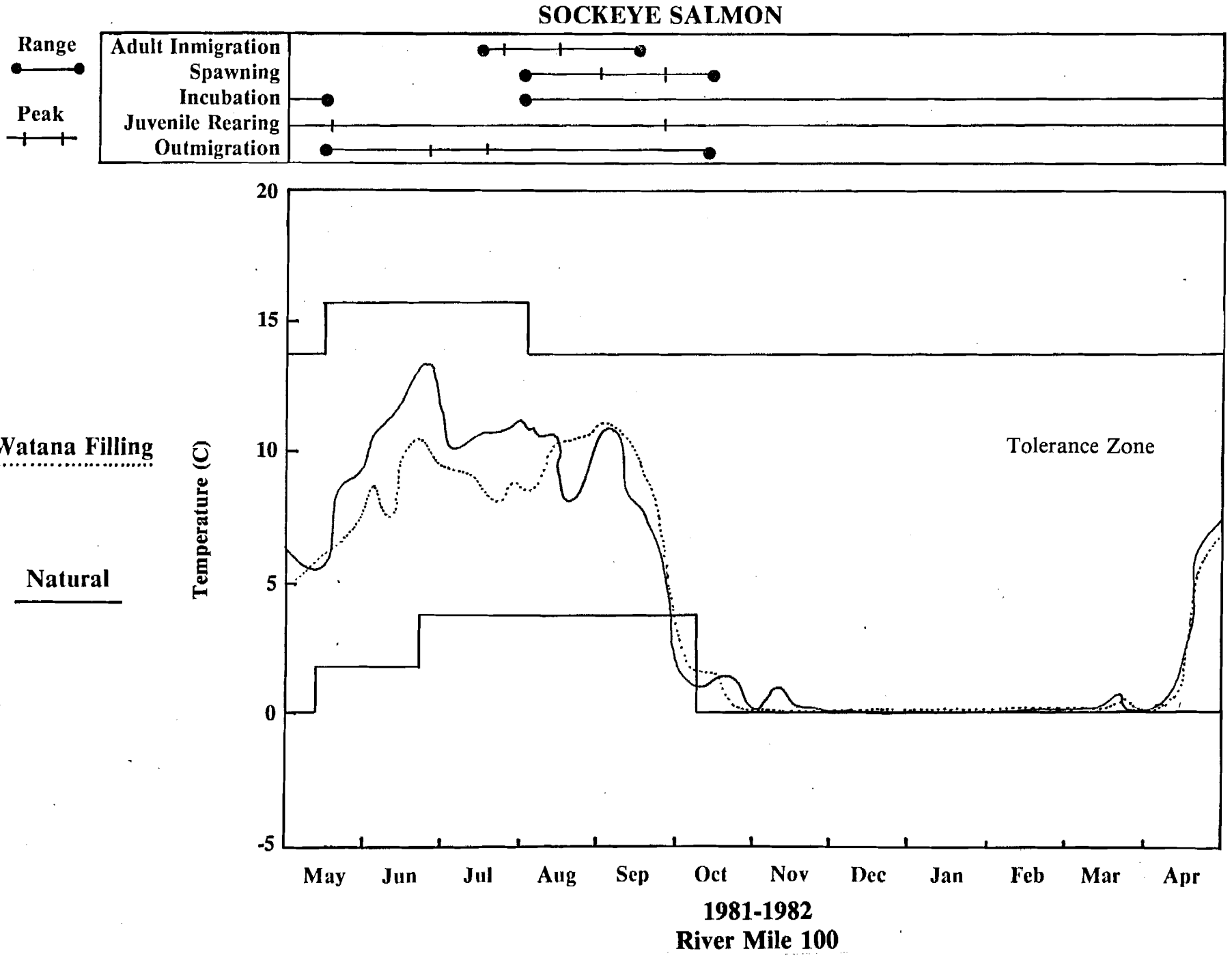
1971-1972
River Mile 150


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
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Tolerance Zone
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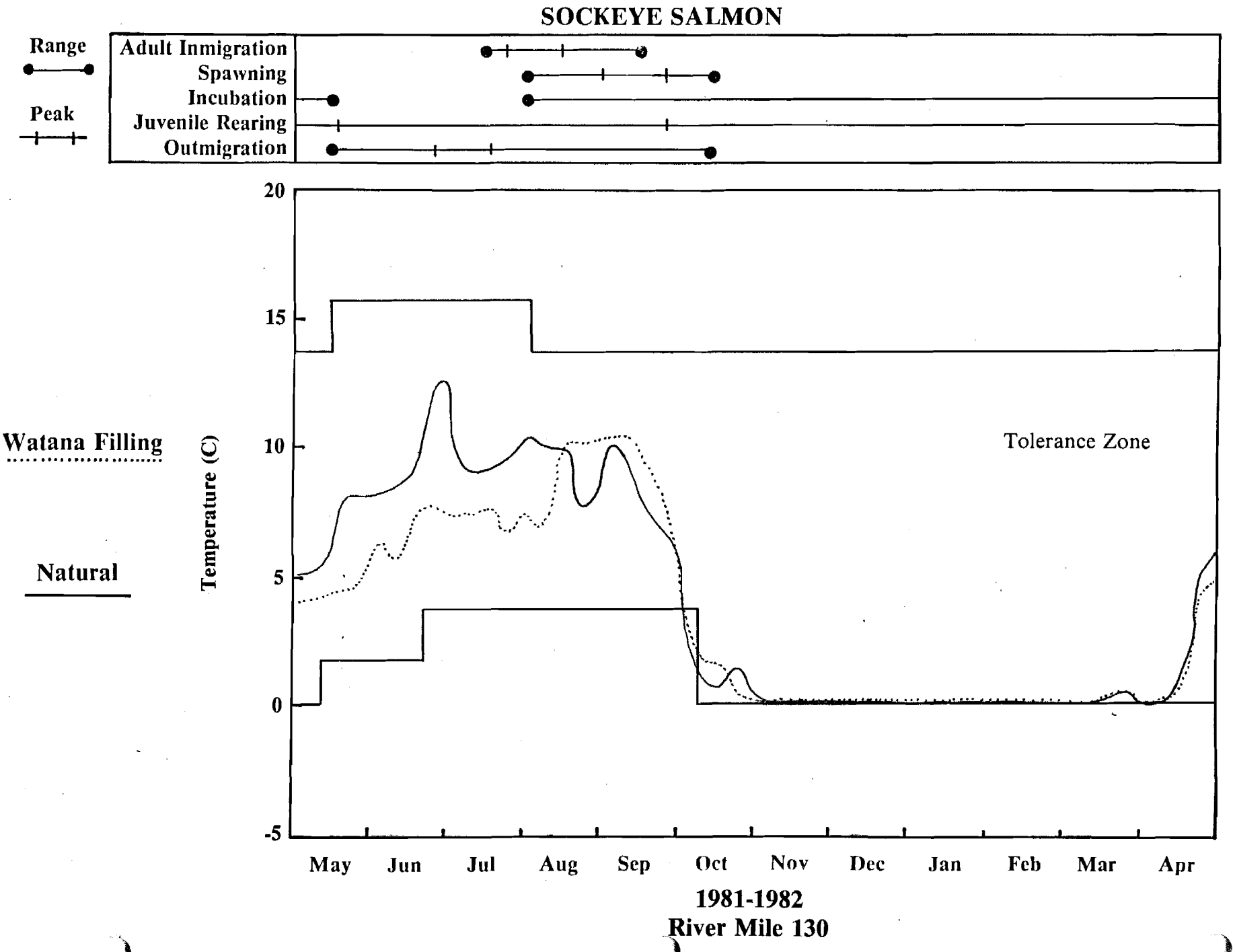
Mar
Apr
1981-1982
River Mile 100


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
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Tolerance Zone
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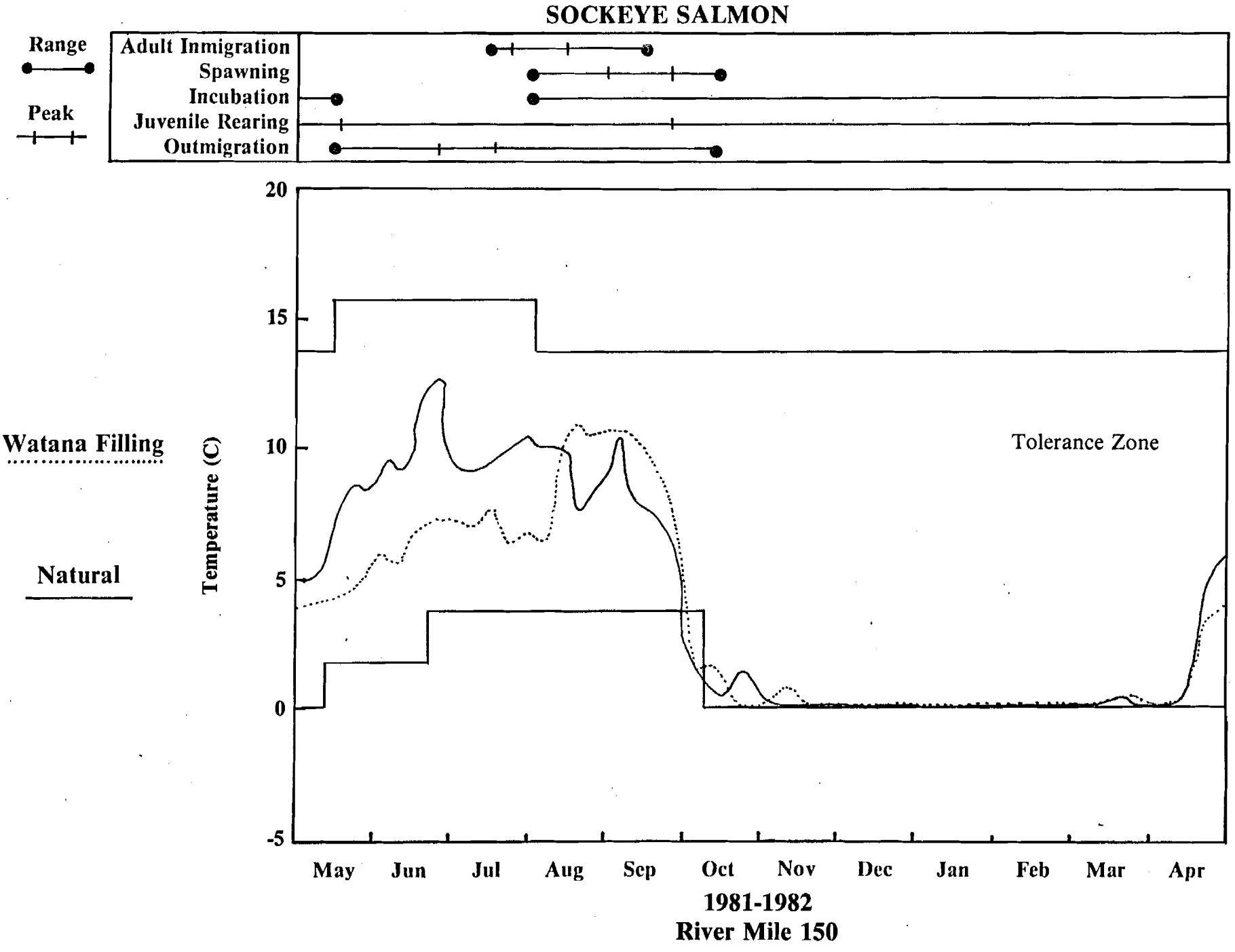
1981-1982
River Mile 130


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
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Tolerance Zone
May
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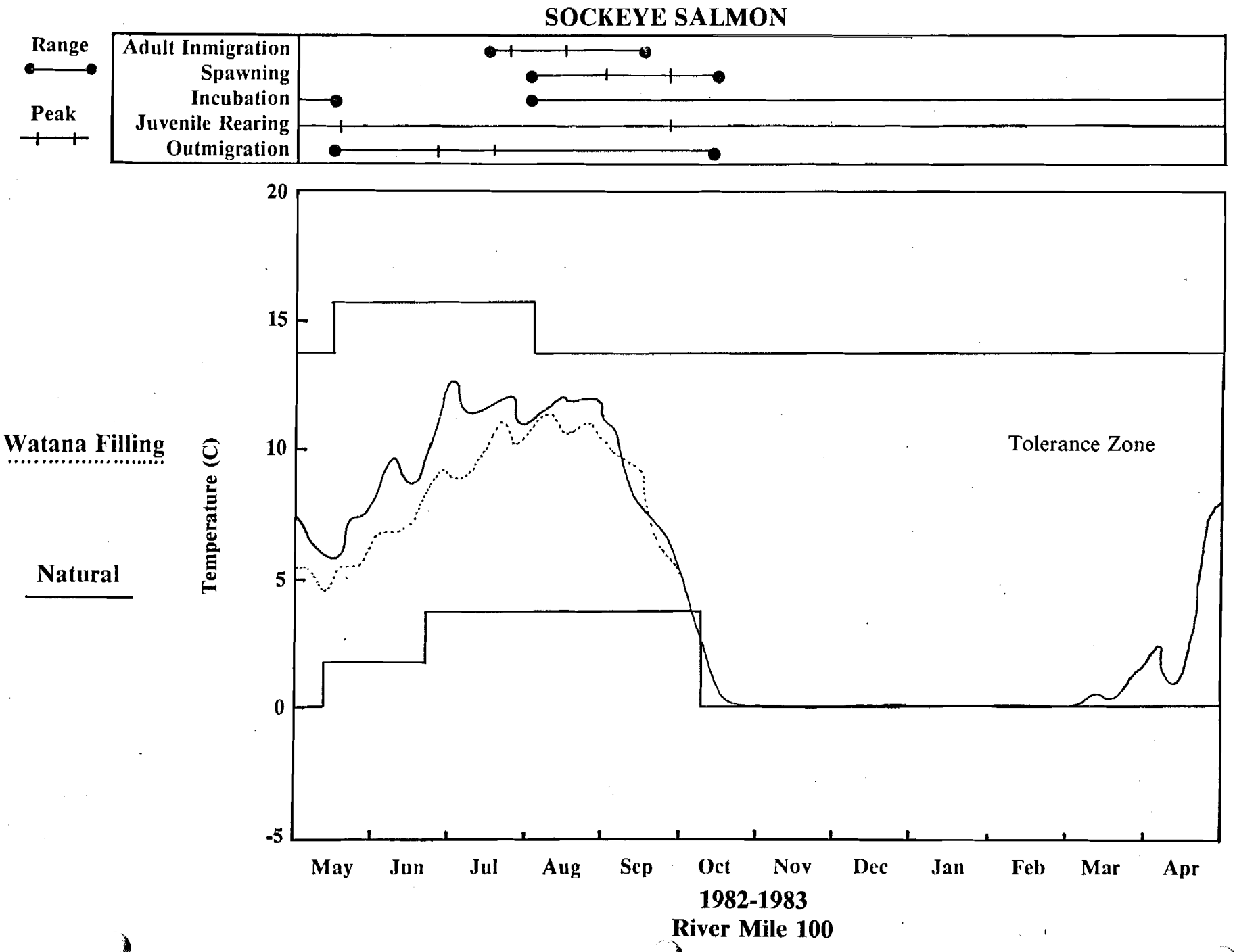
Mar
Apr
1981-1982
River Mile 150


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
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-5
Temperature (C)
Watana Filling
Natural
Tolerance Zone
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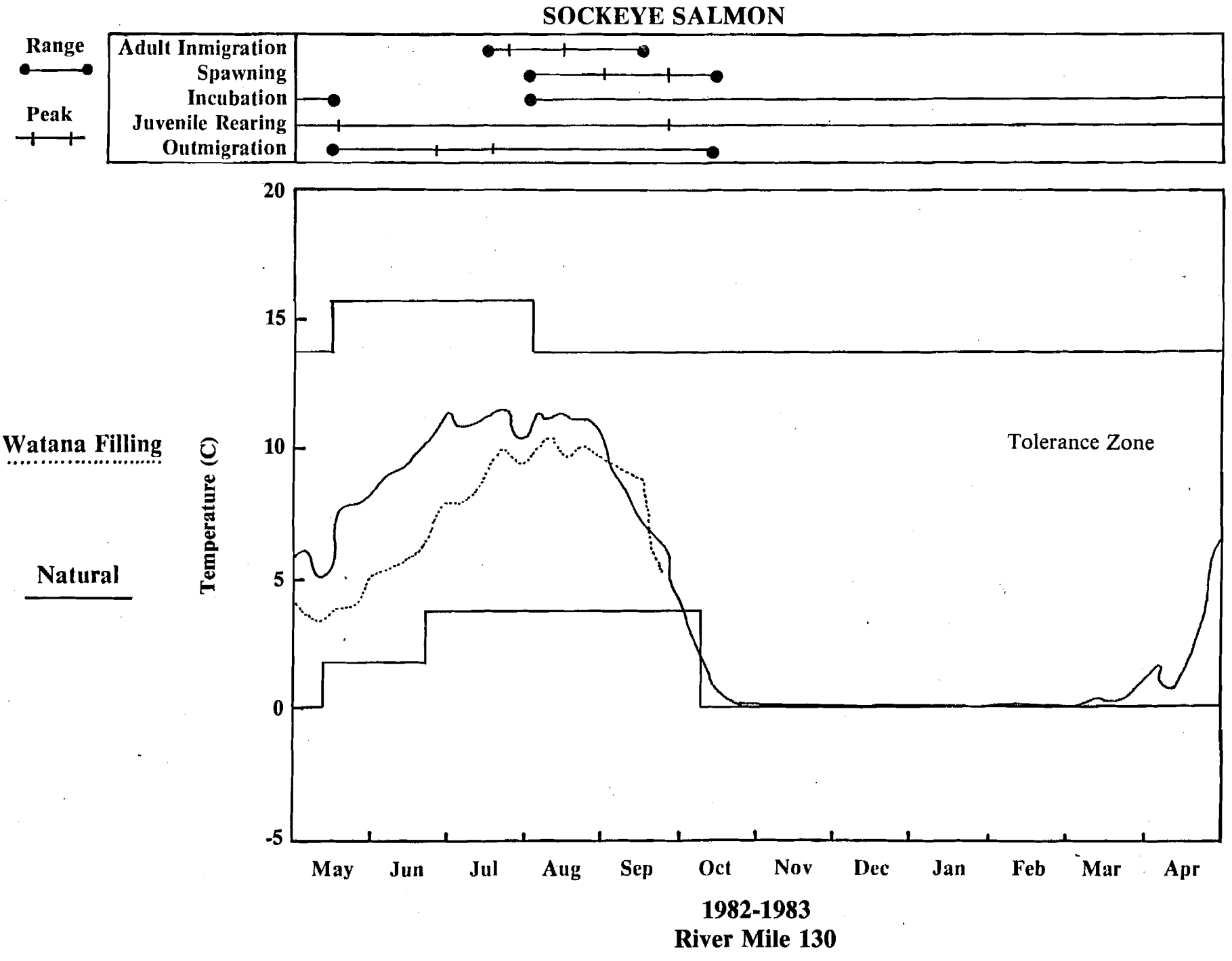
Apr
1982-1983
River Mile 100


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
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Tolerance Zone
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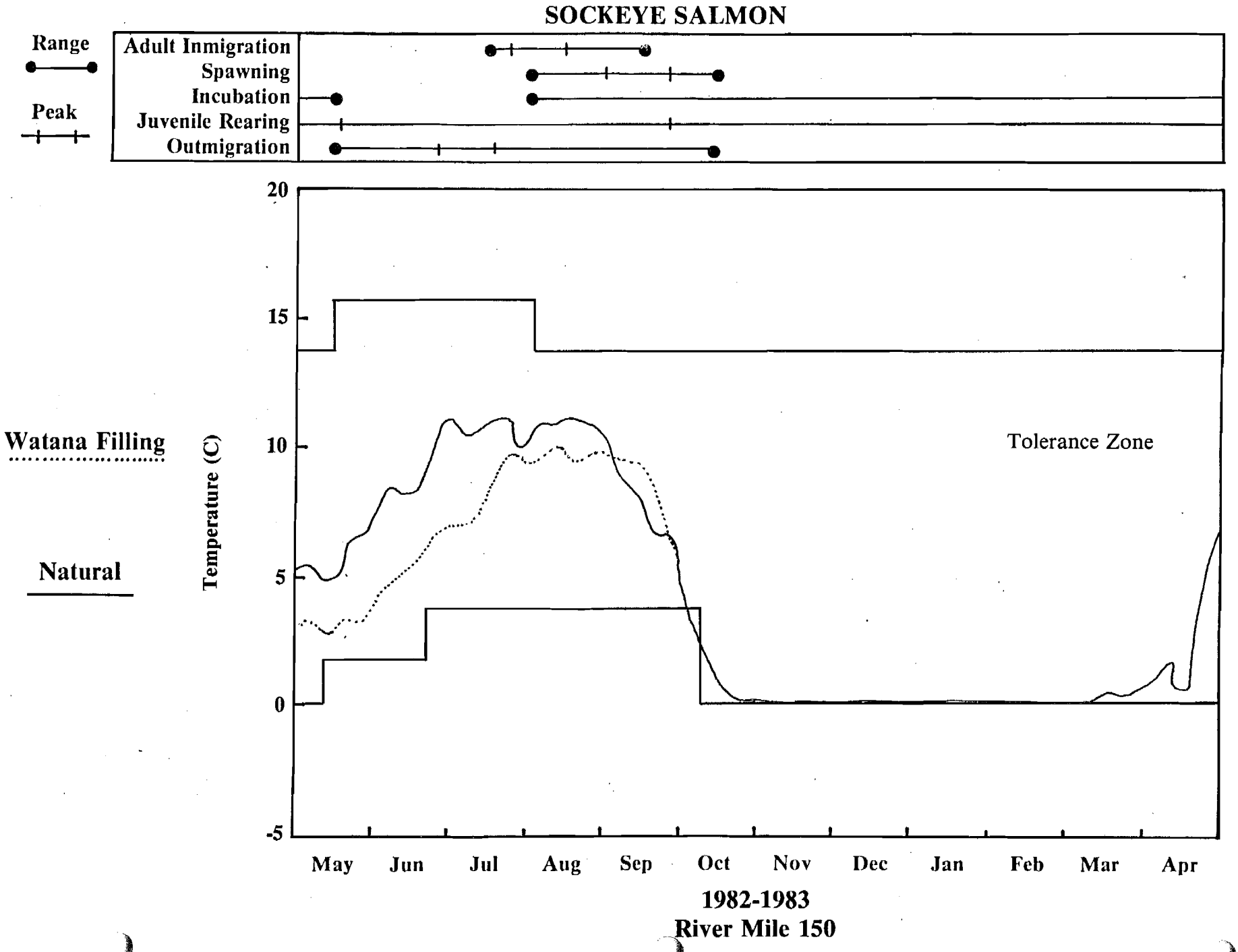
1982-1983
River Mile 130


SOCKEYE SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
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-5
Tolerance Zone
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Feb
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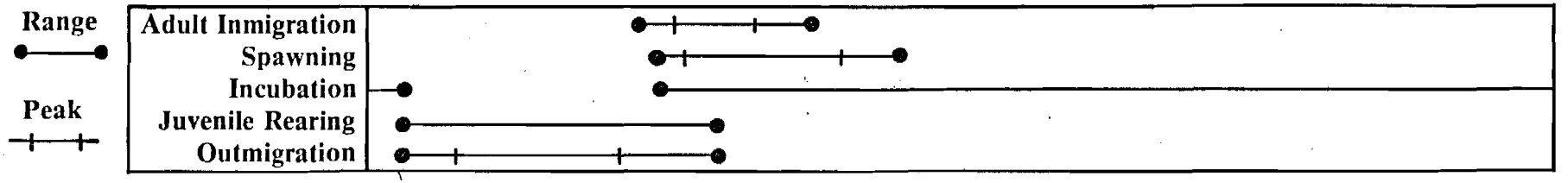
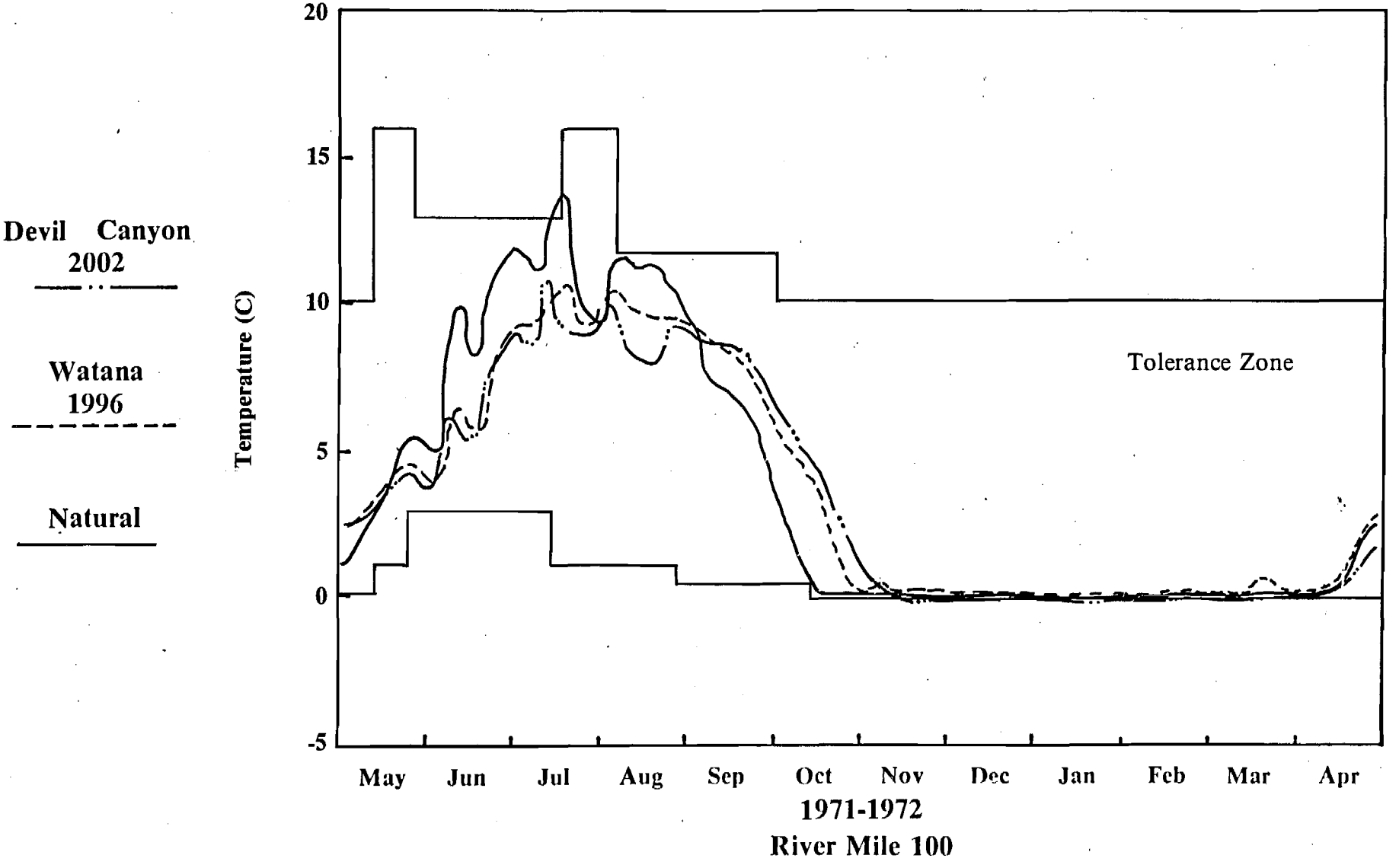
Apr
1982-1983
River Mile 150

CHUM SALMON


Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration


Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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Tolerance Zone
May
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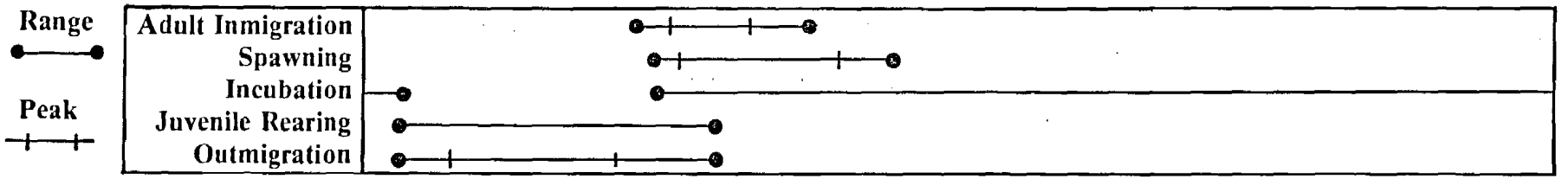
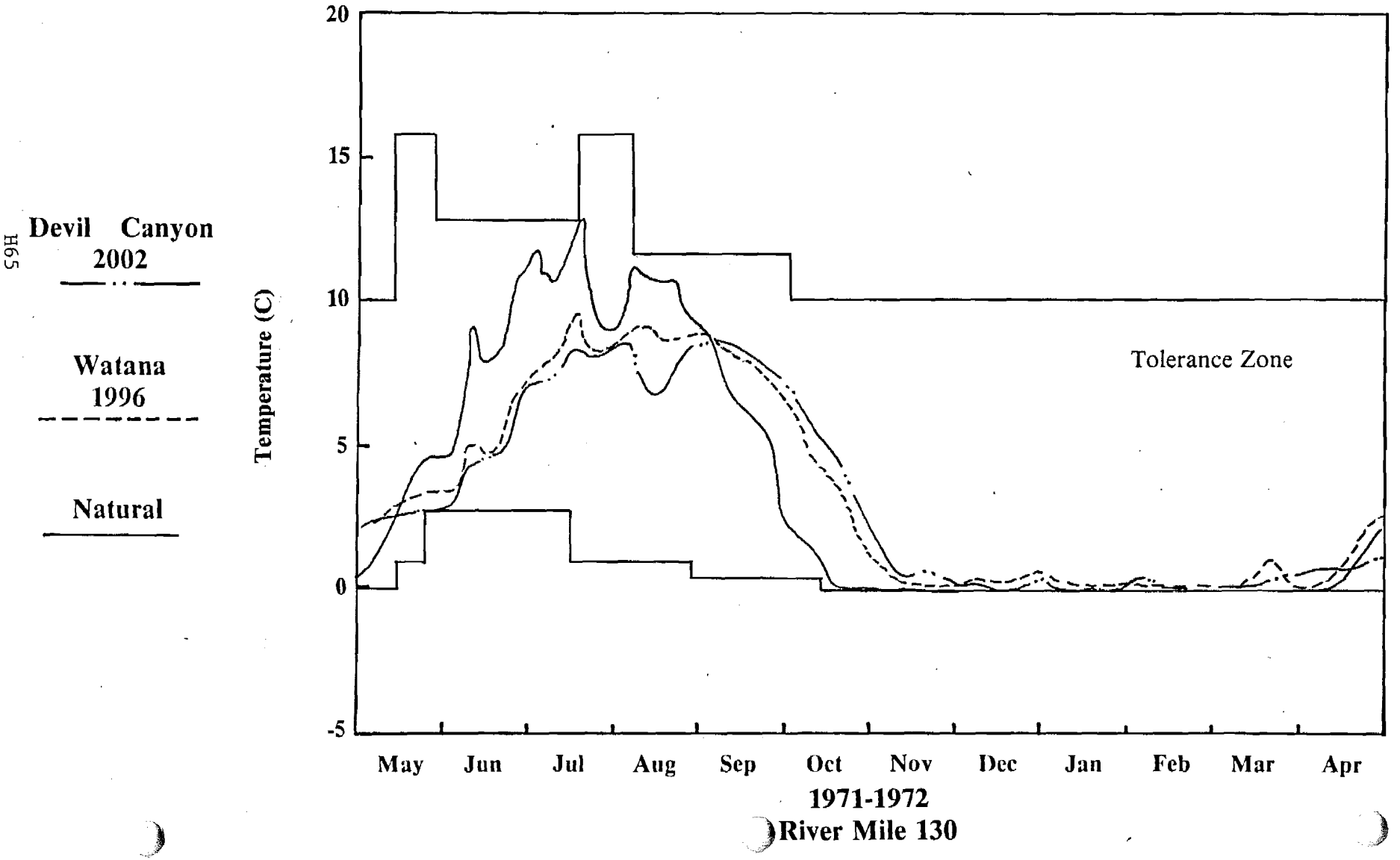
Dec
Jan
Feb
Mar
Apr
1971-1972
River Mile 100

CHUM SALMON


Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration


Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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Tolerance Zone
May
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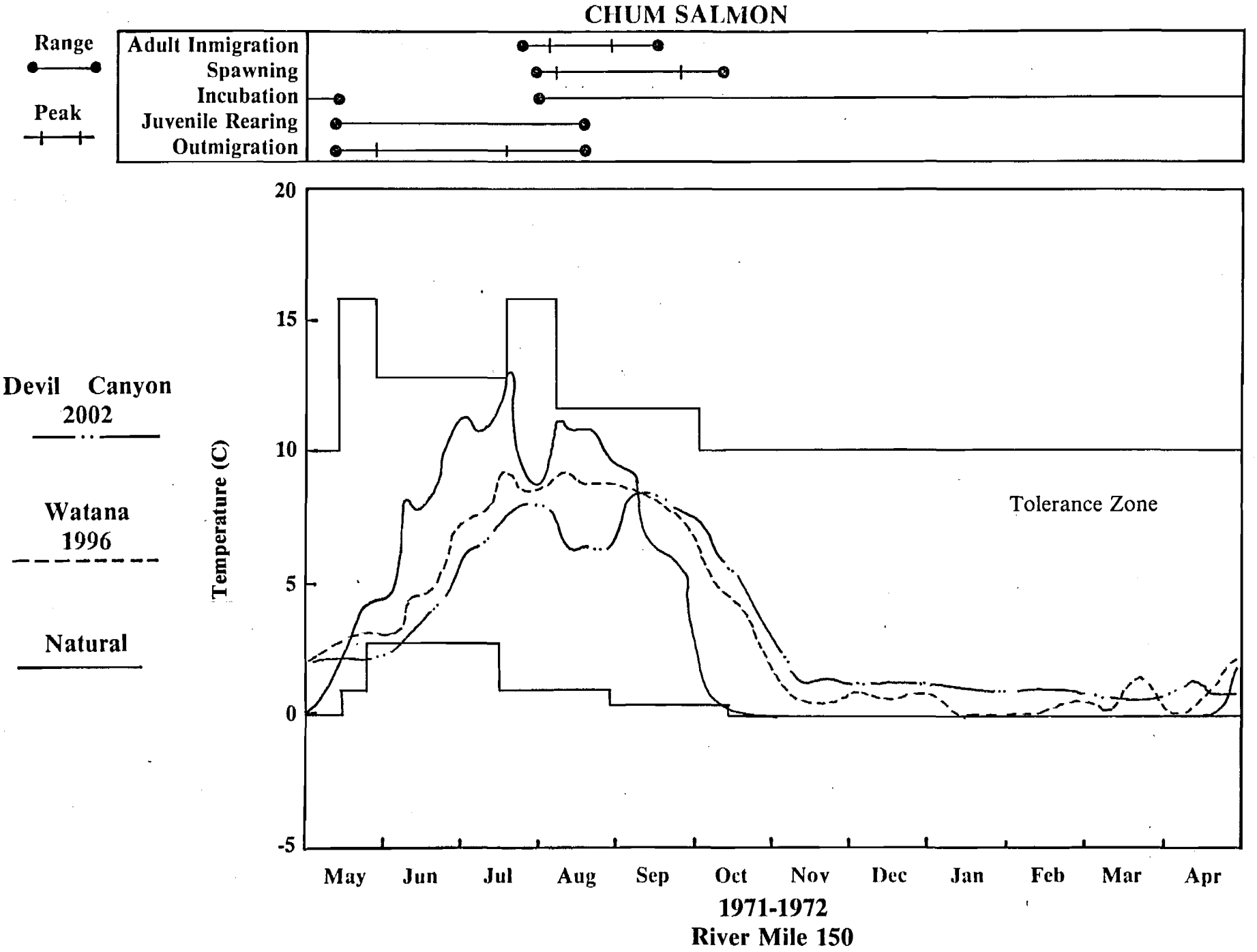
Feb
Mar
Apr
1971-1972
River Mile 130


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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Tolerance Zone
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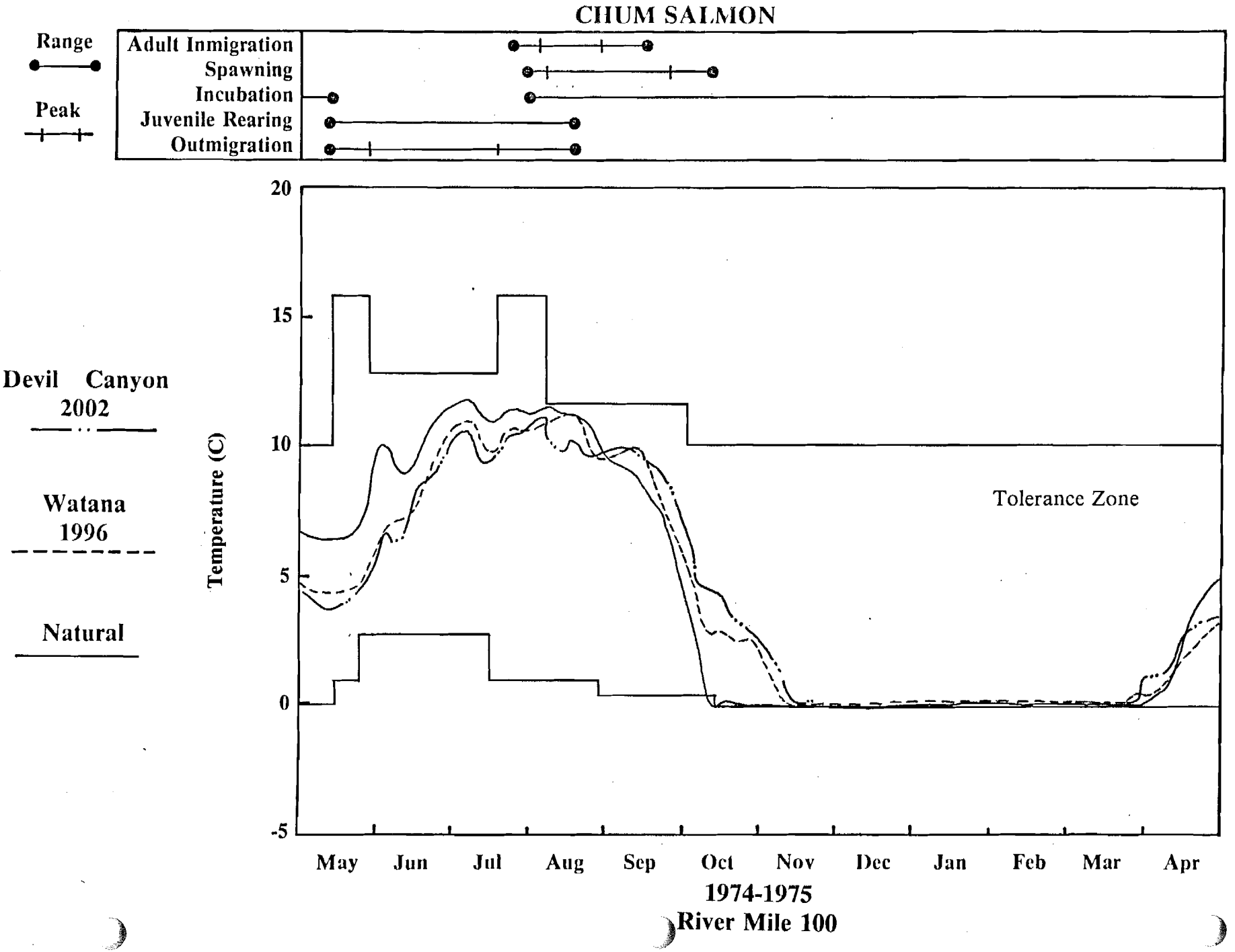
Apr
1971-1972
River Mile 150


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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Tolerance Zone
May
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Jan
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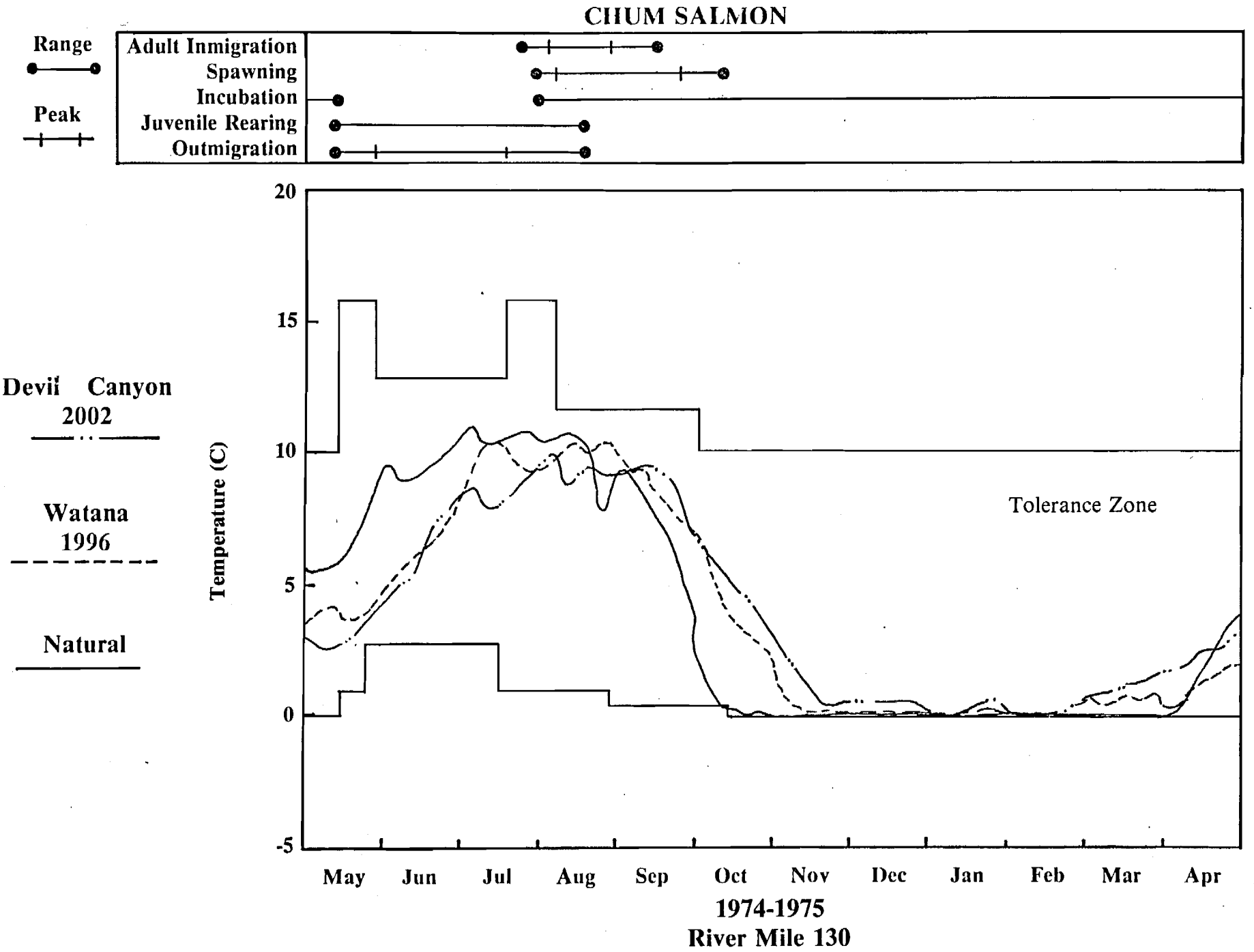
Mar
Apr
1974-1975
River Mile 100


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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Tolerance Zone
May
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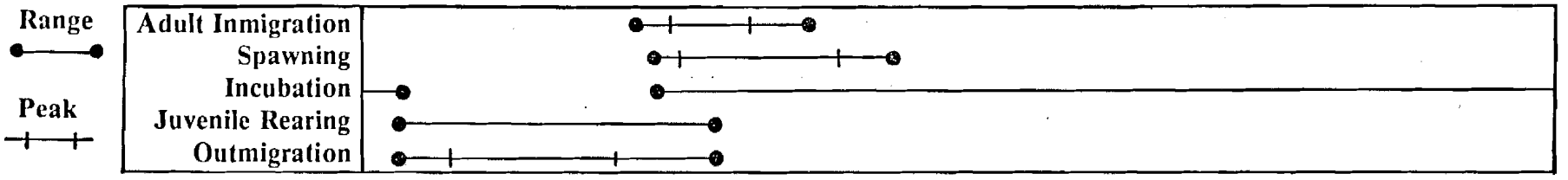
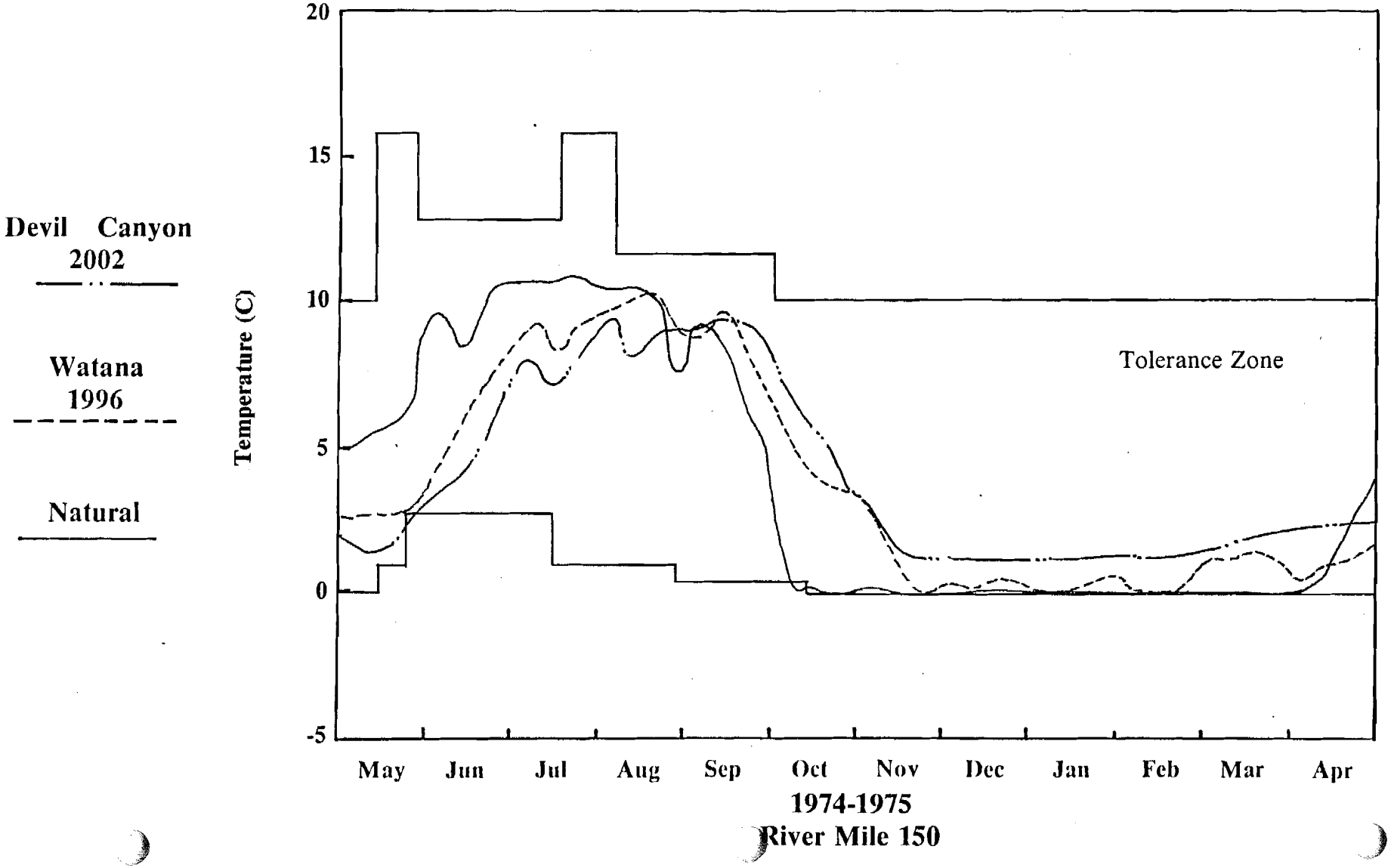
Feb
Mar
Apr
1974-1975
River Mile 130

CHUM SALMON


Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration


Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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10
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Tolerance Zone
May
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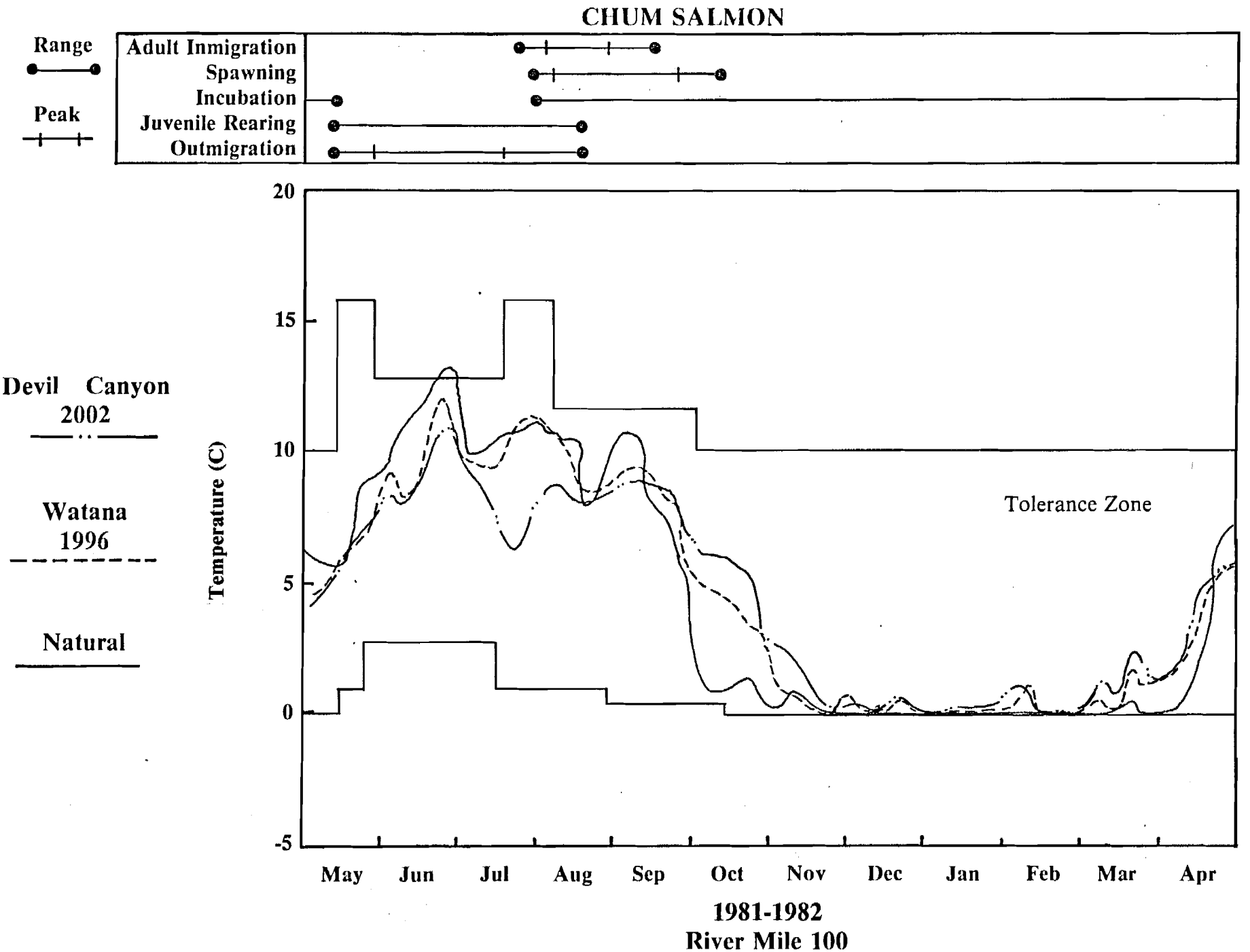
Feb
Mar
Apr
1974-1975
River Mile 150


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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-5
Tolerance Zone
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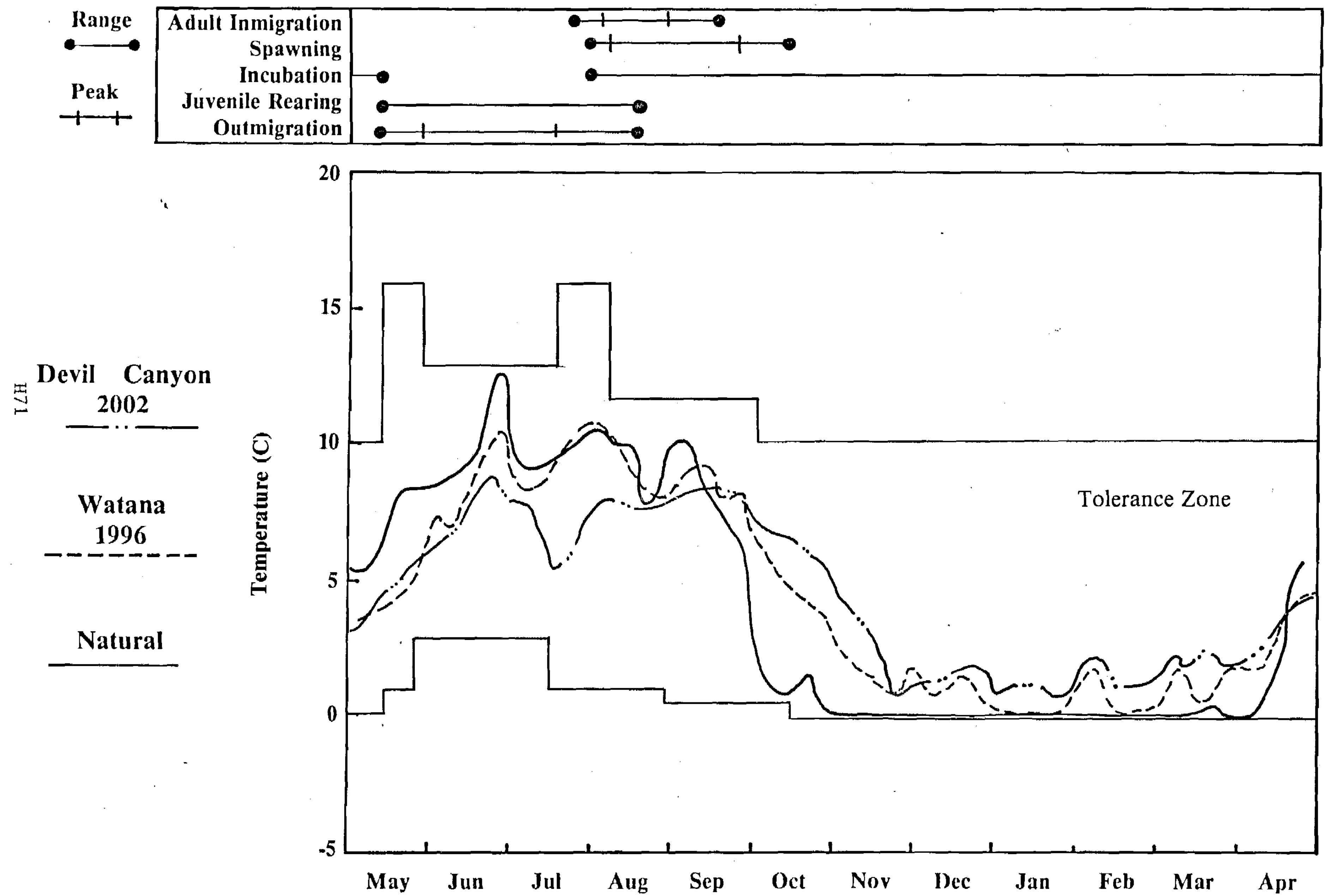
Apr
1981-1982
River Mile 100

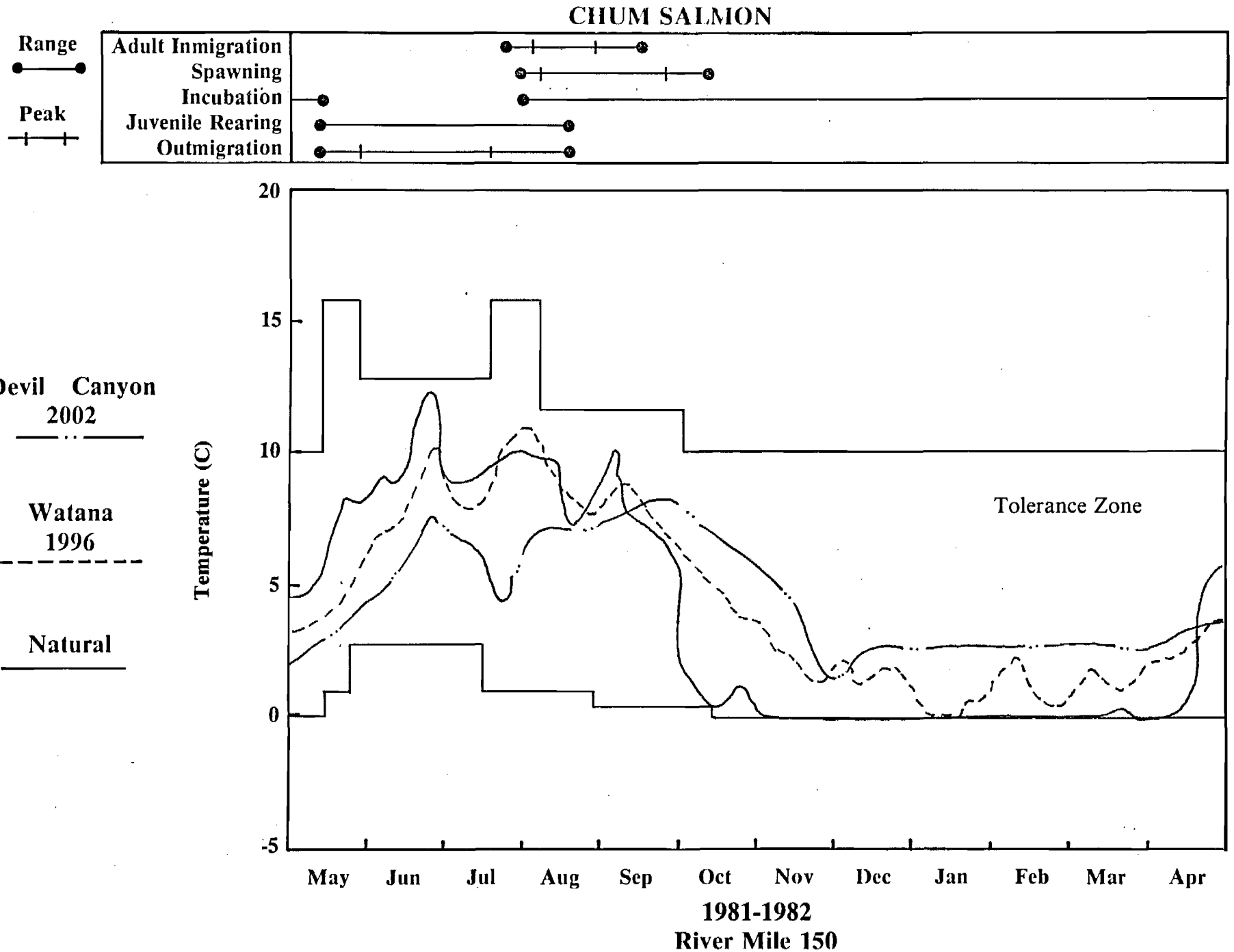
H70

CHUM SALMON



1981-1982

River Mile 130


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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Tolerance Zone
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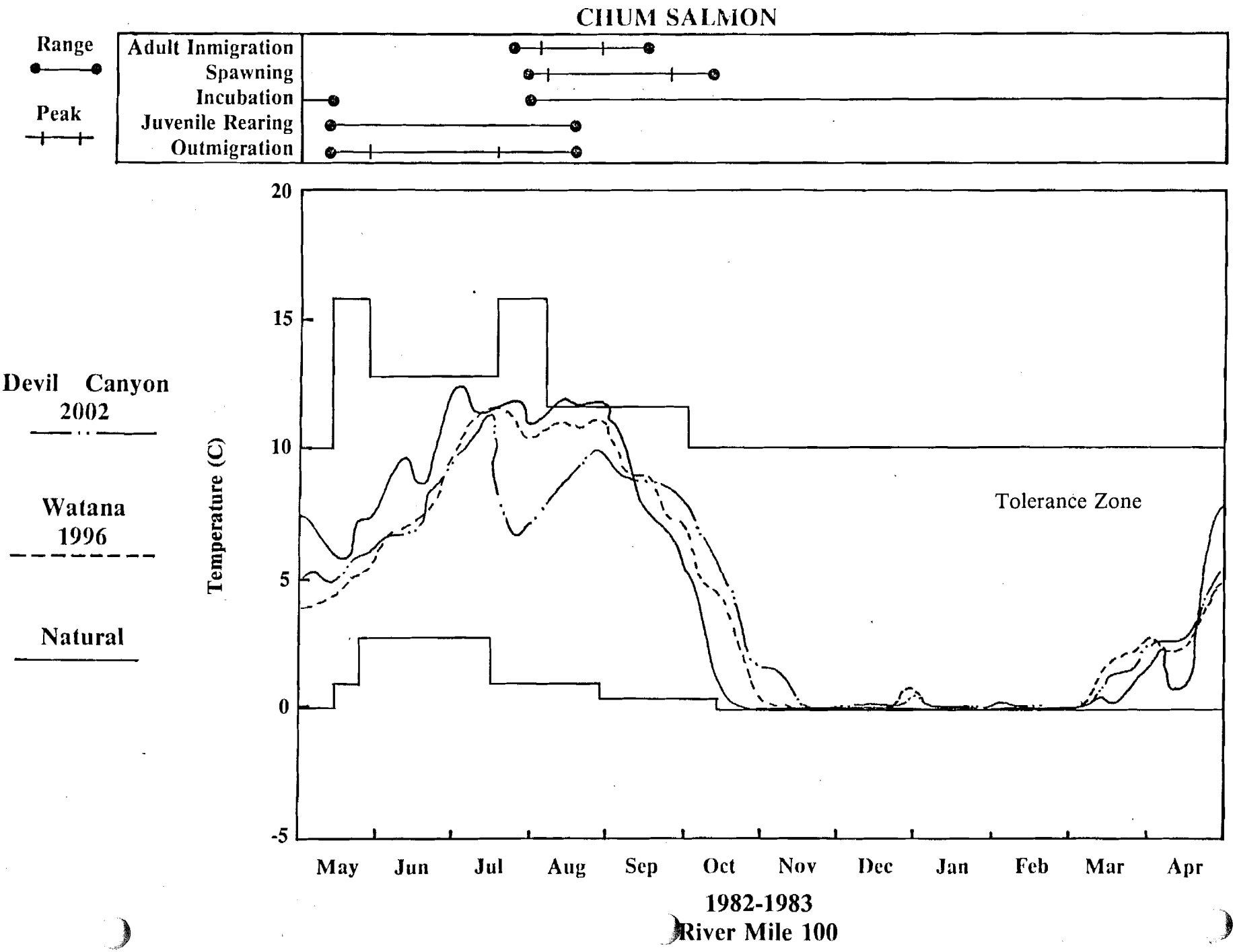
1981-1982
River Mile 150


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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Tolerance Zone
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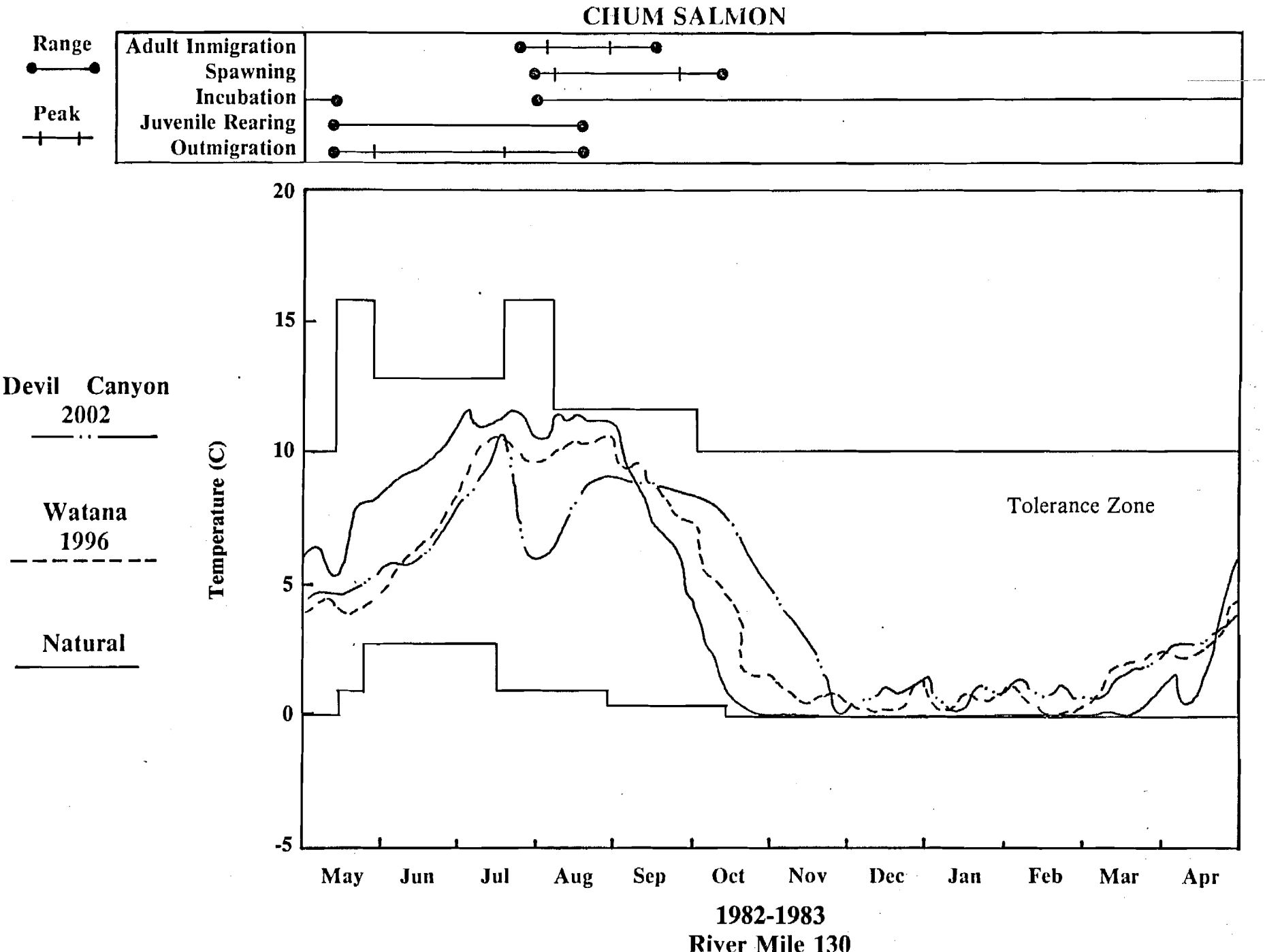
Mar
Apr
1982-1983
River Mile 100


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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Tolerance Zone
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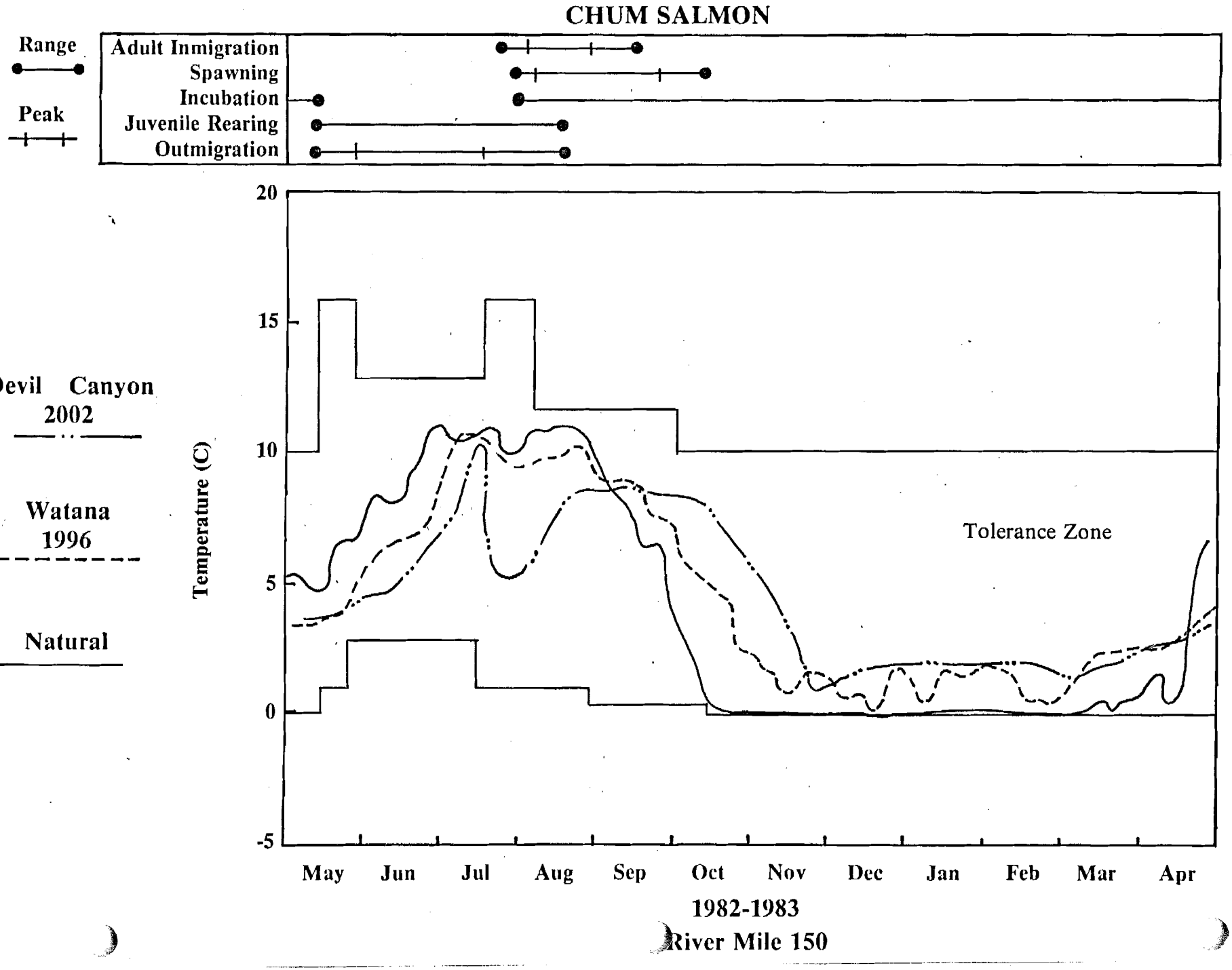
Apr
1982-1983
River Mile 130


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
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Tolerance Zone
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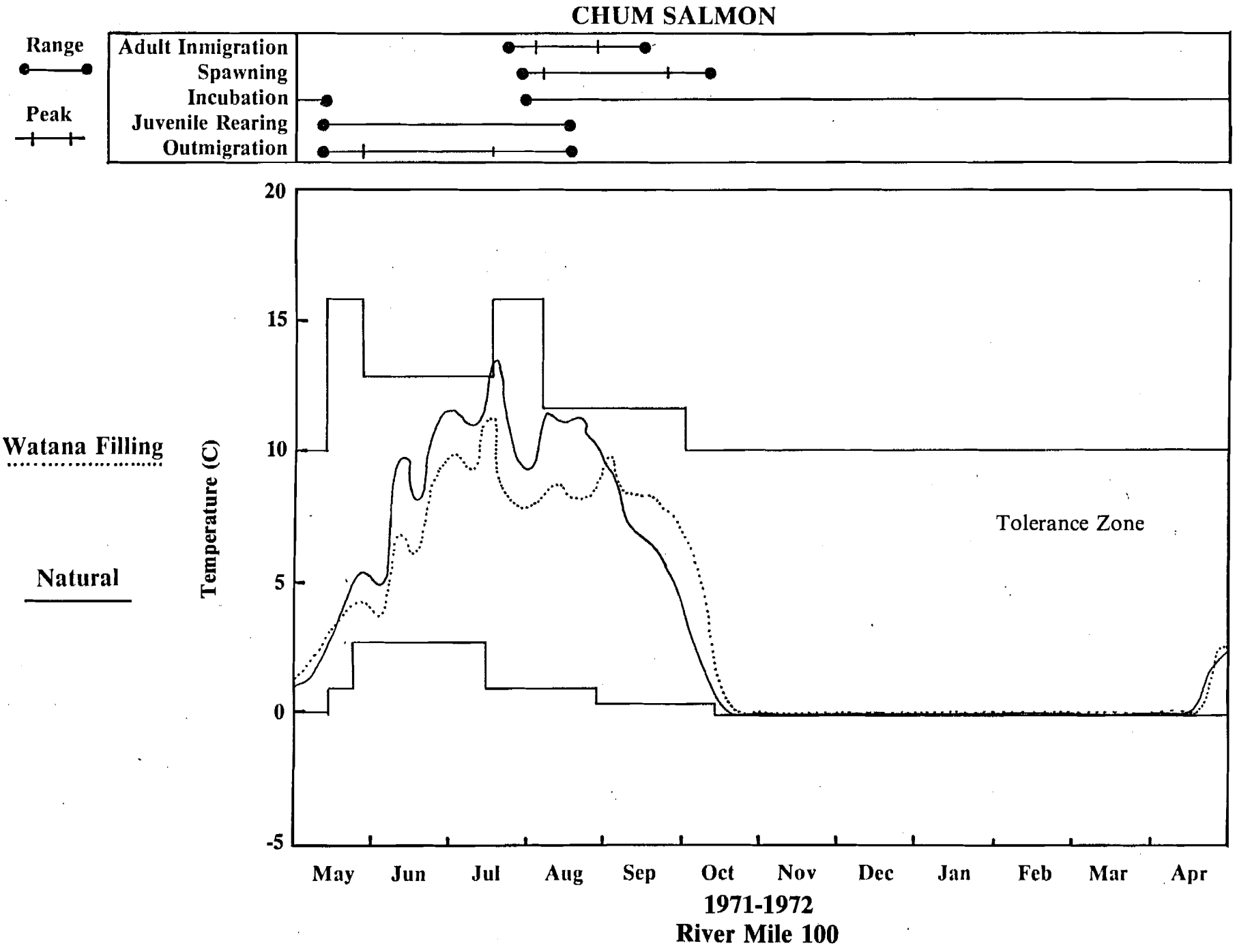
1982-1983
River Mile 150


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
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Tolerance Zone
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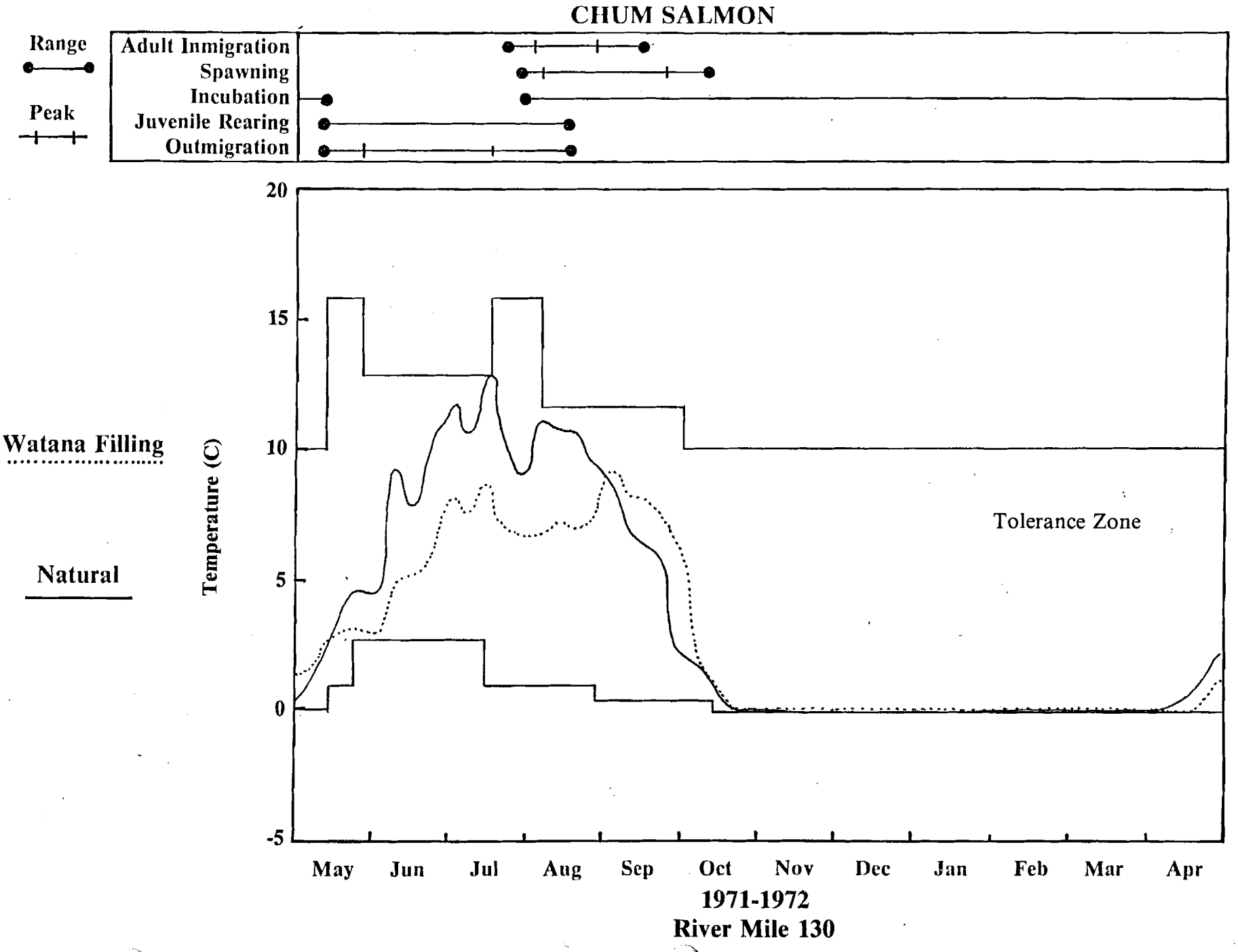
Apr
1971-1972
River Mile 100


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
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Temperature (C)
Watana Filling
H77
Natural
Tolerance Zone
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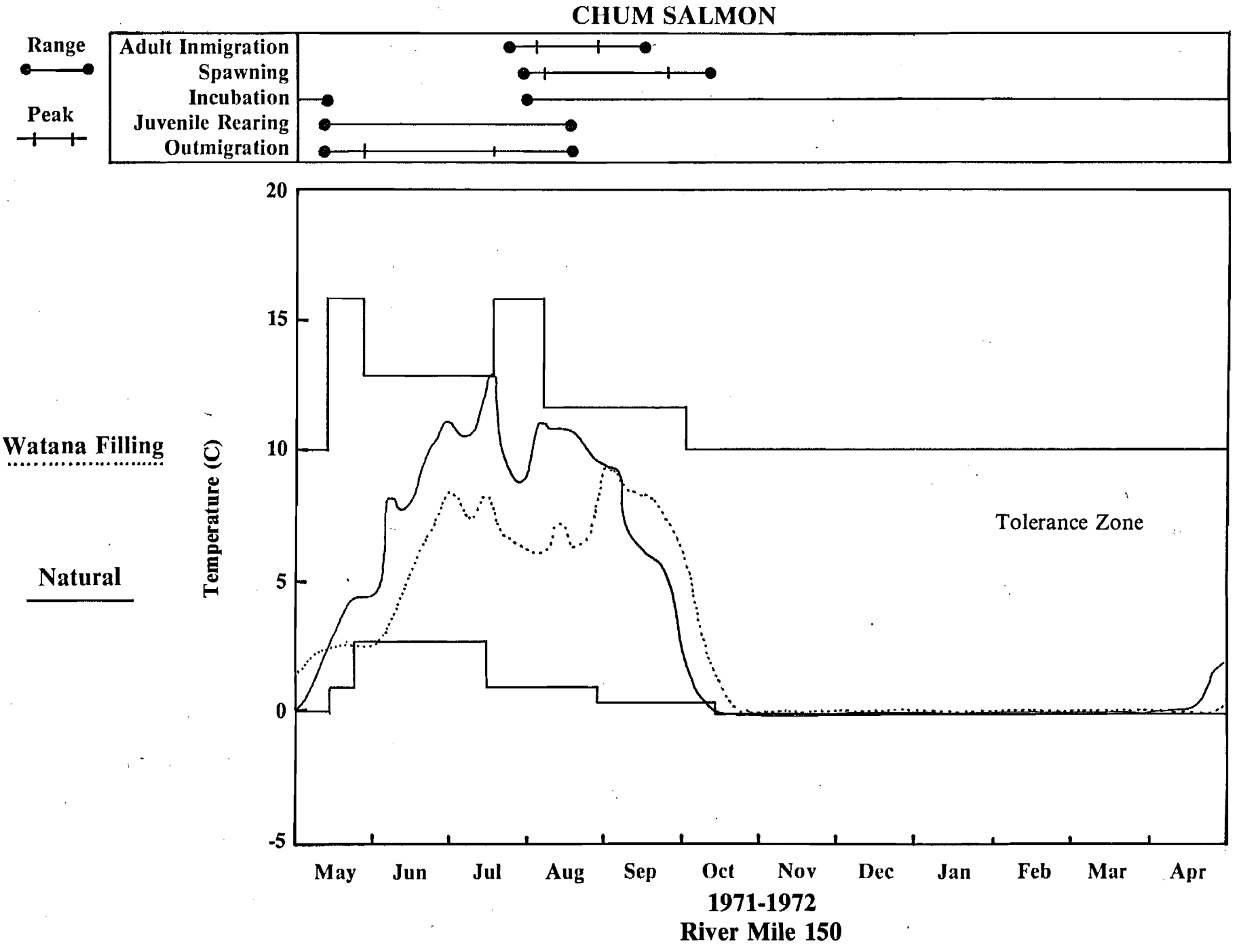
Apr
1971-1972
River Mile 130


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
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Tolerance Zone
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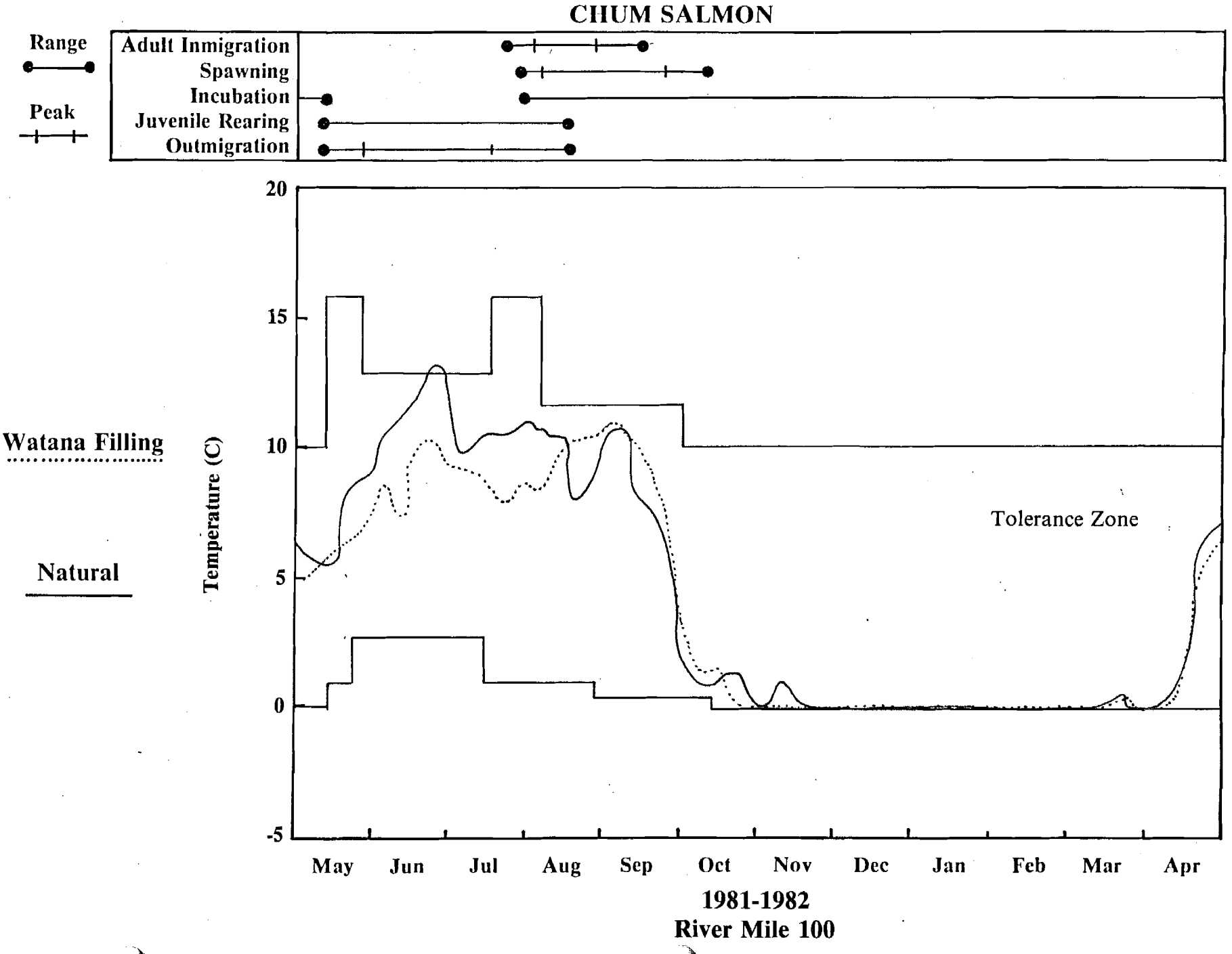
1971-1972
River Mile 150


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
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Tolerance Zone
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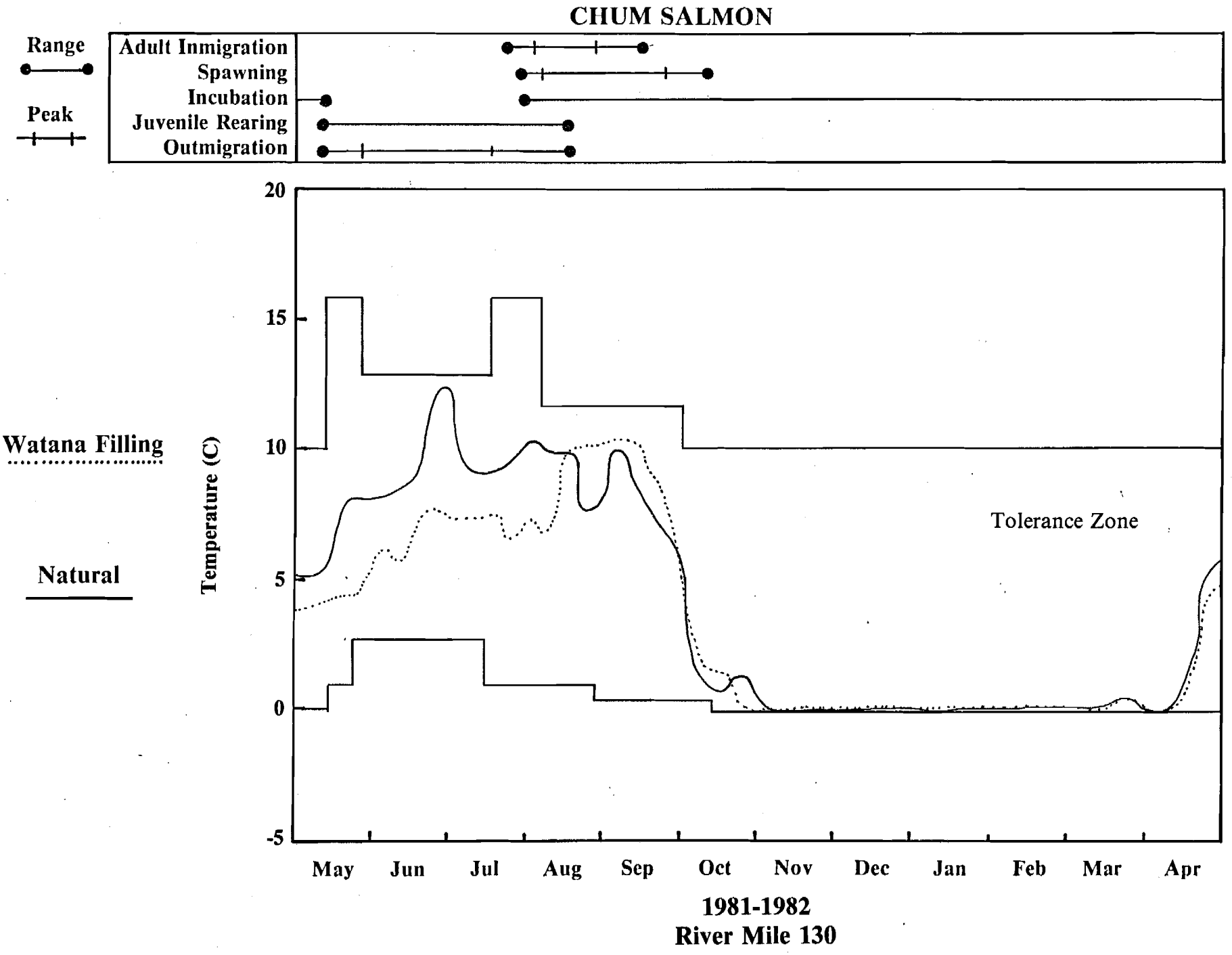
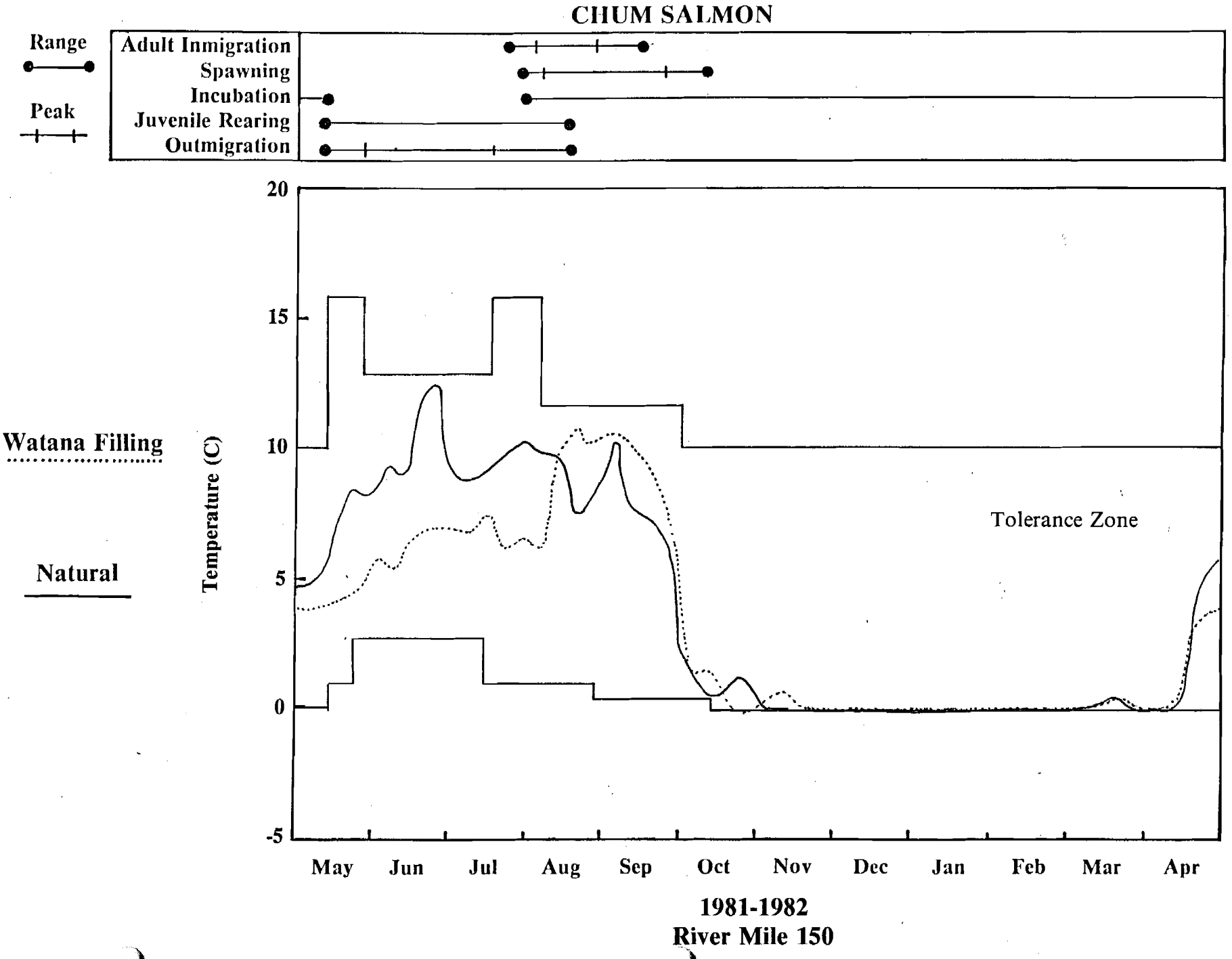
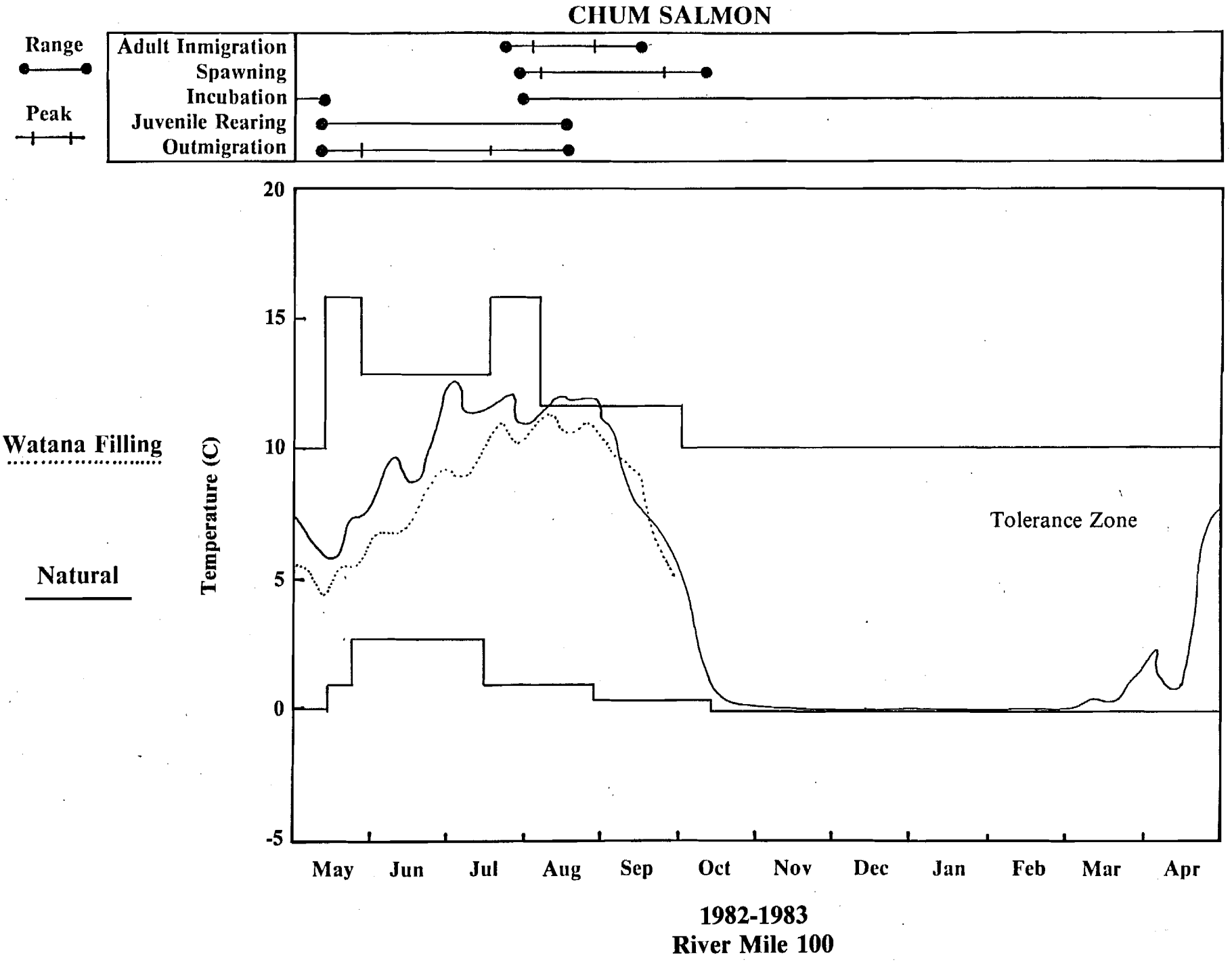
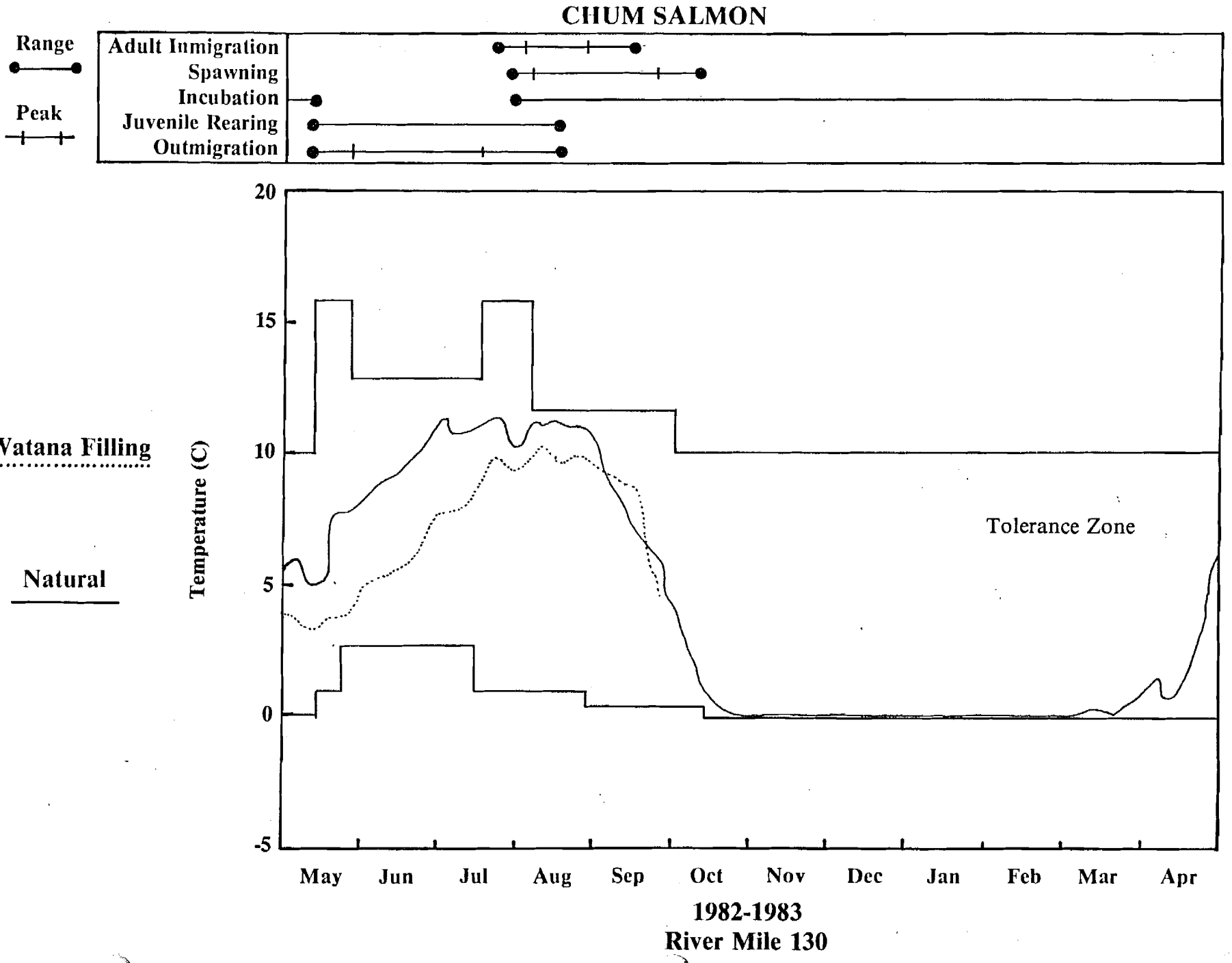
1981-1982
River Mile 100


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1981-1982
River Mile 130


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1981-1982
River Mile 150


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1982-1983
River Mile 100


CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
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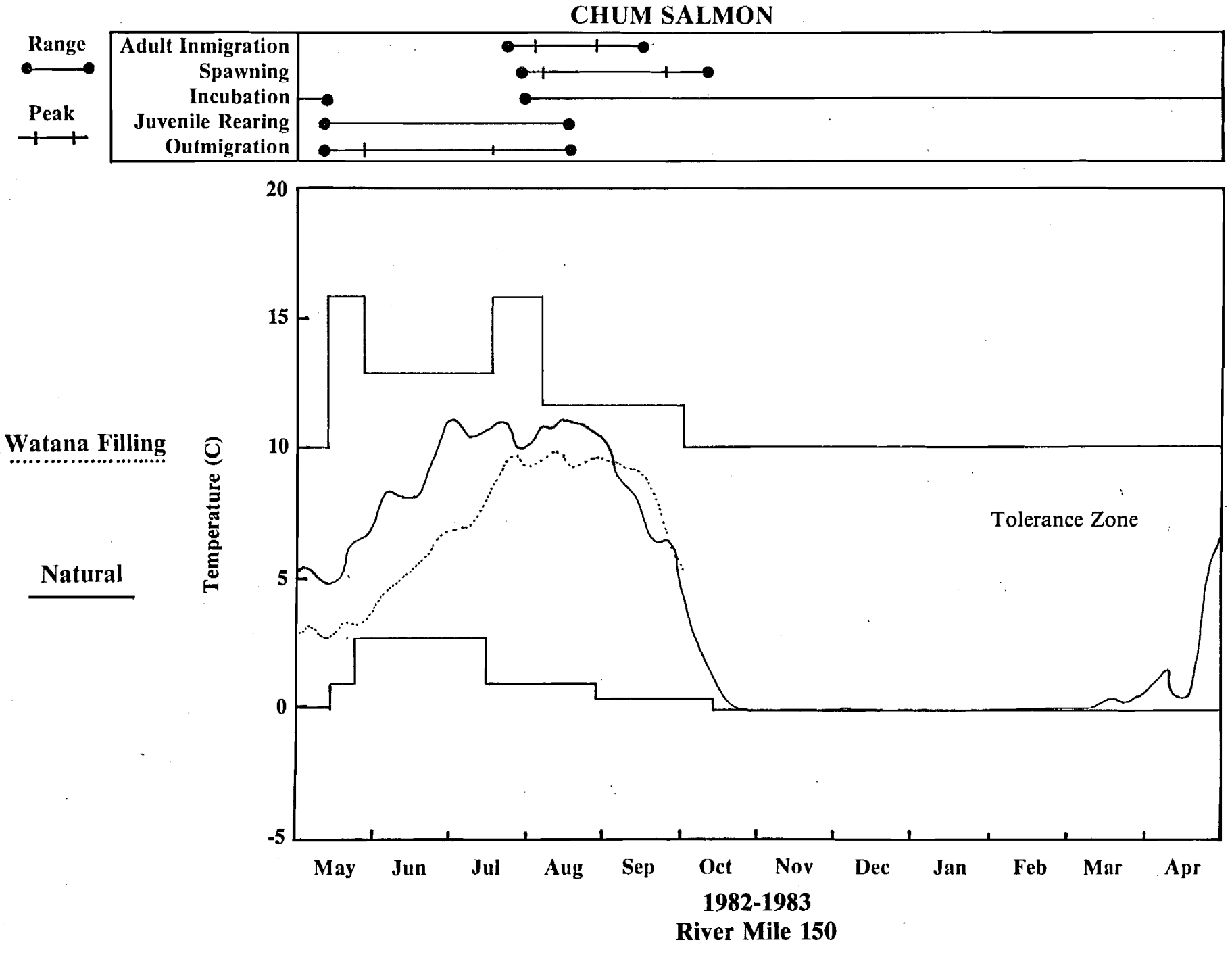
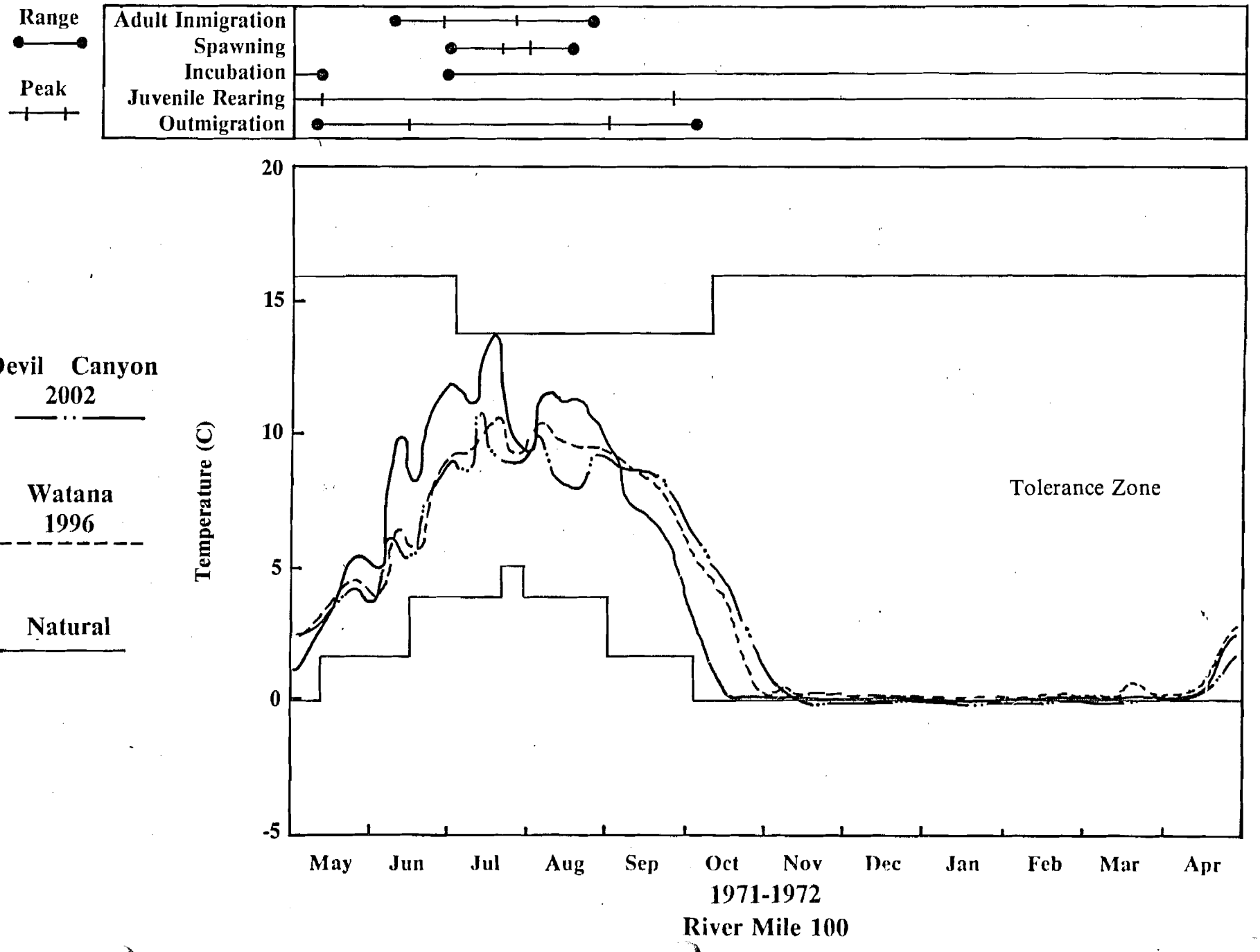
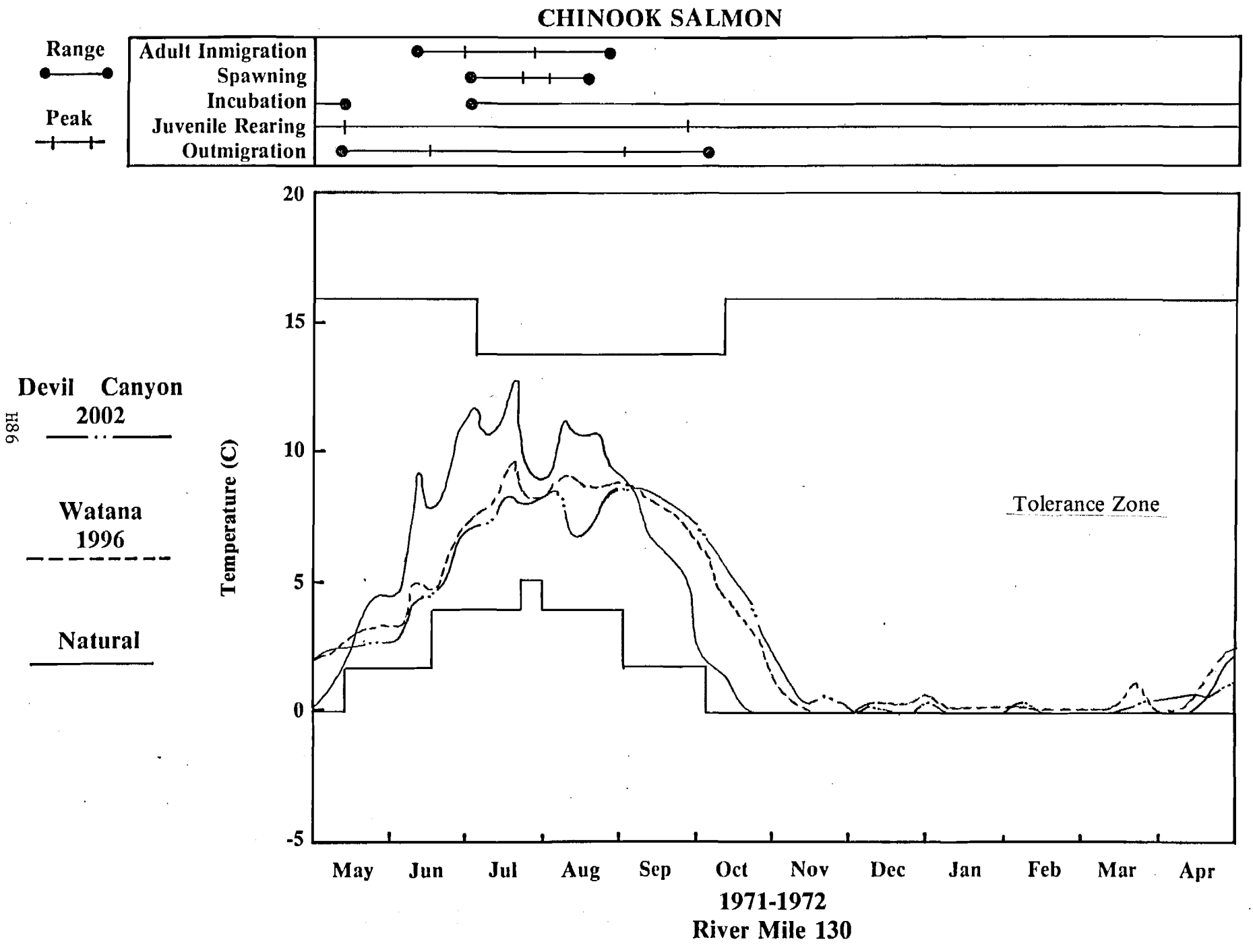
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1982-1983
River Mile 130

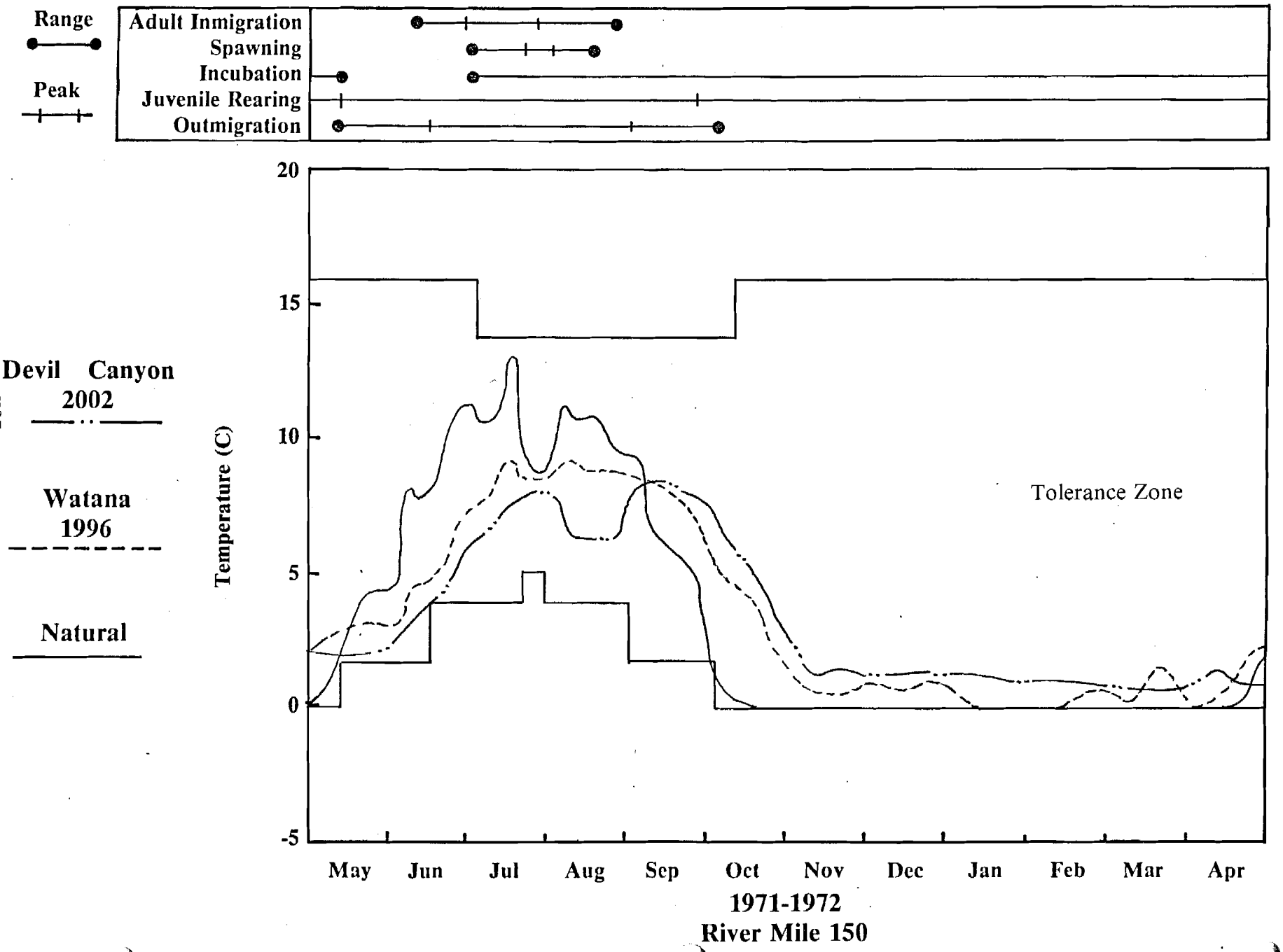

CHUM SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1982-1983
River Mile 150

CHINOOK SALMON

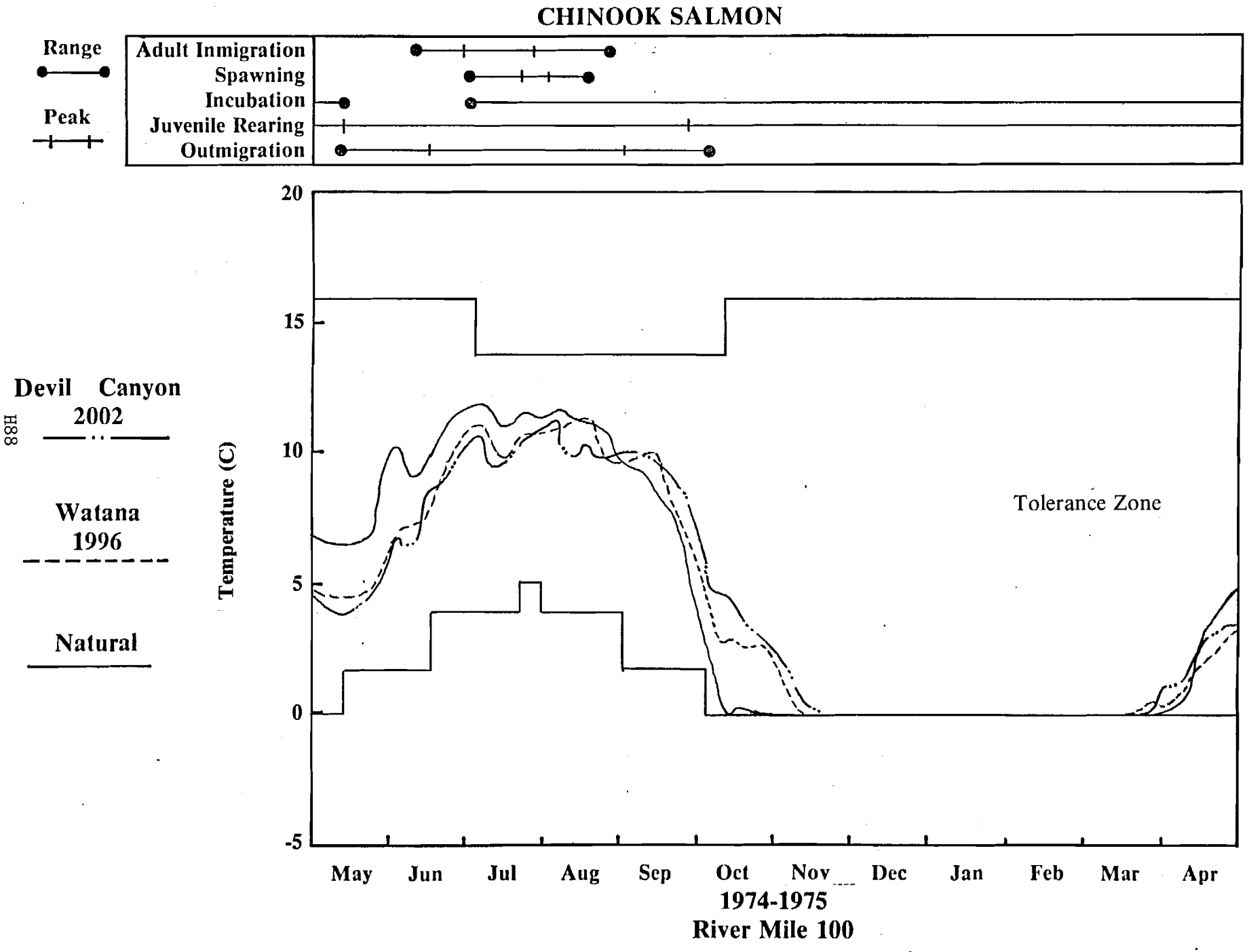



CHINOOK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
15
10
5
0
-5
Temperature (C)
Devil Canyon
2002
Watana
1996
Natural
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1971-1972
River Mile 130
H86

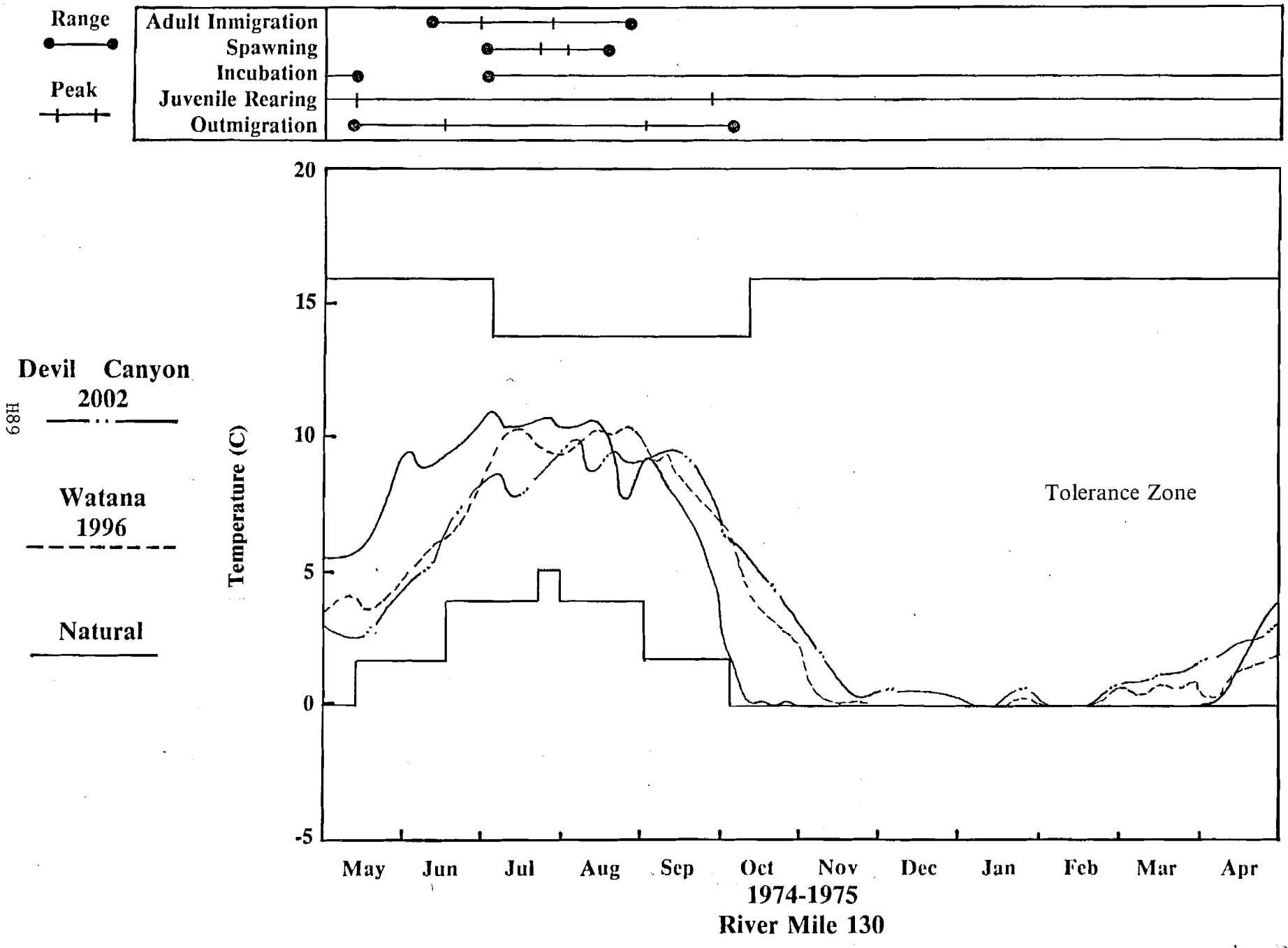
CHINOOK SALMON

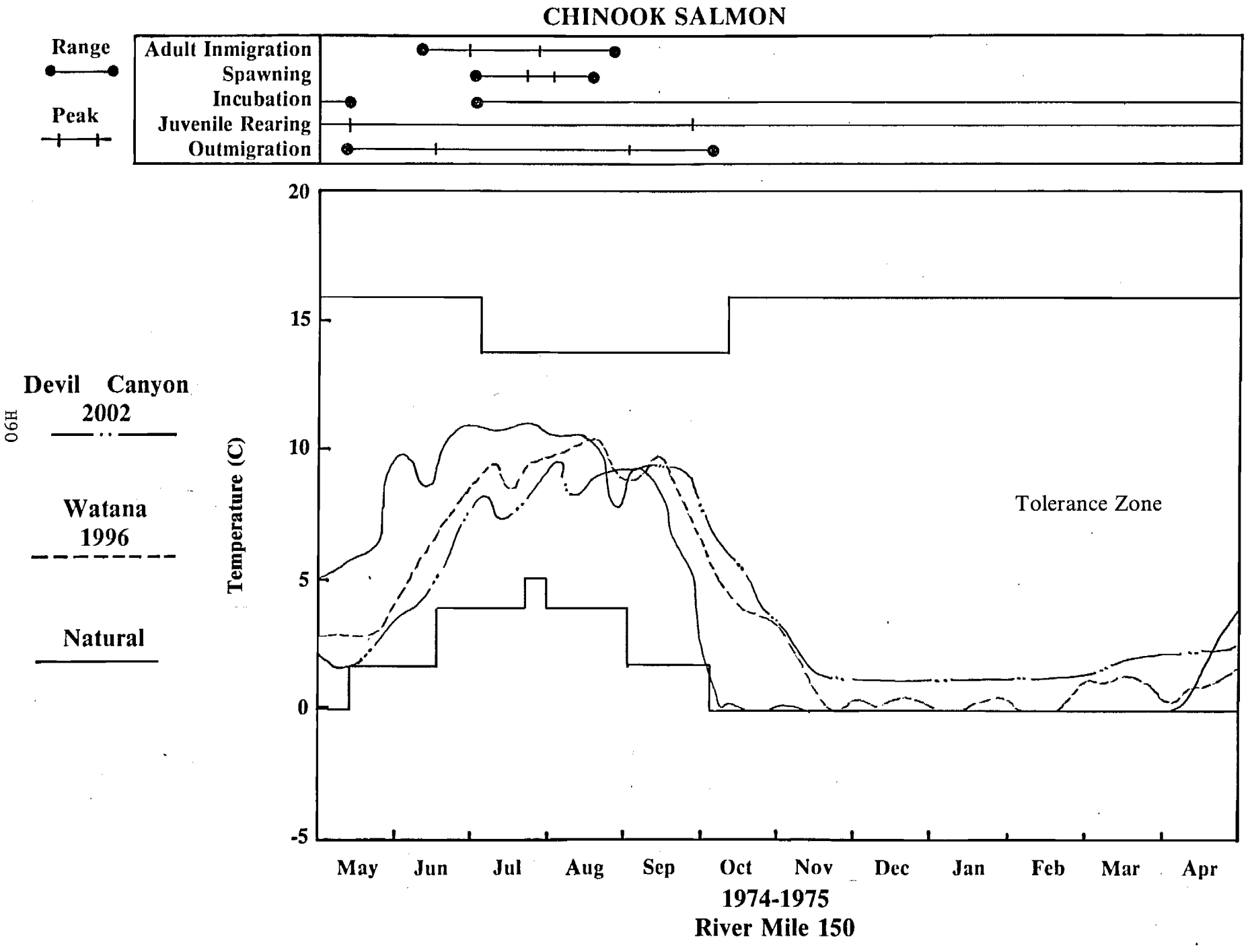


H87

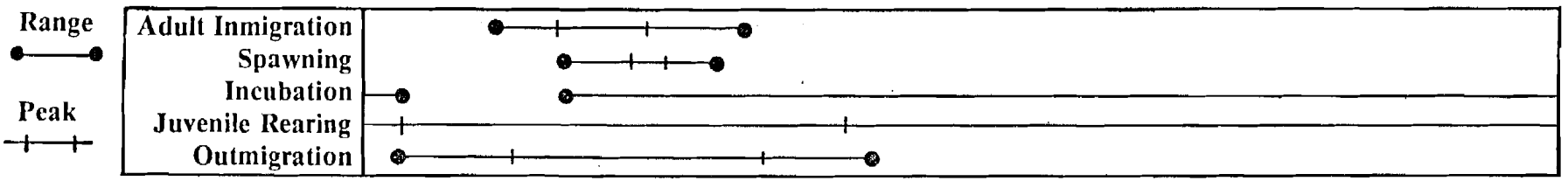

CHINOOK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1974-1975
River Mile 100
H88

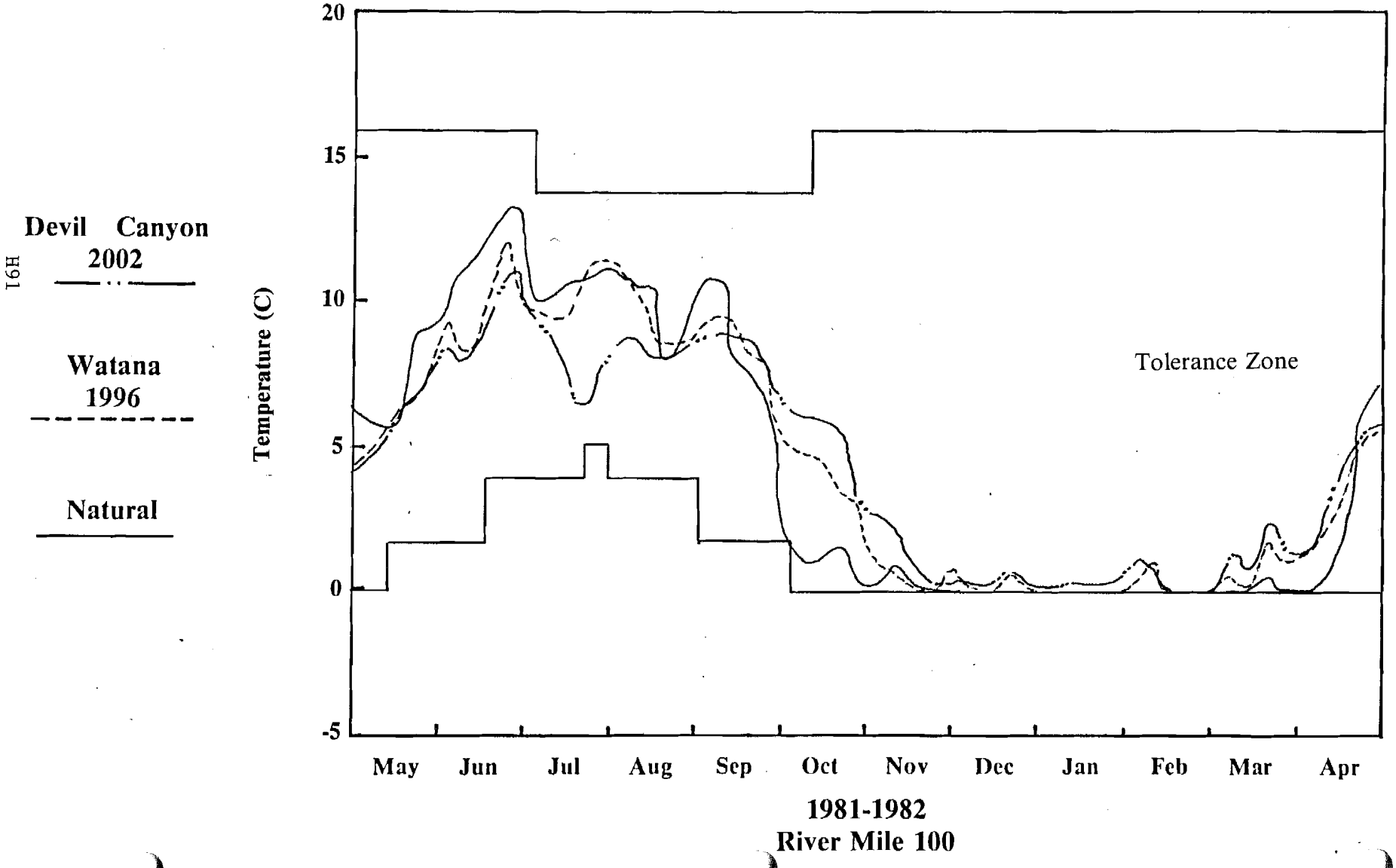
CHINOOK SALMON



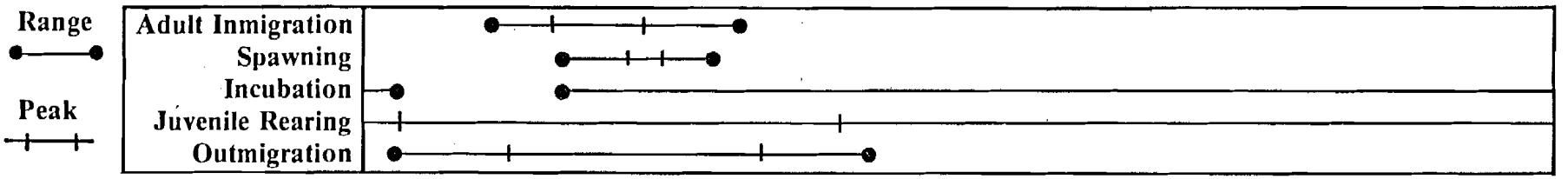

CHINOOK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1974-1975
River Mile 150
H90

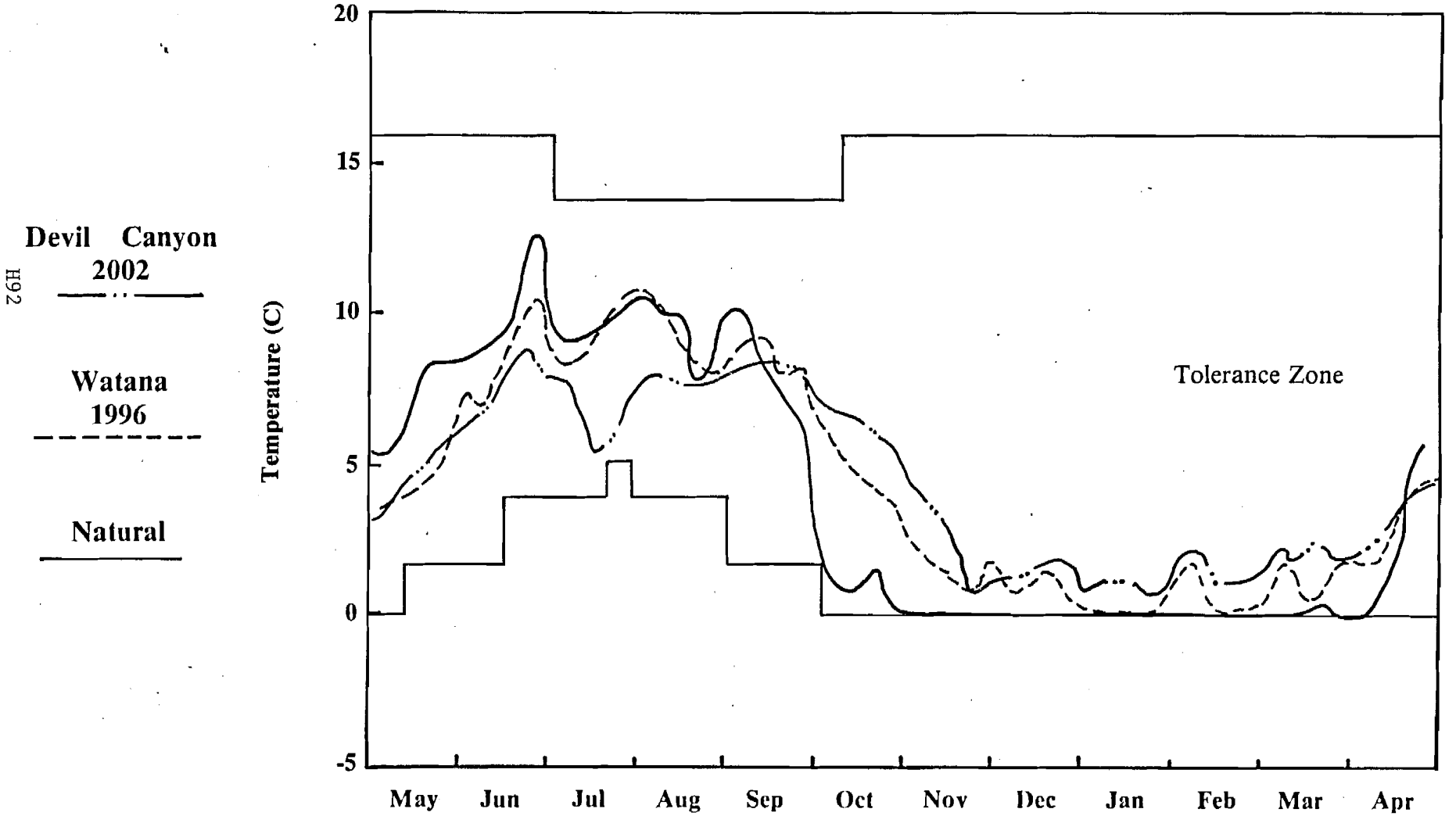
CHINOOK SALMON





CHINOOK SALMON

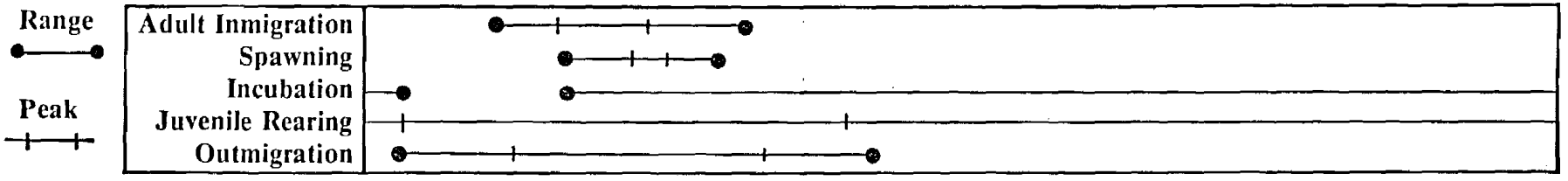


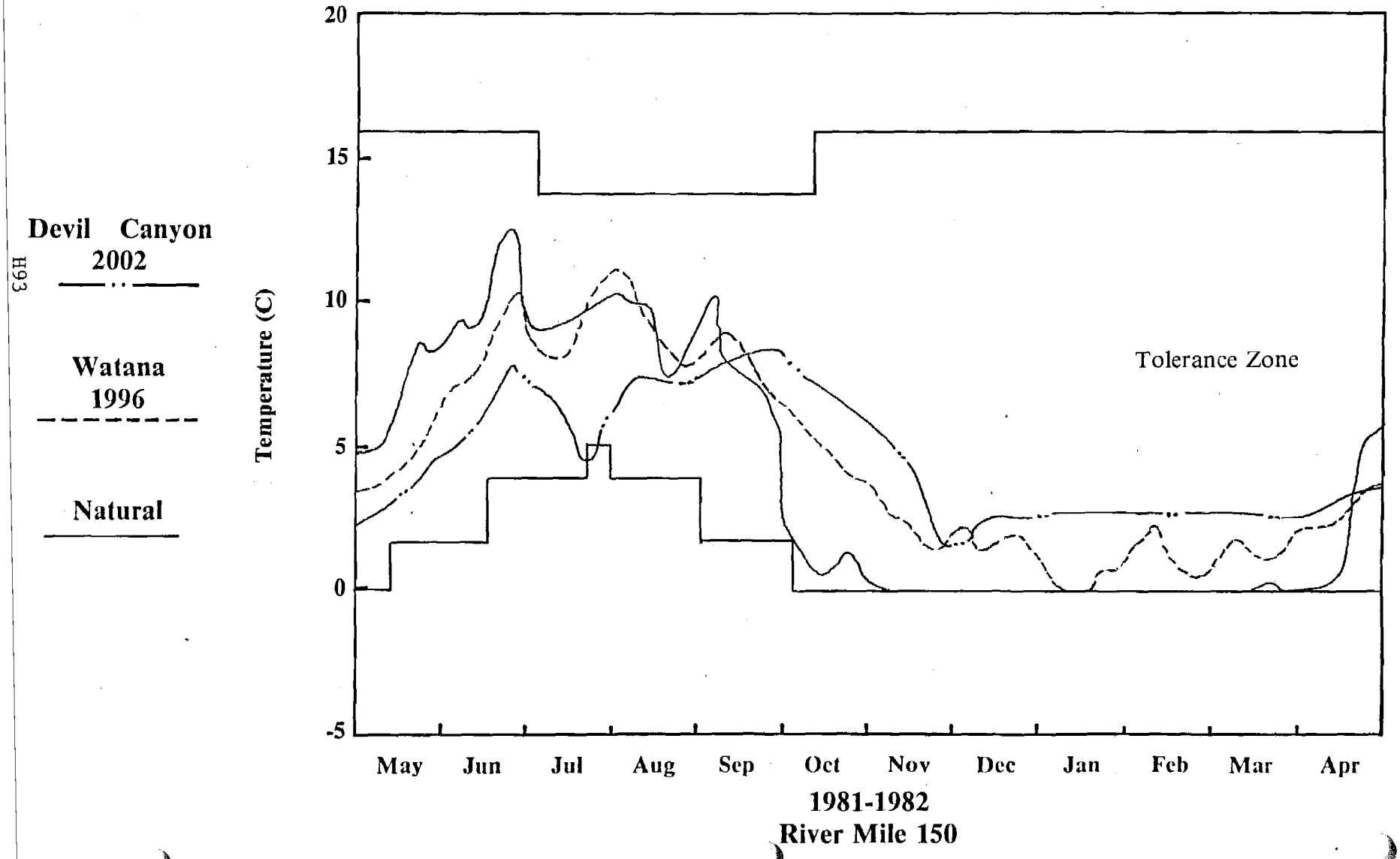


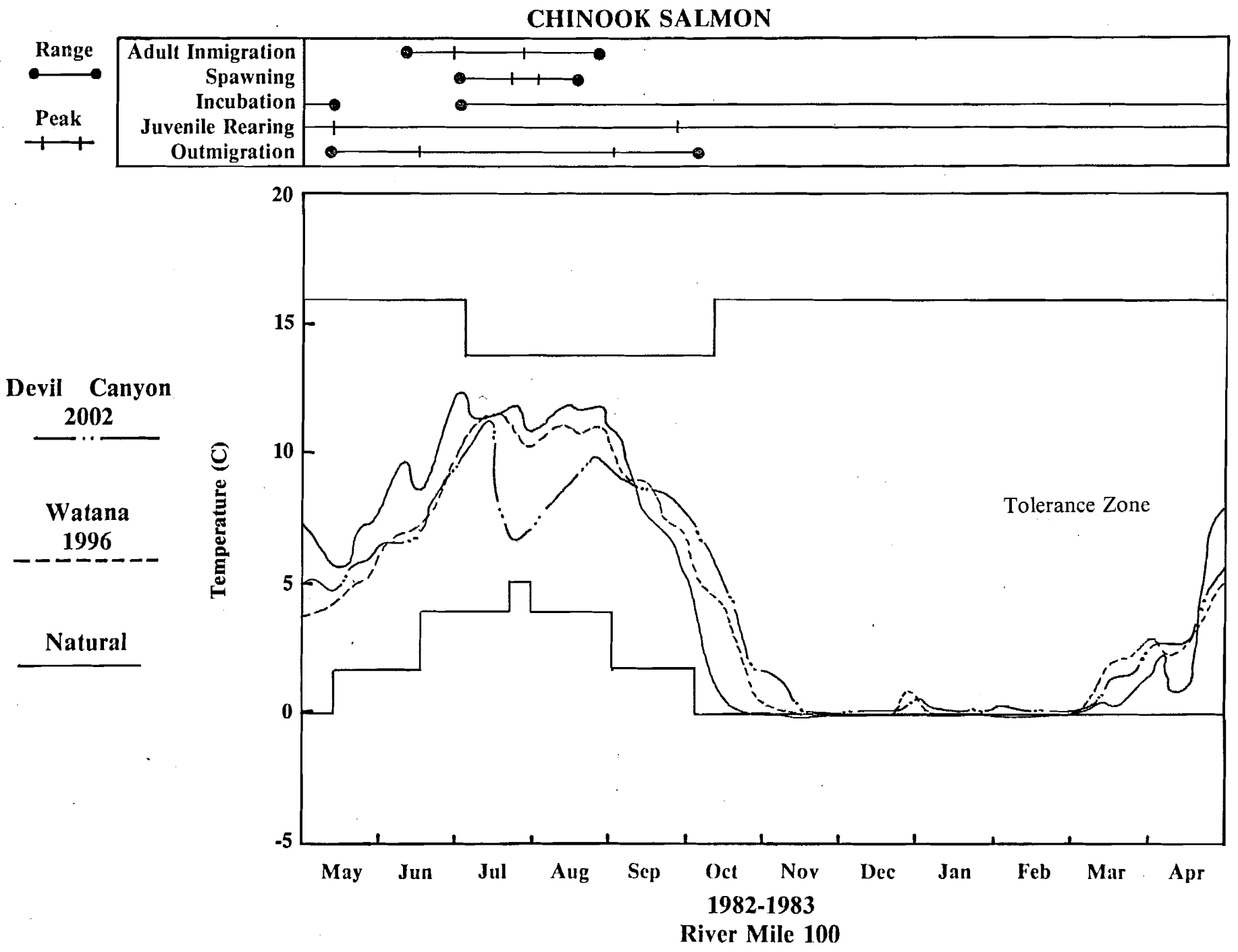
1981-1982

River Mile 130

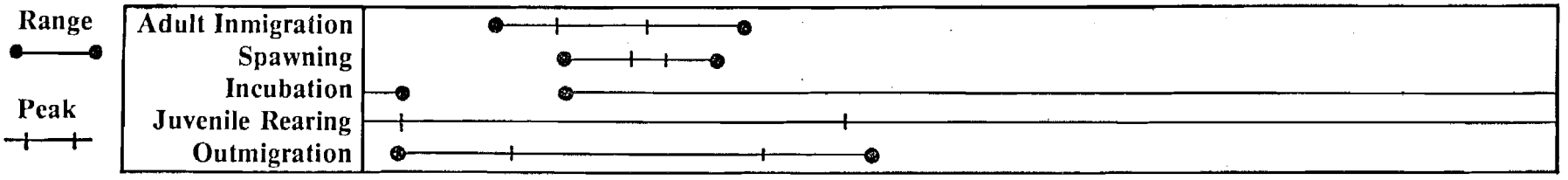
CHINOOK SALMON

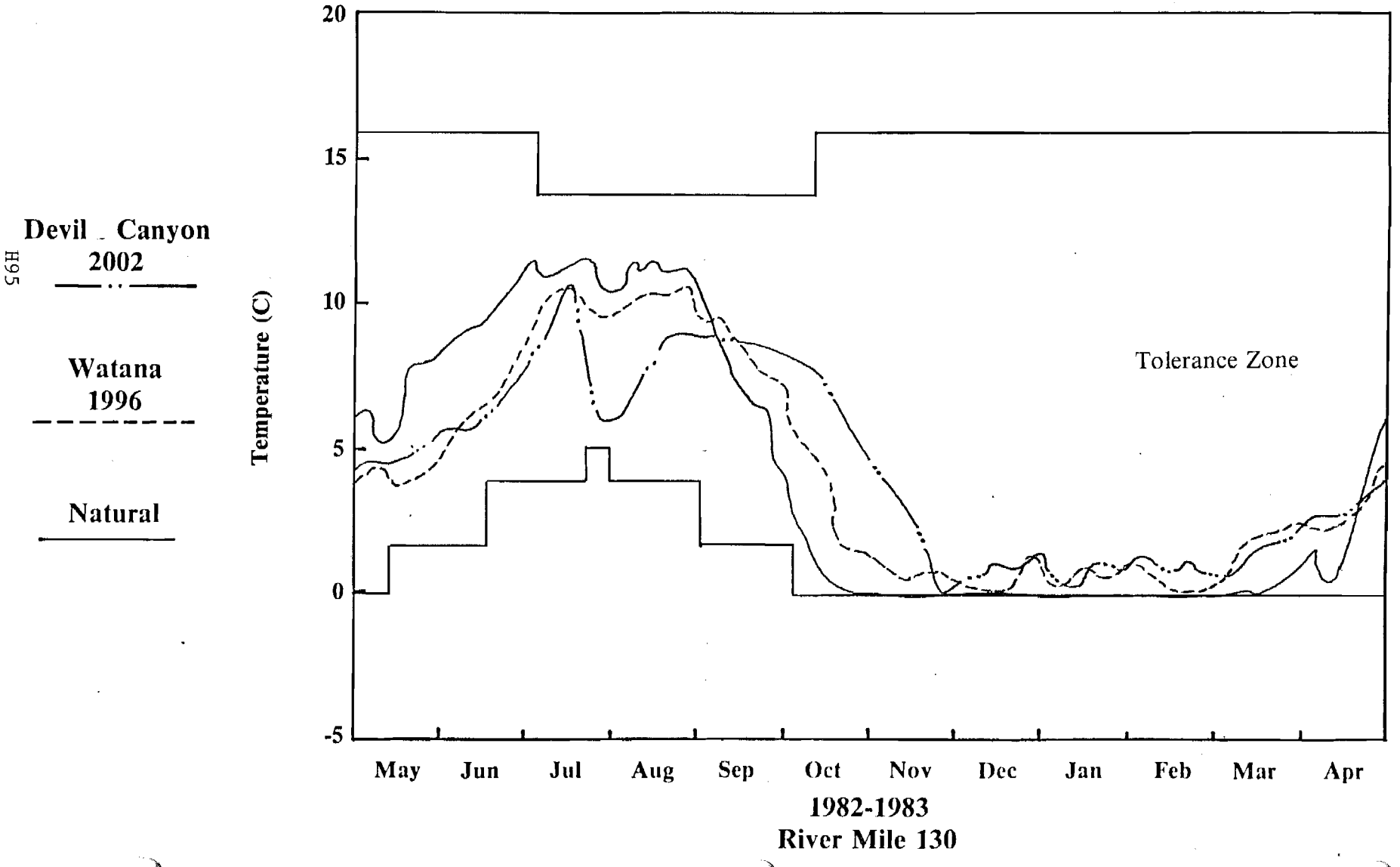




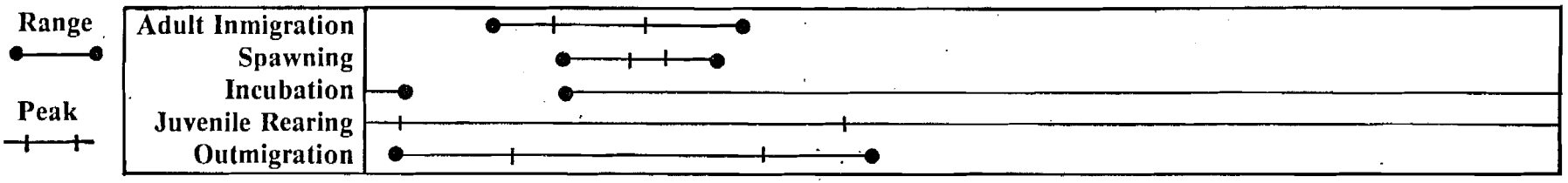

CHINOOK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Devil Canyon
2002
Watana
1996
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1982-1983
River Mile 100

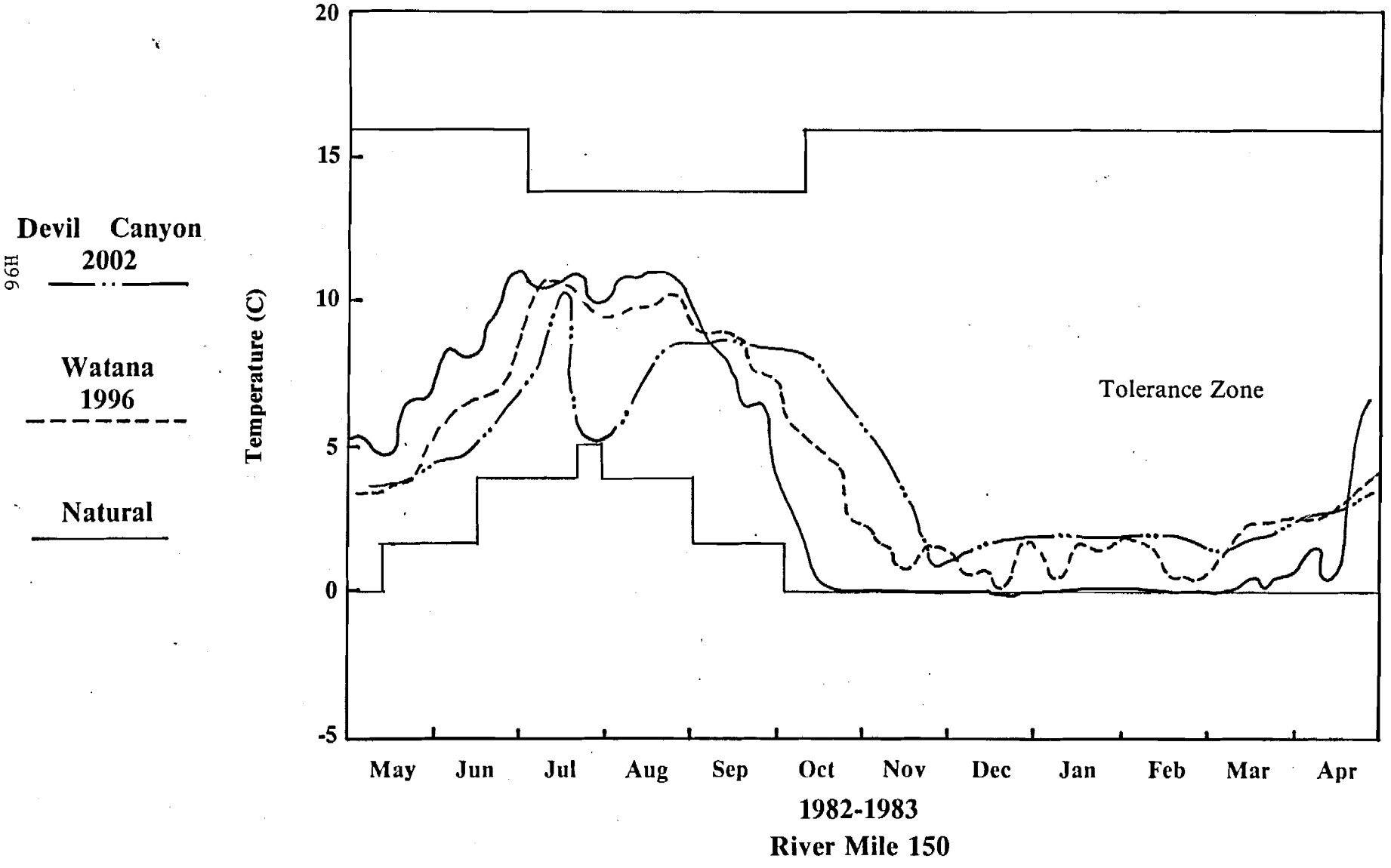
CHINOOK SALMON





CHINOOK SALMON

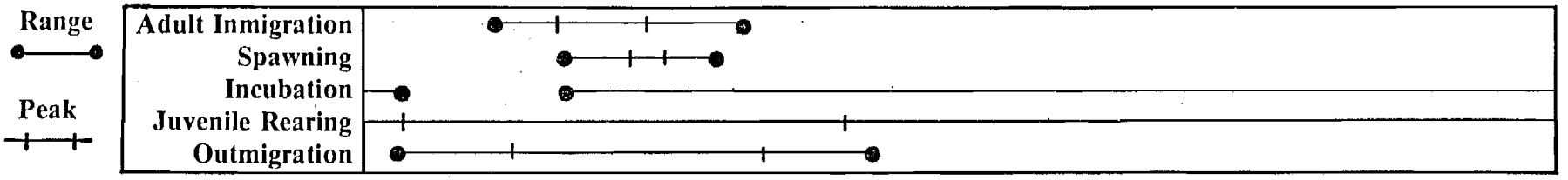


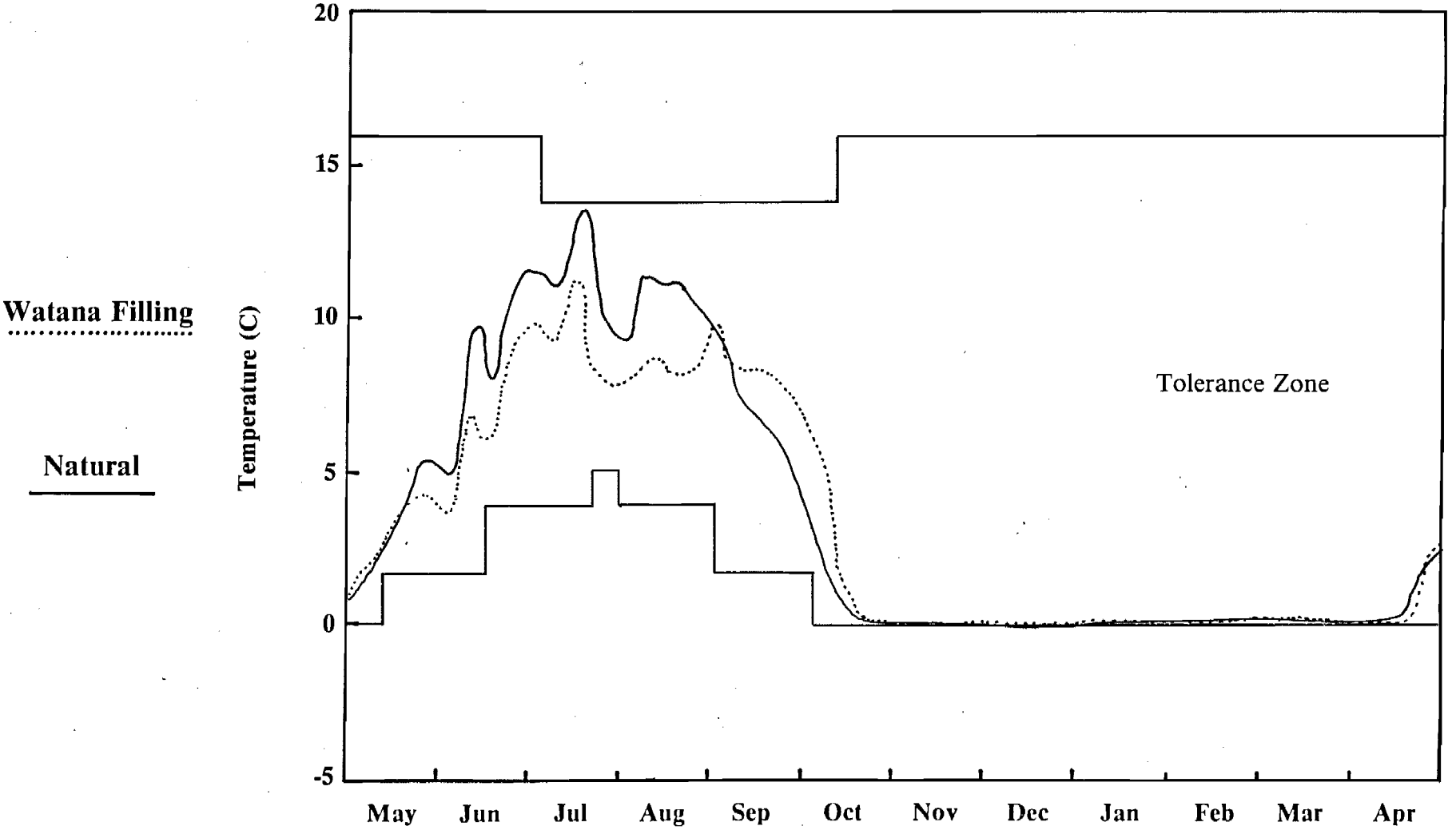


1982-1983

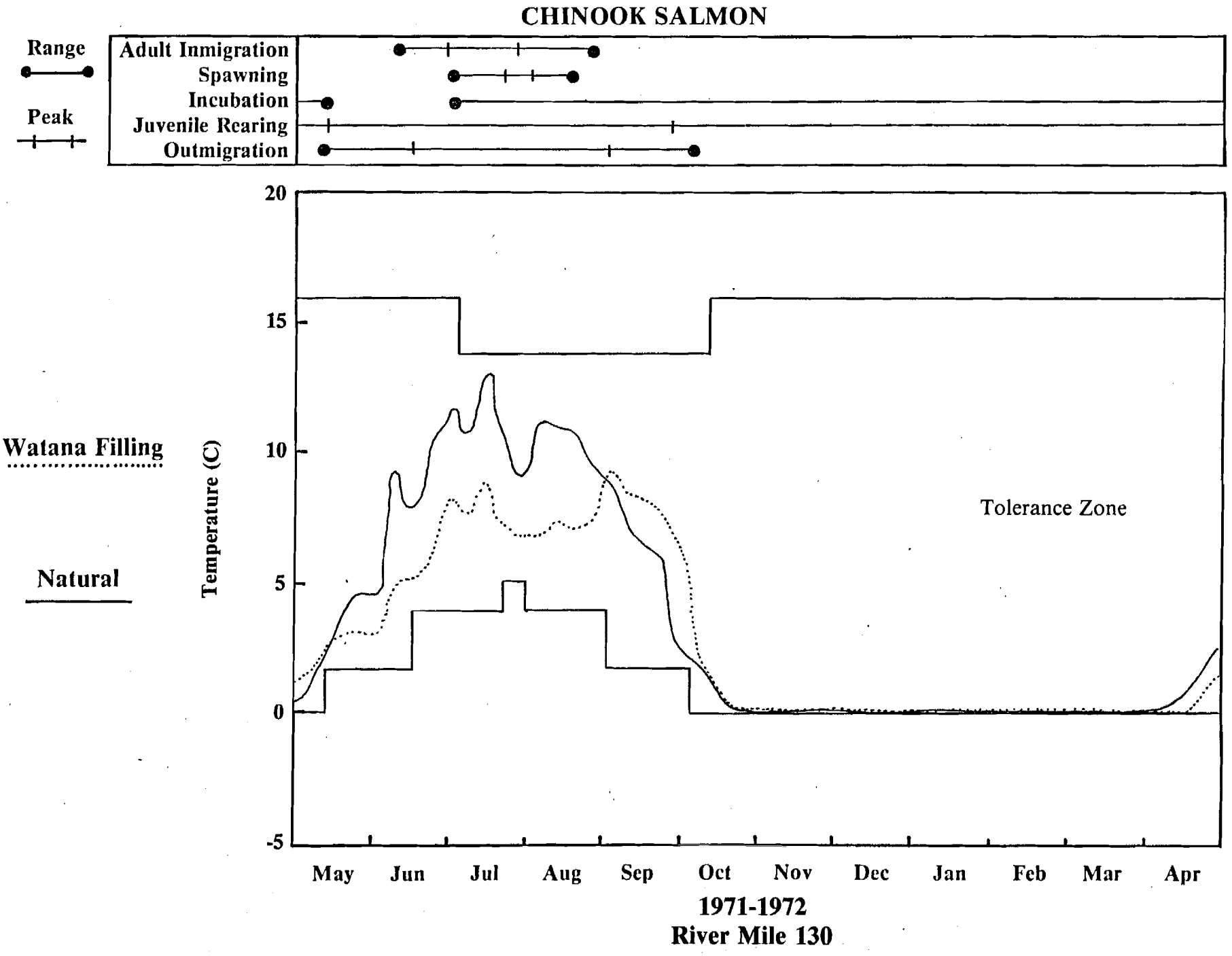
River Mile 150

CHINOOK SALMON

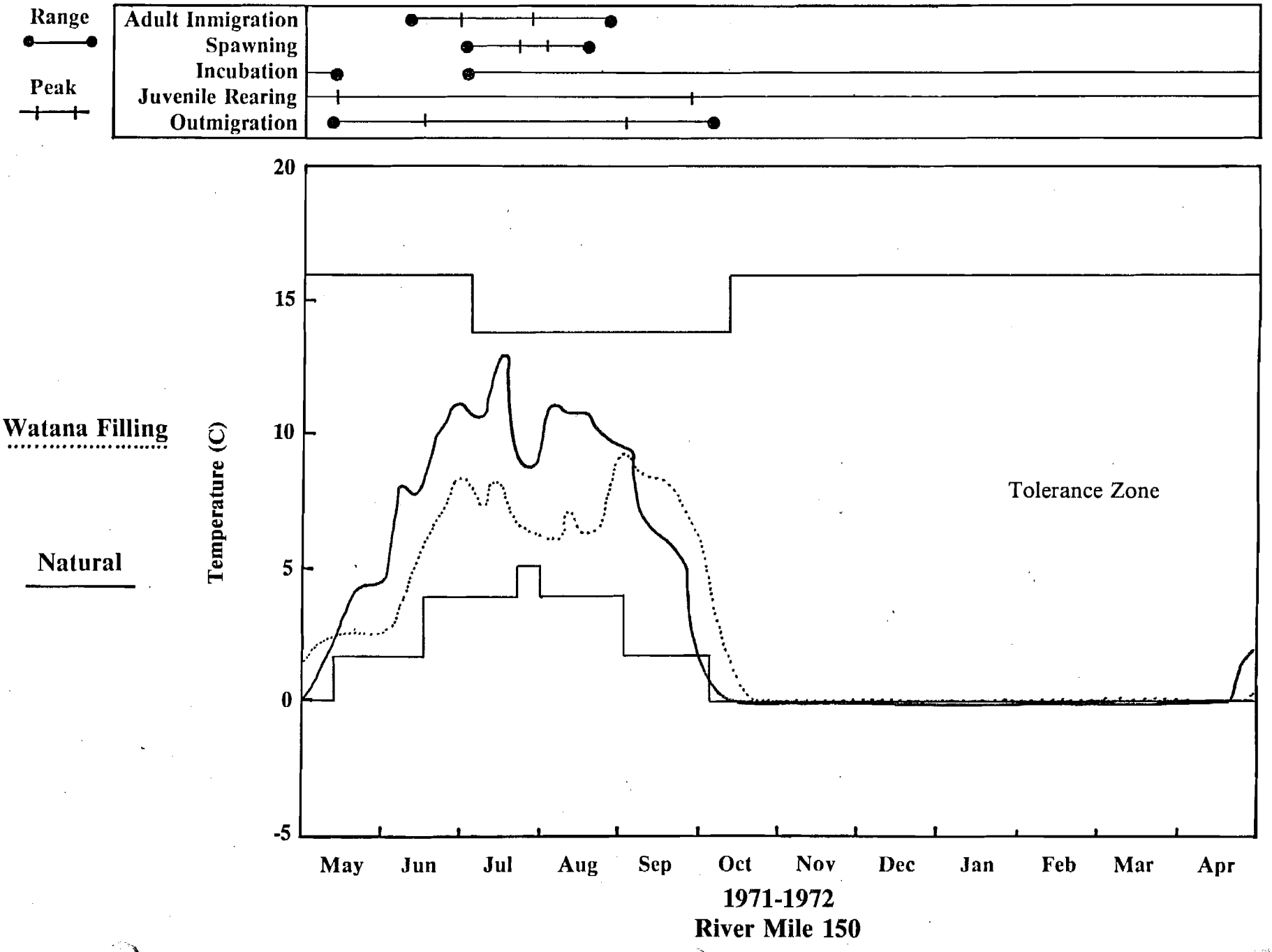


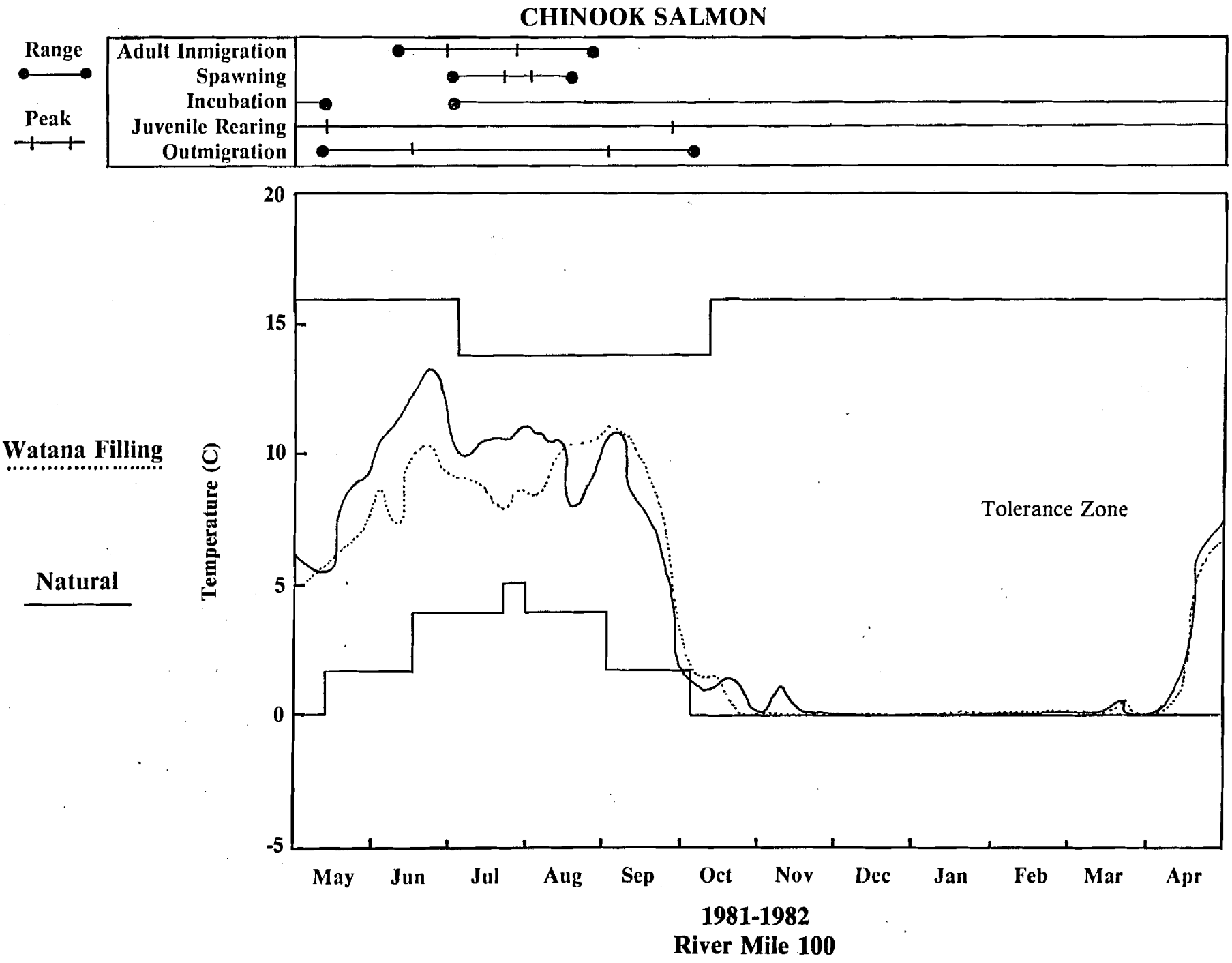


1971-1972
River Mile 100


CHINOOK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
10
5
0
-5
Tolerance Zone
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1971-1972
River Mile 130

CHINOOK SALMON




CHINOOK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
15
10
5
0
-5
Temperature (C)
Watana Filling
Natural
Tolerance Zone
May
Jun
Jul
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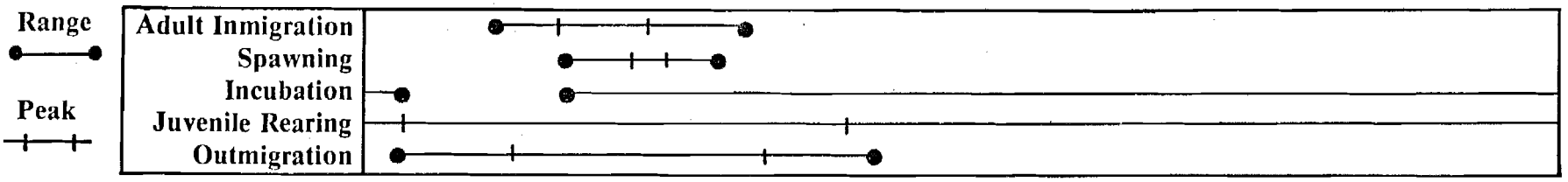
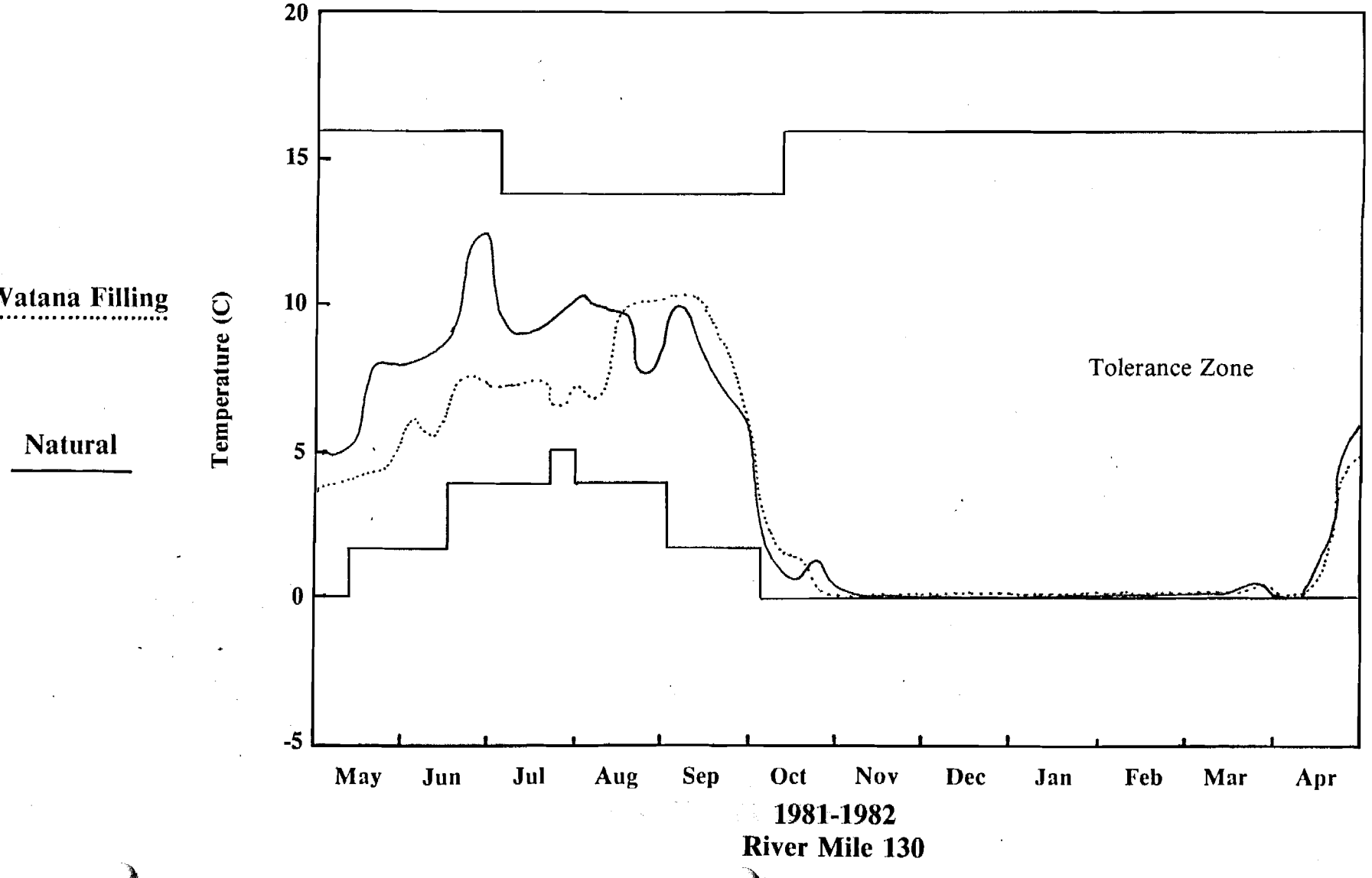
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1981-1982
River Mile 100

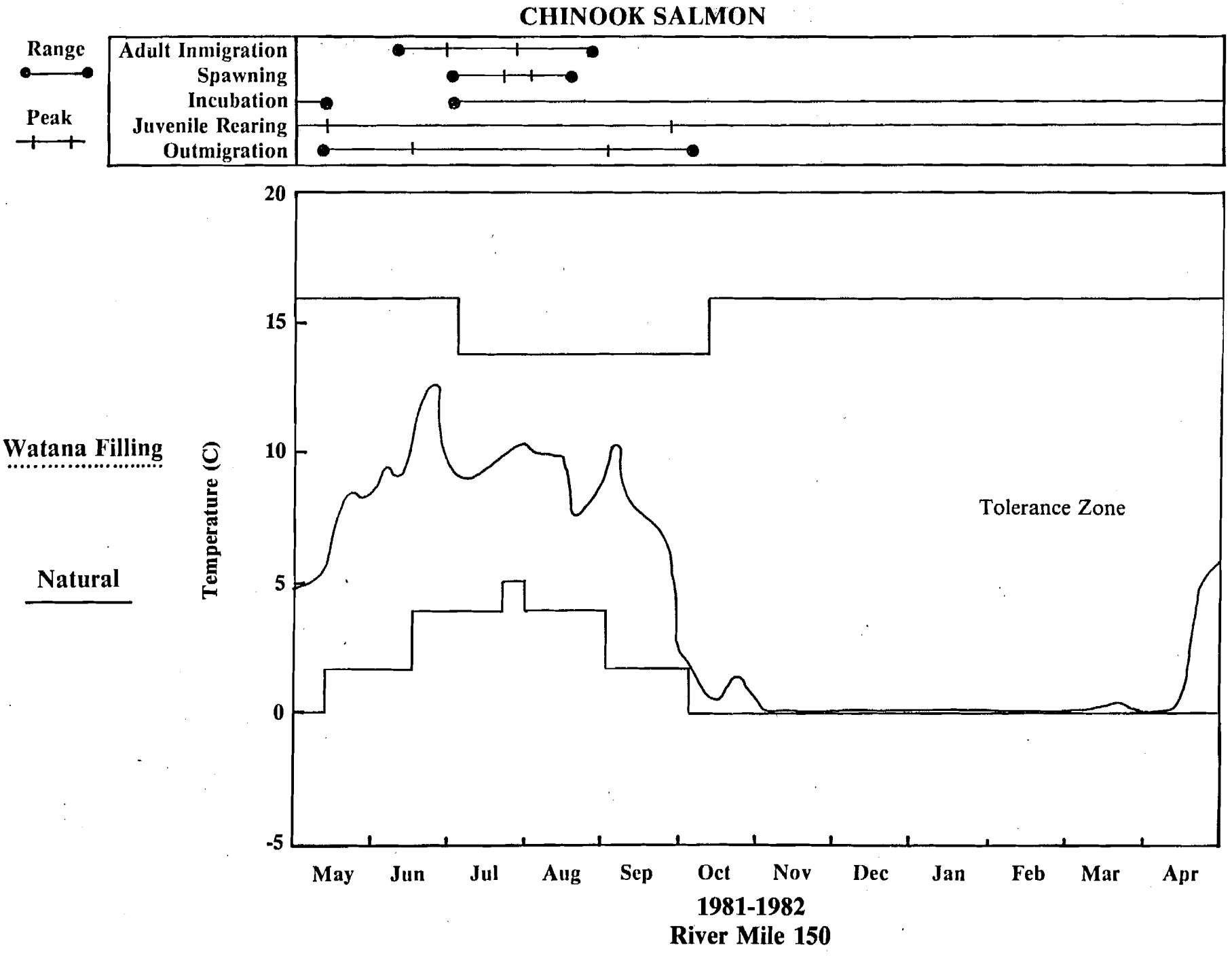
H100

CHINOOK SALMON





H101


CHINOOK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
20
15
10
5
0
-5
Temperature (C)
Watana Filling
Natural
Tolerance Zone
May
Jun
Jul
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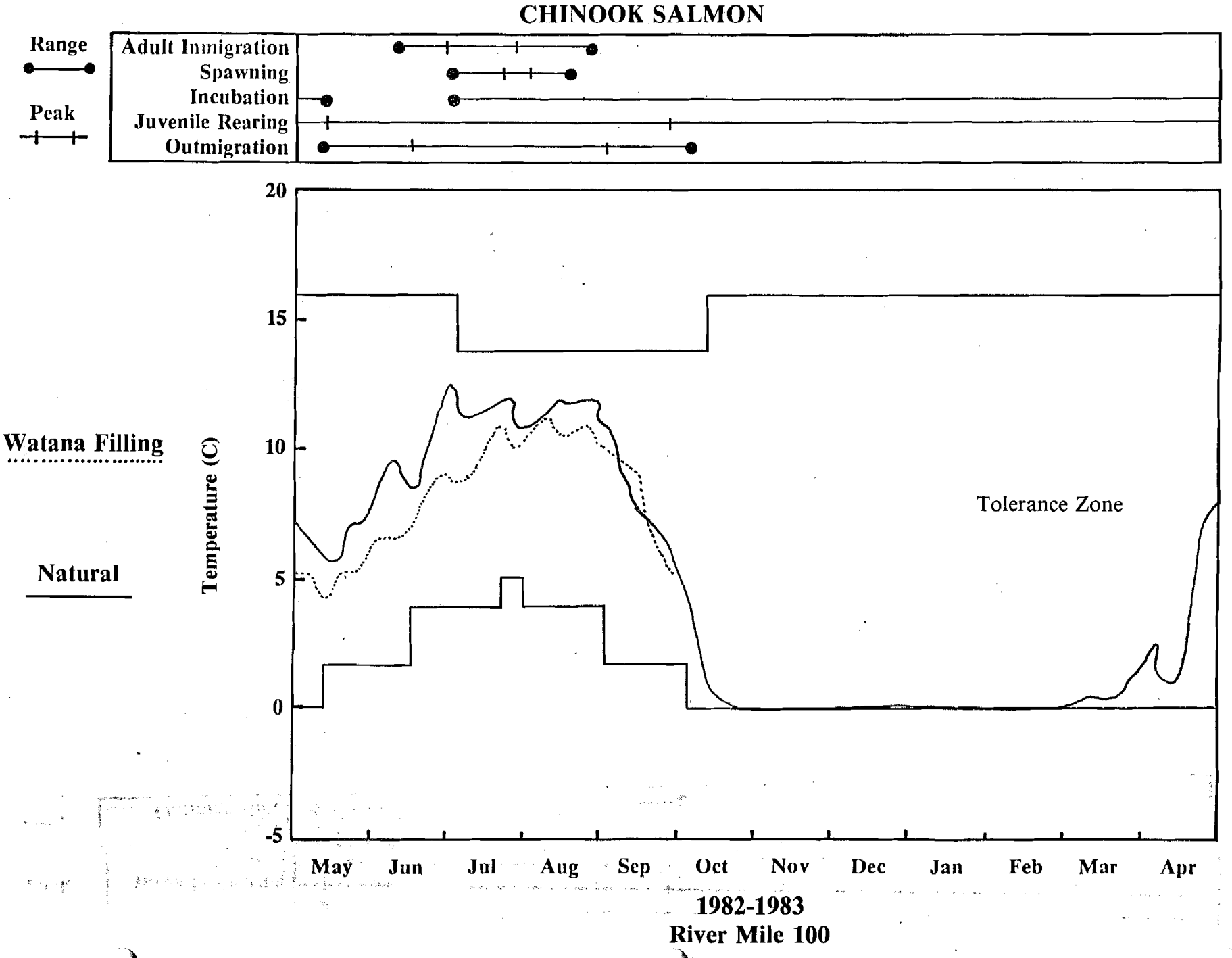
Dec
Jan
Feb
Mar
Apr
1981-1982
River Mile 150

H102


CHINOOK SALMON
Range
Peak
Adult Immigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
15
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Tolerance Zone
May
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Oct
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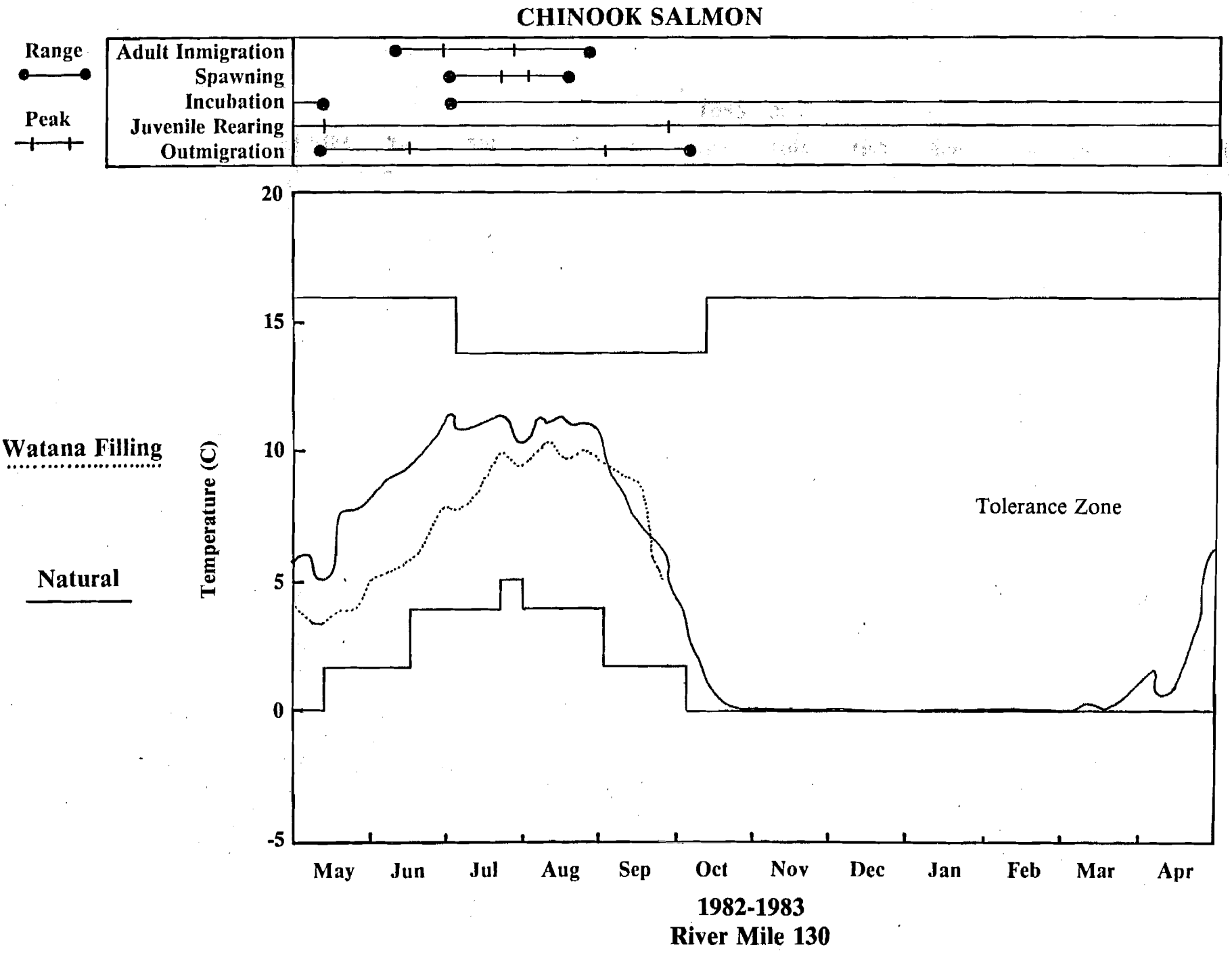
Dec
Jan
Feb
Mar
Apr
1982-1983
River Mile 100


CHINOOK SALMON
Range
Peak
Adult Inmigration
Spawning
Incubation
Juvenile Rearing
Outmigration
Watana Filling
Natural
Temperature (C)
20
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10
5
0
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Tolerance Zone
May
Jun
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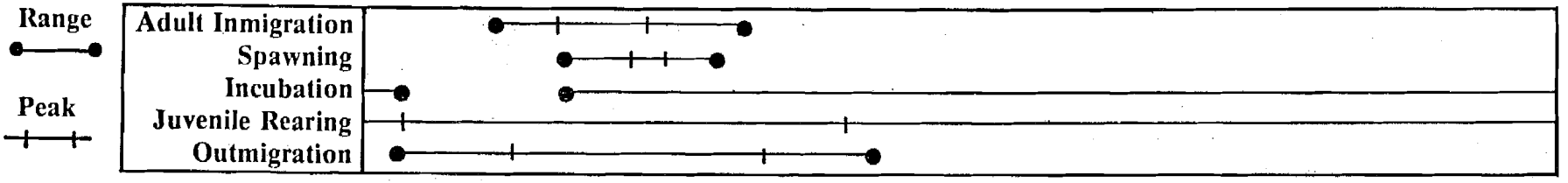
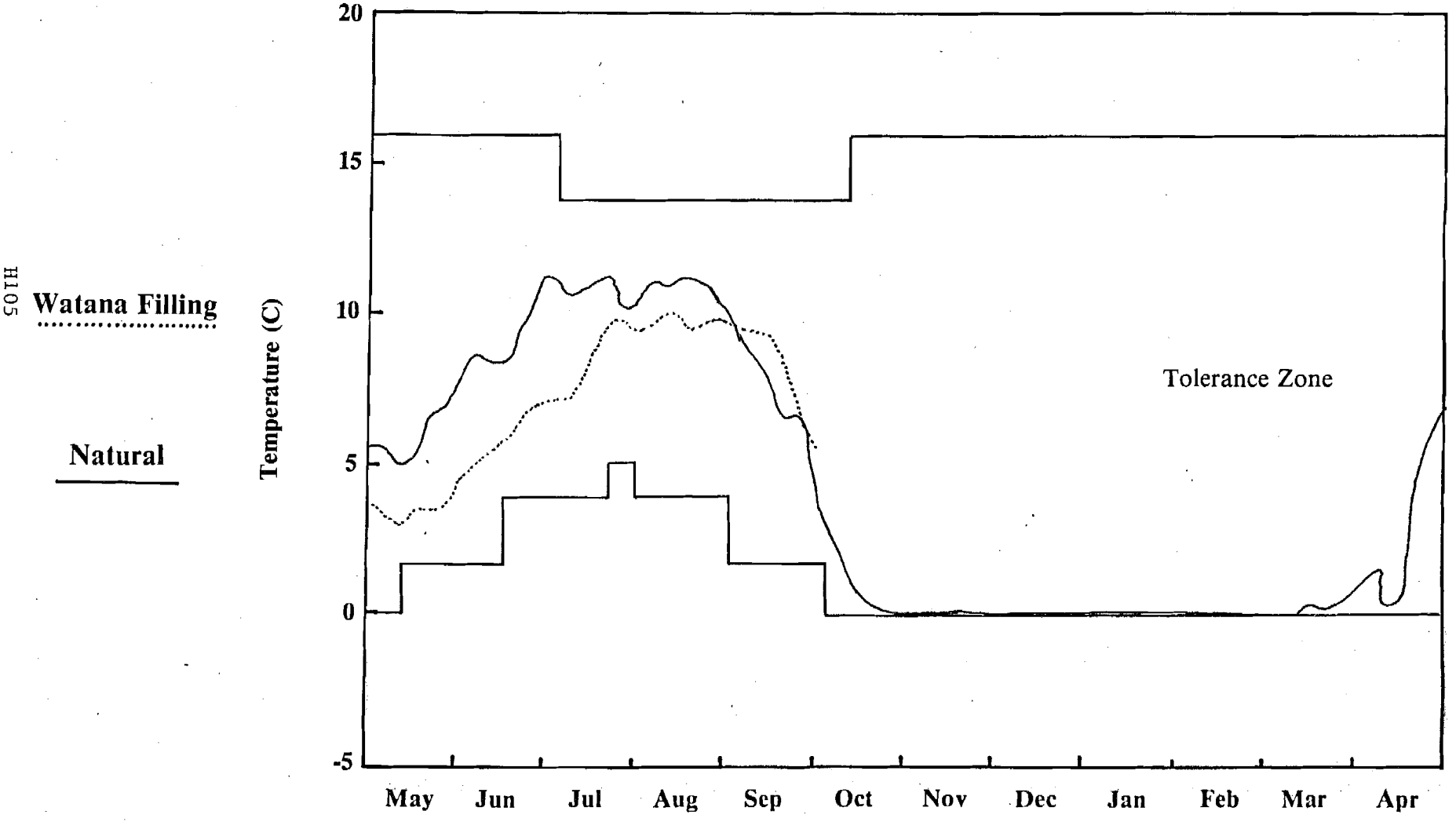
Oct
Nov
Dec
Jan
Feb
Mar
Apr
1982-1983
River Mile 130

CHINOOK SALMON





1982-1983
River Mile 150

H105