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UMATILLA RIVER BASIN ANADROMOUS FISH HABITAT ENHANCEMENT PROJECT

1990 ANNUAL REPORT

Prepared by

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Project No. 87-100-01
Contract Number DE-BI79-87BP35768

January, 1991

ABSTRACT

The Umatilla habitat improvement program is funded under the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program measure 704 (d) (1) 34.02, and targets the improvement of water quality and the restoration of riparian areas, spawning and rearing habitat of steelhead, spring and fall chinook and coho salmon.

The Confederated Tribes of the Umatilla Indian Reservation are responsible for enhancing stream reaches within the Reservation boundaries as guided by an implementation plan developed cooperatively with the Oregon Department of Fish and Wildlife and the U.S.D.A. Forest Service, Umatilla National Forest.

Treatment areas included the lower 4 miles of Meacham Creek, the lower 1/4 mile of Boston Canyon Creek, and the Umatilla River between RM 78.5 and 80. The upper 1/2 of the Meacham Creek project area including Boston Canyon Creek, which were initially enhanced during 1989, were reentered for maintenance and continued enhancements.

Approximately 2,400 cu. yds. of boulders and 1,000 cu. yds. of riprap was used in the construction of in-stream, stream bank and flood plain structures and in the anchoring of large organic debris (LOD) placements. In-stream structures were designed to increase instream cover and channel stability and develop of a defined thalweg to focus low summer flows. Flood plain structures were designed to reduce sediment inputs and facilitate deposition on flood plains.

Riparian recovery was enhanced through the planting of over 1,000 willow cuttings and 400 lbs. of grass seed mix and through the exclusion of livestock from the riparian corridor with 4.5 miles of high tensile smooth wire fence.

Photo documentation and elevational transects were used to monitor changes in channel morphology and riparian recovery at permanent standardized points throughout the projects. Water quality (temperature and turbidity) data was collected at locations within the project area and in tributaries programmed for future enhancements..

ACKNOWLEDGEMENTS

This program was funded by the Bonneville Power Administration (BPA). The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) thank Jerry Bauer and other BPA personnel for their assistance. Thanks are extended to Tim Baily, Jim Phelps and Steve Williams of the Oregon Department of Fish and Wildlife (ODFW) and John Sanchez and Ed Calame of the Umatilla National Forest for field and technical assistance.

We would like to acknowledge the many landowners who supported our efforts through the signing of conservation easements and by providing invaluable background on the properties within the project areas. Thanks go to the Union Pacific Railroad for their assistance in the transport of boulders for instream structures.

Thanks to CTUIR staff, whose cooperation and contributions are evident in this report. Special thanks to Ken Hall, Melvin Farrow, and Mike McCloud for their long hours of on-the-ground efforts. Gary James provided critical technical review of the project and Joe Richards provided administration of this agreement. Julie Burke and Celeste Reves provided secretarial services.

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INTRODUCTION

This report covers work accomplished by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) during April 1990 through May 1991 as part of the Umatilla Drainage Habitat Improvement Program. This Program is funded under the Northwest Power Planning Council's Columbia River Basin Fish and Wildlife Program, Measure 704 (d) (1) 34.02, as partial mitigation for construction of hydroelectric dams and the subsequent losses of anadromous fish throughout the Columbia River system. The CTUIR as co-managers of the fisheries resources, was identified as the agency responsible for implementation of habitat improvements within the Umatilla Indian Reservation boundaries.

The Umatilla River Drainage Anadromous Fish Habitat Improvement Implementation Plan (Implementation Plan), was developed by the Oregon Department of Fish and Wildlife (ODFW), U.S.D.A. Forest Service, Umatilla National Forest (USFS), and the CTUIR to guide enhancement activities in the basin from 1988 through 1992 (Reeve et al. 1988). Enhancement activities target improvement of water quality, and restoration of riparian areas and spawning and rearing habitat of steelhead (Oncorhynchus mykiss), spring and fall chinook salmon (Oncorhynchus tshawytscha), and coho salmon (Oncorhynchus kisutch). These species represent an important cultural and religious resource to the Indian Tribes and their protection is mandated by Treaty with the United States Government.

Enhancement strategies include riparian vegetation restoration and protection, habitat diversity improvement and channel development. Improvements are being implemented in conjunction with other anadromous fish restoration efforts in the Umatilla River Basin including passage improvements (ladders, screens, and flow enhancement) and hatchery supplementation. These other efforts will help to boost spawning escapement and natural production in the enhanced habitat throughout the Umatilla Basin.

DESCRIPTION OF PROJECT AREA

Meacham Creek is a major tributary to the Umatilla River, entering at rivermile (RM) 79 (Figure 1). It drains approximately 165 square miles and produces 145,000 acre-feet annually at RM 5 near the head of the project area. The Umatilla River is a tributary to the Columbia River at RM 289. It has a drainage basin of 308 square miles below the confluence of Meacham Creek. The principle aquifer is quaternary alluvium composed of unconsolidated sand and gravel, gravel, and some silt. Alluvium may reach a depth of up to 12 feet (Gonthier and Harris 1975).

Boston Canyon Creek, entering Meacham Creek at RM 2.1, is the largest tributary to Meacham Creek within the reservation. It contributes over 4,000 acre-feet annually to Meacham Creek from a drainage basin of approximately 5.5 square miles. It runs over and through large alluvial deposits as it enters the Meacham Creek floodplain.

The project area includes the lower 4 miles of Meacham Creek, the lower 1/4 mile of Boston Canyon Creek, and the Umatilla River between RM 78.5 and 80. The upper 2 miles of Meacham Creek and the lower section of Boston Canyon Creek , initially treated during the 1989 project year, were reentered for maintenance and continued enhancements. The lower two miles of Meacham Creek and the work on the mainstem Umati!la represent initial entries.

Elevations in the project area range from 1,760 to 2,000 feet above sea level, giving the area an unusually long growing season. Stream gradients average less than two percent. Flooding in the project area usually occurs in late winter and spring as a result of a rain on snow event. The flood peaks tend to be high and the volumes large, but the duration of damaging stages seldom last more than a day or two (U.S. Army, Corps of Engineers 1975).

The project lies in a big game winter grazing zone as outlined by the CTUIR Land Development Code (1983). The primary land use is livestock grazing from May to November. Timber harvest is permissible under a conditional use permit.

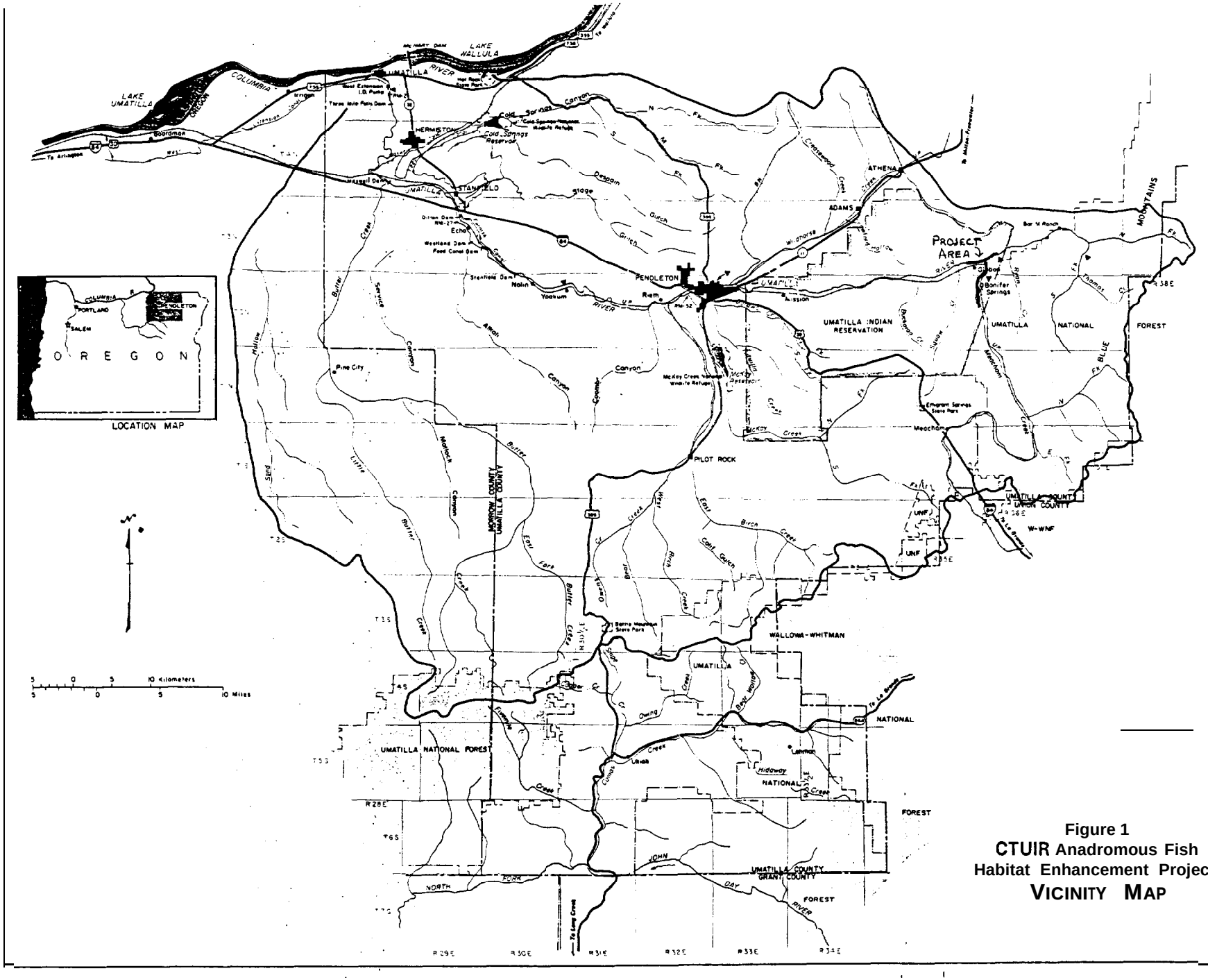


Figure 1
CTUIR Anadromous Fish Habitat Enhancement Project
VICINITY MAP

METHODS AND MATERIALS

The efforts of the CTUIR fish habitat enhancement staff during the 1990191 project year are divided into categories based roughly on chronology as follows:

1) Pre-construction:

The pre-construction phase of the project included all project planning and preparatory activities including: landowner coordination and the development and acquisition of lease and Right-of Way (ROW) agreements; acquisition of all required federal, state and local permits; the survey of properties for accurate property line locations and for project design; the development and award of construction and delivery contracts; the collection of pre-construction biological and physical data and the establishment of recovery transects and photopoints; and the development of implementation schedules and plans.

Project Design and Property Line Survey

The CTUIR contracted with River Masters Engineering, Inc. for the development of designs and blueprints of the lower two miles of Meacham Creek, Section C and selected sites on the Umatilia River. Designs included design rational and cross sections of stream channel and flood plain, for use in physical monitoring and permit acquisition. These designs were completed during the 1989\90 project year.

Property line survey was conducted under sub-contract with a BIA approved land surveyor to meet the requirements of the Code of Federal Regulations, Section 169. All other activities were conducted by CTUIR staff.

Landowner Agreements

Lease and ROW procurement for the lower 2 miles of Meacham Creek and the Umatilla River, Sec. B and C, was ongoing throughout the 1988\89 project year. Each landowner or shareholder was contacted initially by either phone or letter, and then sent an information packet with draft agreements for their review: Field tours of the project area and slide presentations were given to all interested landowners on request.

Monitoring and Data Collection

Data on water temperature and turbidity were collected at sites selected during the pre-construction phase of implementation. These sites included three ISCO waste water sampler stations, each with an associated Tempmentor hydrothermograph. Stations were placed during the 1988\89 project year at RM 2, 4, and 6. The station at RM 6

was moved to the Umatilla River approximately 100 yds. downstream from the confluence with Meacham Creek prior to commencement of instream activities in the Umatilla River and lower two miles of Meacham Creek.

Samples were taken at six hour intervals to create a composite daily sediment sample. Water samples were processed at the USFS water lab in Pendleton by CTUIR habitat staff and USFS personnel. All laboratory personnel time and the use of the lab equipment was donated by the Umatilla National Forest.

Ryan Tempmentor thermographs were also deployed at the lower reaches of Squaw and Buckaroo Creeks. Water temperatures were recorded every half hour.

Stream channel development and riparian recovery were documented using cross channel transects to measure changes in channel morphology and using standardized photo points to record riparian recovery and changes in channel morphology. Permanent photo point and transect markers were placed throughout the project area. Channel measurements and standardized photos were taken prior to construction activities and immediately following construction to document construction related changes in channel cross section and initial riparian condition. This recovery documentation will be repeated following the first years high flow events and thereafter every other year.

2) Construction:

The construction phase of the project consisted of all on-the-ground activities including: initial project staking, development of machine accesses, delivery of materials to structure sites, construction of instream and riparian area structures, maintenance of existing structures, riparian vegetation enhancement, construction of riparian exclosure fence, project construction monitoring and data collection, and photo documentation.

In-stream Activities

In-stream activities were scheduled to correspond. to periods of low stream. flow and to avoid spawning periods far salmonids. The'location and type of in-stream and riparian structures were determined by the hydrologists and engineers under subcontract in coordination with the tribal habitat biologist.

Petroleum absorbent booms were deployed downstream from all heavy equipment working in the stream zone to protect against spills of petroleum products from engine and hydraulic systems.

Meacham Creek and the Umatilla River - Deflectors, spur dikes, and turning rocks were placed to reduce erosion of stream banks and the influx of sediments from adjacent riparian areas and to encourage the deposition of fines for the establishment of riparian vegetation.

Weirs, large organic debris, and instream boulder placements were used to increase holding and hiding cover and to encourage the development of a stable, narrow thalweg.

The Hilti rock hammer drill was used to drill 9\16" diameter holes approximately 6" into boulders. Half inch diameter aircraft cable was epoxied into the holes to anchor LOD and to increase stability and long term durability of the structures.

In areas of extensive bed-load deposition and high channel instability, river gravels were sloped and shaped to form a stable channel configuration and to facilitate the recovery of riparian vegetation. This stable channel configuration will be maintained by the placement of boulder structures and through the recovery of a stable riparian community.

Boston Canyon Creek - Additional log sills were placed to set grade in the lower sections where the channel had become incised during high spring runoff.

Riparian Corridor Fencing

Livestock grazing will be eliminated from the project area using a high tensile smooth wire fence to enclose the riparian corridor. Fence designs and specifications were provided by the Oregon Department of Fish and Wildlife.

Riparian Vegetation Enhancement

High summer water temperature and the loss of habitat diversity resulting from excessive bedload movement and stream bank instability are major limiting factors to salmonid production in the basin. The re-establishment of riparian vegetation in the project area is critical to the long term stabilization of the bed-load and the subsequent development of a narrow shaded channel. Vegetative recovery and enhancement will be achieved through livestock exclusion and the planting of riparian hardwood cuttings from local stock and seeding of all' gravel bars and exposed. banks with a mix of grasses and forbs recommended by the Soil Conservation Service.

Monitoring and Data Collection

Water quality data including suspended sediments and water temperature were collected throughout the construction period. Construction activities were photographed and video-taped.

3) Post-construction:

This phase of project implementation included the post-construction project monitoring and water quality data collection as follows:

Monitoring and Data Collection

Riparian recovery and changes in channel morphology were monitored at preselected photo points and cross channel transects which were established during the pre-construction phase of the project. Channel cross sections were resurveyed before and after the spring high flow event to assess the effectiveness of the prescribed structures at meeting desired goals of riparian stabilization and enhanced fish habitat. Post-construction standardized photographs were taken at all transects and at other preselected photo points to document riparian recovery and structure success.

RESULTS AND DISCUSSION

1) Pre-construction:

Landowner Agreements

Agreements were signed with 15 landowners for nine tax lots and two trust allotments on approximately 3.4 miles of stream channel. This included 1.9 miles of the Umatilla River in Sections B and C, and approximately 1.5 miles of Meacham Creek. A total of approximately 140 acres of stream channel and riparian area were included in these agreements.

Right of Way agreements were signed by an additional 18 share holders in two trust allotments for which 100 percent consent was not obtained. These allotments were left untreated pending agreements with three more share holders.

Sub-contracts

All sub-contract documents and specifications were developed by the CTUIR, Department of Natural Resources staff during the 1990\91 project year.

Property Line Survev - Property line surveys were completed under sub-contract with William R. Wells Land Surveying and Planning, in order to meet the requirements of the Bureau of Indian Affairs and the Code of Federal Regulations Part 169.

Equipment Rental - Sub-contract for equipment rental was awarded to Hamey County Gypsum for the rental of a D-8 crawler dozer, a track mounted excavator, and a crawler loader.

Rock Haul - Sub-contract for the loading and haul of boulders and riprap was awarded to Humbert Excavating.

Project Design - Design of the lower two -miles of Meacham Creek was sub-contracted to River. Masters Engineering; Project design was developed in coordination with the tribal habitat biologist.

Fence Construction - Fence construction sub-contract was awarded to Raymond Doherty for 4.5 miles of fence in the 1989\90 project area on Meacham Creek.

2) Construction and Post-construction:

Materials Supply and Delivery

Rock supply and delivery was coordinated with the Union Pacific Railroad (UPRR). The UPRR donated the delivery of 2,400 cu. yds. of boulders from a stock pile at Barnhart Pit to the Gibbon Siding at Gibbon, OR. This rock was purchased from Meridian Aggregate Co.

Offloading of rail cars and trucking of rock to structure sites on Meacham Creek and the Umatilla River was completed under sub-contract with Humbert Excavating.

An additional 1,000 cu. yds. of riprap was excavated from a local pit and hauled to site by Hamey County Gypsum Company. This riprap was used primarily for bank revetment.

Instream Activities

All instream activities were directed and inspected by Tribal habitat staff. Rock and log structures throughout the project were secured using over 1,000 Hilti Fastening system placements and a total of 1,000 ft of 1/2 inch steel cable.

Meacham Creek - Initial instream activities included the development of a stable channel configuration through approximately 1/2 mile of unstable gravel deposits. Adult holding water was improved in the lower two miles of channel through the construction of eight rock weirs with holding pools. Stream bank stability was improved by the placement of 34 boulder deflectors, over 1,000 lineal feet of boulder wing walls and toe rocks, 120 feet of rock bank revetment and 60 feet of log bank revetment. Instream cover was increased through the placement of 30 in-pool boulders, 33 boulder clusters, and 24 large organic debris placements with anchor boulders. Channel thalweg and instream cover was enhanced by the placement of 60 thalweg boulders and 23 sets of turning boulders. Stream bed stability was increased with the construction of three bed level boulder sills to control-vertical channel erosion.

Boston Canyon Creek - Continued enhancements and repairs included the repair of one log sill which had been lost to a channel head wall cut. Channel grade was stabilized with two additional log weirs and 50 cu. yds. of riprap channel bottom armor. Additional boulders were placed to neck down the chute on one log weir.

Umatilla River - Adult holding water was improved through the construction of an adult holding pool and boulder weir. Large organic debris was cabled in place to bedrock within the pool to improve cover.

The channel was stabilized through the construction of two vertical control sills, eight boulder deflectors, 70 feet of log revetment, 950 feet of boulder revetment, and 220 feet of boulder wing wall.

Rearing habitat and instream cover was improved with 15 LOD placements including 18 anchor boulders, 12 boulder clusters, 13 sets of turning boulders, and two slough developments.

Fence Construction

The lease areas were enclosed with 4.5 miles of high tensile smooth wire fence to exclude livestock. Three stream crossing structures and six gates were also constructed. The fencing of lease areas in the 1990 project areas on the lower two mile of Meacham Creek and the Umatilla River was deferred to the following year in order that the effectiveness and integrity of the instream and flood plain structures could be evaluated through a high flow event. This strategy should reduce the risk of high flows damaging fences due to improper location within the flood plain.

Riparian Vegetation Enhancement

Riparian vegetation was enhanced through the planting of over 1,000 willow cuttings in Meacham Creek, the Umatilla River and Boston Canyon Creek. A D-8 crawler dozer with four foot long ripper was used successfully to plant large numbers of cuttings deeply in the extensive gravel bar areas in the project. Large clumps of alder were planted using a track mounted excavator.

Areas disturbed during implementation were seeded with a mix of grasses and forbs to reduce erosion and the growth of undesirable species. A wet site seed mix was used along stream margins and in sloughs. A total of. 300 Ibs. of dry site seed and 100 lbs. of wet site seed were spread during the fall and spring following high flows. All seed used was certified weed free.

Monitoring and Data Collection

Water temperatures were recorded at the mouth of Meacham Creek, lower Squaw Creek and in the Umatilla River below the mouth of Meacham Creek to monitor the output temperatures from the primary spring chinook and steelhead spawning and rearing areas on the Reservation (Figs 2 - 4, and appendix a). The critical period for anadromous fish was during July and August when the mean daily water temperatures frequently exceeded 65 F. Temperatures in excess of 65 F have been shown to result in impairment of anadromous fish production (Theurer et al, 1984; Theurer et al 1985; Bell 1984).

Figure 2

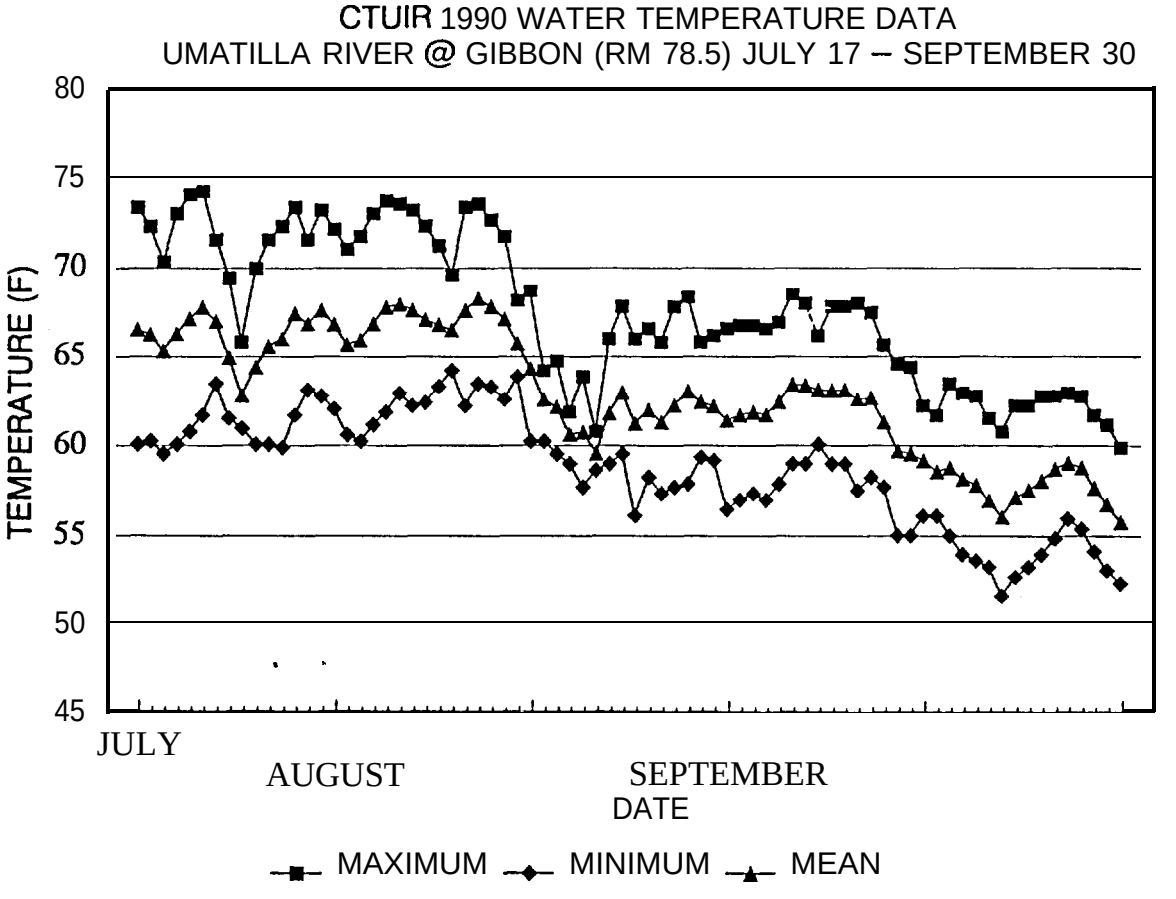


Figure 3

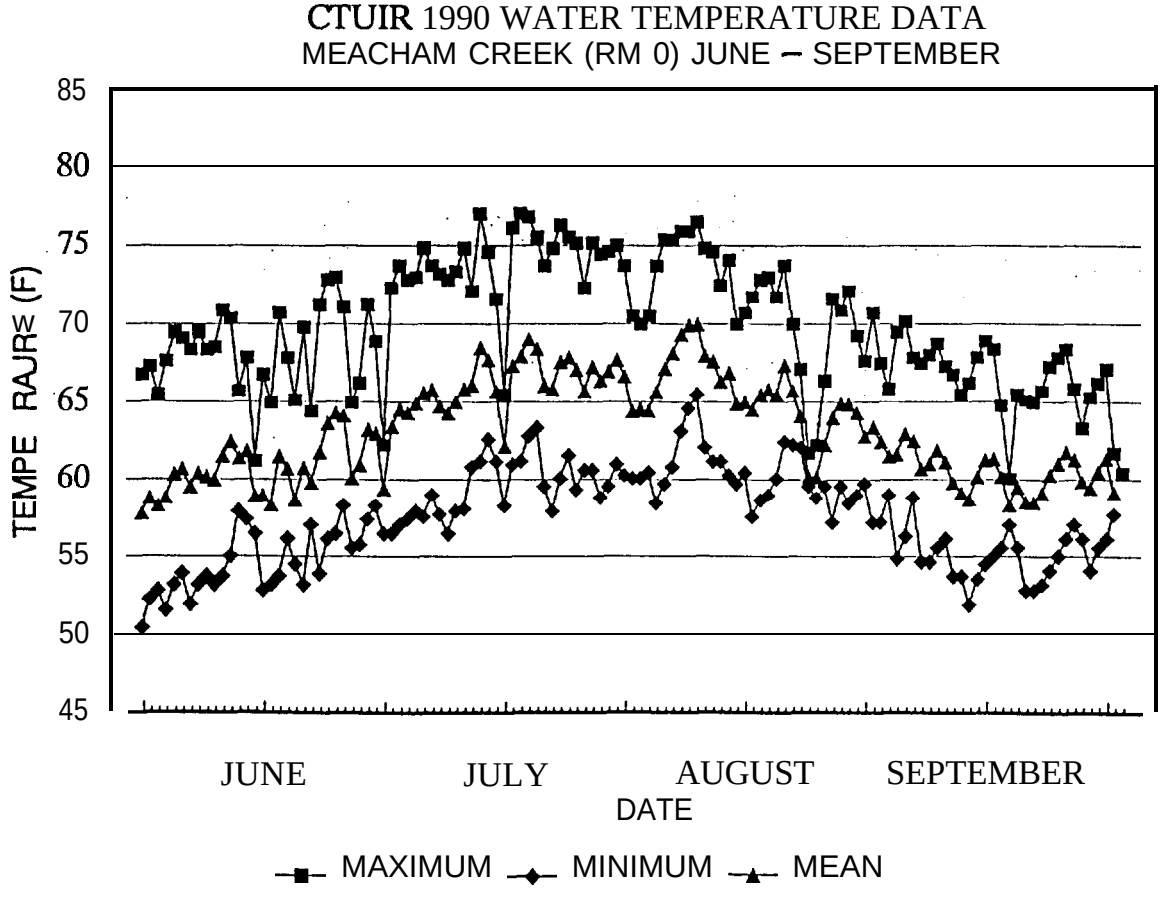
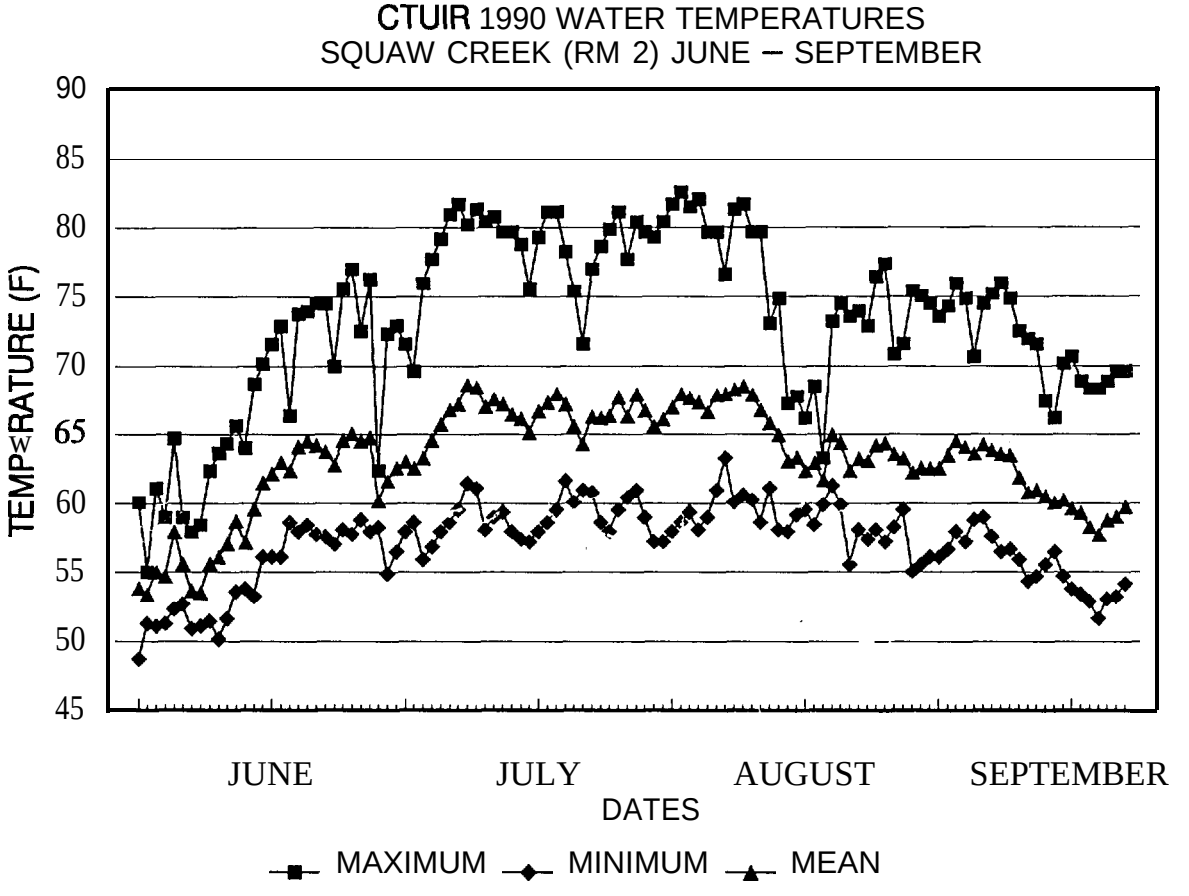


Figure 4


CTUIR 1990 WATER TEMPERATURES
SQUAW CREEK (RM 2) JUNE – SEPTEMBER
TEMP≤RATURE (F)
90
85
80
75
70
65
60
55
50
45
JUNE
JULY
AUGUST
SEPTEMBER
DATES
MAXIMUM
MINIMUM
MEAN

Maximum water temperatures during the critical period occurred between 4pm and 5pm reaching the mid 70s F in Meacham Creek and the Umatilla River and often exceeding 80 F in Squaw Creek. The upper lethal limit due to indirect effects such as reduced growth, reduced capacity to compete for food and avoid predators and increased disease virulence is 68 F (Theurer et al. 1984). Temperatures of between 73 and 77 F have been shown to cause direct mortality in chinook and steelhead (Bell 1984; Theurer et al., 1984). Successful holding, spawning, and rearing of steelhead was documented in Meacham Creek, Squaw Creek and the Umatilla River and successful holding and spawning of spring chinook was documented in Meacham Creek and the Umatilla River even with these extremes in temperature.

Daily minimum temperatures during the critical period ranged from a low of 54.9 F in Squaw Creek to a high of 65.5 F in Meacham Creek. Minimum daily temperatures were generally recorded between 6 and 8 am. The average diurnal fluxes during the critical period were 9.3 F in Meacham Creek, 12.9 F in the Umatilla River and 18 F in Squaw Creek. These daily variations in temperature combined with the use of cool water refuges from springs and subsurface flow interception may permit successful production in what appears to be unsuitable conditions.

Estimates of suspended sediments were made from samples taken at the three ISCO stations and analyzed with stream flow data collected from the USGS gage stations at Meacham Creek RM 2 and the Umatilla River RM 80.5, to develop daily estimates of total sediment yield from Meacham Creek and the Umatilla River (Fig. 5 & 6).

The total estimated sediment yield from Meacham Creek for the 13 month project period (April 1, 1990 - April 30, 1991) exceeded 2800 tons. Samples from the Umatilla River were incomplete for the project period and no estimate of total project period yield was made.

The largest recorded peak in Meacham Creek of over 320 tons/day occurred on May 31, 1990 as a result of heavy spring rams. Normal high spring and winter flows of twice the magnitude would not tend to cause such extreme peaks. The August peaks on the Umatilla River were the result of instream enhancement activities.

Figure 5

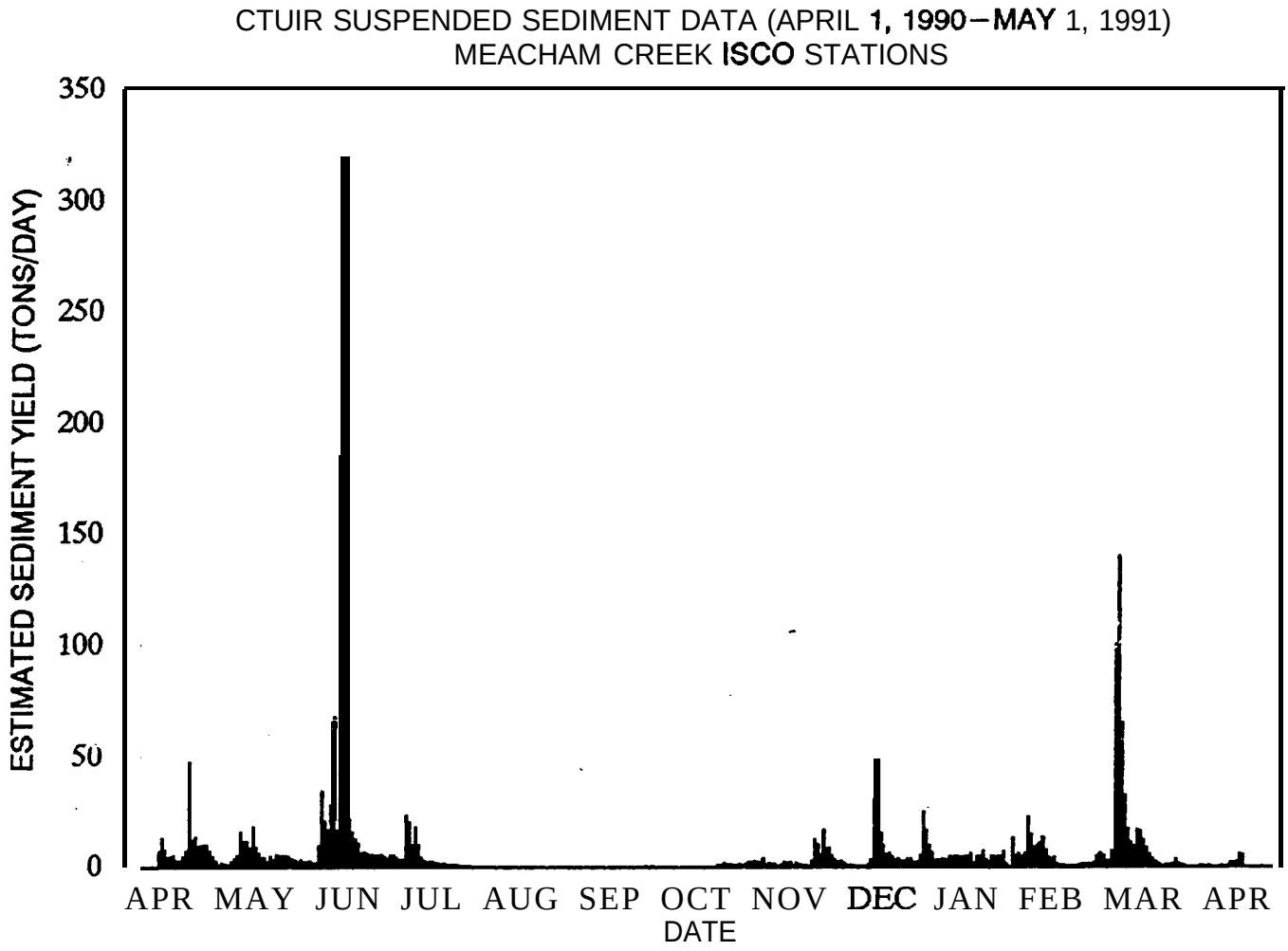
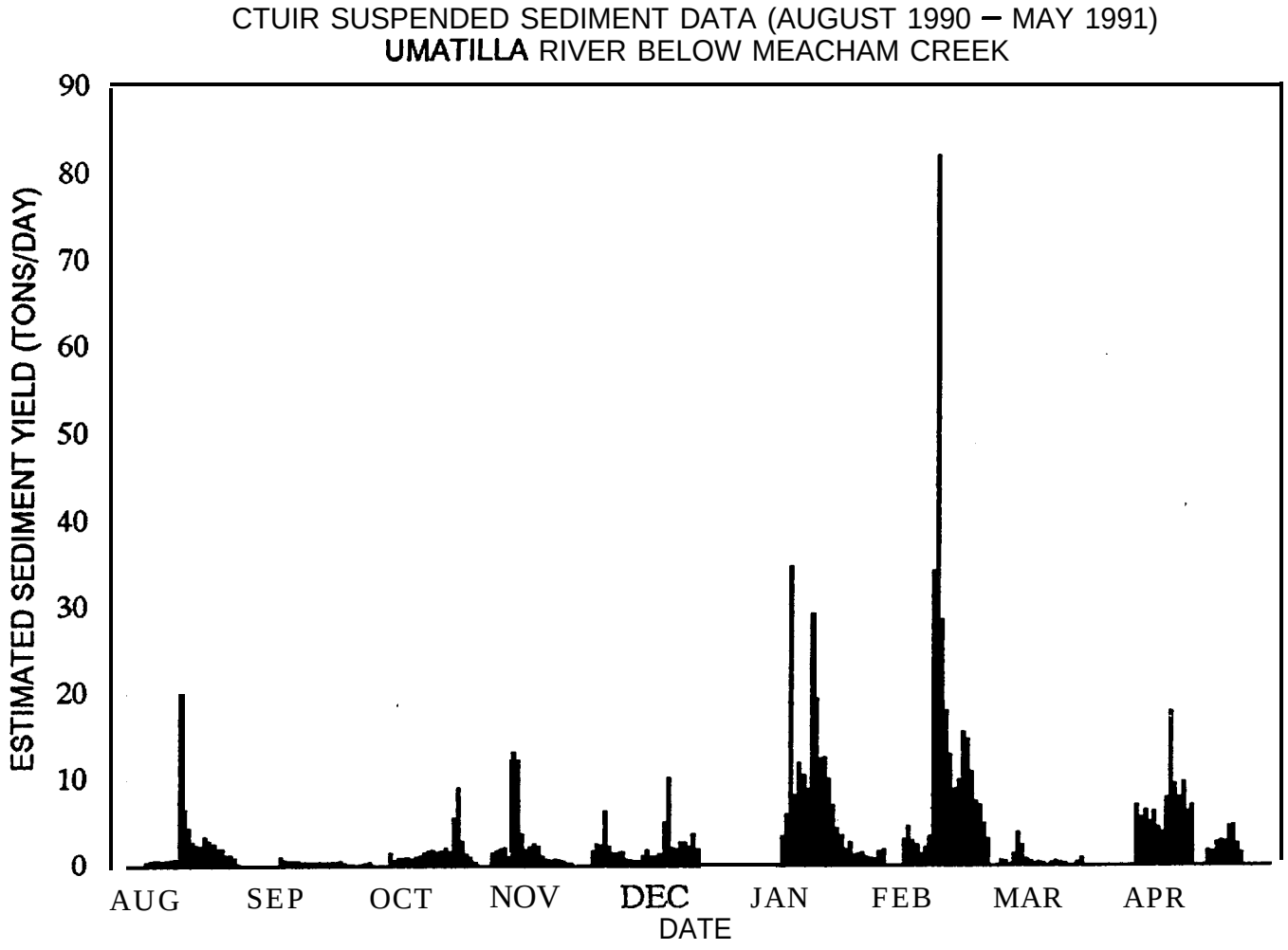

CTUIR SUSPENDED SEDIMENT DATA (APRIL 1, 1990–MAY 1, 1991)
MEACHAM CREEK ISCO STATIONS
ESTIMATED SEDIMENT YIELD (TONS/DAY)
350
300
250
200
150
100
50
0
APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR
DATE

Figure 6


CTUIR SUSPENDED SEDIMENT DATA (AUGUST 1990 – MAY 1991)
UMATILLA RIVER BELOW MEACHAM CREEK
ESTIMATED SEDIMENT YIELD (TONS/DAY)
90
80
70
60
50
40
30
20
10
0
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
DATE

Summary of Expenditures - Habitat Enhancement April 1, 1990 - April 30, 1991	
1. Personnel (Salaries & Fringe Benefits)	$ 85,830.74
2. Travel	$ 2,160.86
3. Services and Supplies	$ 21,278.37
4. Contractual Supplies	$ 145,547.89
5. Capital Outlay	$ 973.97
6. Overhead	$ 32,601.65
7. Total	$ 288,393.49

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APPENDIX A
WATER QUALITY DATA

YOU ARE IN TL901367.001.
1 hours / sample
max. = 25.0 degrees C.
min. = −32.2 degrees C.
05/31/89 07 50:00 SN901367 #001

MEACHAM CREEK RM 0 1 HR INTERVAL

DEPLOYED 5/31/89 0800 CAS

1.0
1.0
25.0
−32.2
5.0 31.0 89.0 7.0 50.0 0.0 ******** 1.0
0.0 1.0
5.0 31.0 89.0 800.0

DIRTO c:\habitat\tm2\
For auto permanent entries
DIRFROM + DIRTO (- - - > change)

DATE	MILITARY TIME 0100	0200	0300	0400	0500	0600	0700	0800	0900	1000.0	1100.0	1200.0	1300.0	1400.0	1500.0	1600.0	1700.0	1800.0	1900.0	2000.0	2100.0	2200.0	2300.0	2400.0	MAX	MIN	MEAN	MAX	MIN	MEAN
06/01/89	12.5	11.9	11.5	11.1	10.8	10.5	10.3	10.4	10.8	11.8	13.0	14.4	15.9	17.3	18.4	19.2	19.3	19.0	18.3	17.1	16.2	15.3	14.4	13.9	19.3	10.3	14.3	66.7	50.5	57.7
06/02/89	13.4	12.8	12.4	12.1	11.8	11.4	11.3	11.4	11.7	12.5	13.6	15.0	16.4	17.7	18.6	19.3	19.6	19.2	18.5	17.4	16.5	15.6	14.7	14.1	19.6	11.3	14.9	67.3	52.3	58.8
06/03/89	13.6	13.1	12.8	12.4	12.1	11.8	11.6	11.6	12.1	12.9	14.0	15.4	16.5	17.4	18.0	18.4	18.6	18.0	17.4	16.2	15.3	14.4	13.7	13.0	18.6	11.6	14.8	65.5	52.9	58.3
06/04/89	12.7	12.4	12.0	11.6	11.3	11.1	10.9	11.1	11.6	12.6	13.8	15.3	16.7	17.9	19.0	19.7	19.8	19.4	18.6	17.7	16.8	15.9	15.0	14.4	19.8	10.9	14.9	67.6	51.6	58.8
06/05/89	13.9	13.4	13.0	12.6	12.2	11.9	11.8	11.8	12.3	13.2	14.6	16.1	17.6	18.9	19.9	20.6	20.8	20.3	19.5	18.5	17.5	16.6	15.7	15.1	20.8	11.8	15.7	69.4	53.2	60.3
06/06/89	14.4	13.9	13.5	13.1	12.7	12.4	12.2	12.3	12.7	13.6	14.8	16.3	17.7	19.0	19.8	20.5	20.6	20.2	19.5	18.5	17.4	16.5	15.5	14.7	20.6	12.2	15.9	69.1	54.0	60.6
06/07/89	14.1	13.4	12.9	12.4	11.9	11.5	11.3	11.3	11.7	12.7	13.9	15.4	17.0	18.2	19.3	19.9	20.2	19.8	19.1	18.1	17.1	16.2	15.3	14.5	20.2	11.1	15.3	68.4	52.0	59.5
06/08/89	13.9	13.4	12.9	12.5	12.2	11.8	11.8	11.8	12.3	13.3	14.6	16.1	17.6	18.9	19.9	20.5	20.8	20.3	19.6	18.7	17.7	16.8	15.9	15.1	20.8	11.8	15.8	69.4	53.2	60.4
06/09/89	14.5	14.0	13.4	13.1	12.8	12.3	12.1	12.2	12.6	13.5	14.7	16.1	17.4	18.6	19.5	20.1	20.2	19.6	18.8	17.9	16.9	15.9	15.1	14.4	20.2	12.1	15.6	68.4	53.8	60.2
06/10/89	13.9	13.4	13.0	12.6	12.2	11.8	11.8	11.8	12.3	13.3	14.1	15.6	17.1	18.3	19.3	20.1	20.3	20.0	19.2	18.3	17.3	16.5	15.6	14.8	20.3	11.8	15.5	68.5	53.2	59.9
06/11/89	14.2	13.7	13.3	12.8	12.6	12.2	12.1	12.3	12.8	13.7	15.3	16.8	18.3	19.7	20.8	21.4	21.6	21.2	20.5	19.5	18.5	17.5	16.7	15.9	21.6	12.1	16.4	70.9	53.8	61.5
06/12/89	15.2	14.6	14.1	13.8	13.3	12.8	12.8	13.0	13.6	14.6	16.0	17.5	18.9	19.9	20.9	21.3	21.3	21.2	20.5	19.7	19.0	18.0	17.2	16.5	21.3	12.8	16.9	70.3	55.0	62.4
06/13/89	15.9	15.4	15.1	14.8	14.6	14.4	14.4	14.4	14.7	15.0	15.5	16.4	17.2	17.7	18.3	18.7	18.7	18.5	18.2	17.7	17.1	16.7	16.2	15.9	18.7	14.4	16.3	65.7	57.9	61.4
06/14/89	15.6	15.2	14.9	14.7	14.4	14.3	14.1	14.2	14.4	14.5	15.3	16.0	16.9	18.3	19.4	19.7	19.9	19.8	19.1	18.8	17.9	17.4	16.9	16.5	19.9	14.1	16.6	67.8	57.4	61.8
06/15/89	16.2	15.7	15.5	15.2	15.0	14.7	14.7	14.8	14.9	14.8	14.9	15.0	15.2	15.2	15.2	15.3	15.3	15.2	15.0	14.7	14.4	14.1	13.9	13.6	16.2	13.6	14.9	61.2	56.5	58.9
06/16/89	13.2	12.8	12.4	12.2	11.9	11.6	11.6	11.8	12.4	12.8	13.9	14.7	16.2	17.3	18.3	19.3	19.3	19.1	18.6	17.7	16.8	15.9	15.1	14.4	19.3	11.6	15.0	66.7	52.9	58.9
06/17/89	13.9	13.4	12.8	12.6	12.1	11.8	11.8	11.8	12.4	12.9	13.4	14.0	15.2	16.0	17.1	18.0	18.3	18.1	17.6	16.9	16.2	15.6	15.0	14.4	18.3	11.8	14.6	64.9	53.2	58.3
06/18/89	13.9	13.4	12.9	12.7	12.5	12.1	12.1	12.3	12.9	13.9	15.3	16.8	18.3	19.8	20.8	21.5	21.5	21.3	20.3	19.4	18.4	17.7	16.8	16.1	21.5	12.1	16.4	70.7	53.8	61.5
06/19/89	15.4	14.8	14.3	13.9	13.8	13.6	13.4	13.4	13.7	14.0	14.9	15.6	16.8	18.2	19.1	19.9	19.8	19.2	18.3	17.6	16.9	16.1	15.3	14.7	19.9	13.4	15.9	67.8	56.1	60.7
06/20/89	14.3	13.8	13.6	13.3	12.8	12.7	12.6	12.5	12.5	13.1	13.2	13.7	14.7	15.8	17.3	18.3	18.4	18.2	17.6	16.8	15.9	15.4	14.7	14.0	18.4	12.5	14.8	65.1	54.5	58.6
06/21/89	13.6	13.0	12.8	12.4	12.1	11.8	11.8	12.0	12.6	13.5	15.0	16.4	17.9	19.3	20.2	21.0	21.0	20.7	19.9	18.9	17.9	17.0	16.3	15.7	21.0	11.8	16.0	69.8	53.2	60.7
06/22/89	15.3	14.9	14.6	14.3	14.1	13.9	13.9	13.9	14.1	14.4	14.8	15.2	15.9	17.0	18.0	17.8	17.4	17.4	17.1	16.5	15.8	15.3	14.7	14.2	18.0	13.9	15.4	64.4	57.0	59.8
06/23/89	13.8	13.4	13.0	12.8	12.5	12.2	12.2	12.6	13.2	14.2	15.6	17.1	18.6	20.0	21.0	21.8	21.7	21.3	20.5	19.5	18.6	17.7	17.0	16.3	21.8	12.2	16.5	71.2	54.0	61.7
06/24/89	15.6	15.1	14.5	14.1	13.6	13.4	13.4	13.7	14.3	15.3	16.8	18.2	19.6	20.8	22.0	22.8	22.7	22.2	21.3	20.4	19.3	18.4	17.4	16.8	22.7	13.4	17.6	72.9	56.1	63.6
06/25/89	16.1	15.4	14.8	14.4	13.9	13.6	13.6	13.9	14.4	15.6	16.8	18.3	19.8	21.2	22.3	22.8	22.8	22.5	21.8	21.1	20.1	19.0	18.3	17.6	22.8	13.6	17.9	73.0	56.5	64.3
06/26/89	16.9	16.4	15.9	15.4	15.0	14.7	14.6	14.8	15.5	16.5	17.8	18.9	20.2	21.0	21.4	21.7	21.7	21.2	20.3	19.3	18.6	17.7	16.8	16.0	21.7	14.6	17.8	71.1	58.3	64.1
06/27/89	15.3	14.8	14.3	13.8	13.5	13.3	13.1	13.4	13.7	14.1	14.7	15.5	16.5	17.5	18.1	18.3	18.2	17.9	17.6	17.1	16.7	16.2	15.6	15.1	18.3	13.1	15.6	64.9	55.6	60.1
06/28/89	14.7	14.4	14.1	13.9	13.6	13.4	13.2	13.7	14.5	14.9	15.7	17.1	18.3	18.8	19.0	18.9	18.8	18.3	17.9	17.5	17.1	16.5	16.1	15.7	19.0	13.2	16.1	66.2	55.8	60.9
06/29/89	15.3	15.0	14.7	14.5	14.3	14.2	14.1	14.4	14.7	15.5	16.3	17.2	18.6	19.8	21.0	21.7	21.8	21.6	20.8	19.8	18.8	17.9	17.3	16.6	21.8	14.1	17.3	71.2	57.4	63.2
06/30/89	16.2	15.7	15.4	15.0	14.8	14.7	14.6	14.7	15.2	15.9	17.1	18.3	19.4	20.5	20.3	19.9	19.6	19.6	19.0	18.6	18.0	17.4	16.8	16.2	20.5	14.6	17.2	66.9	58.3	63.0
07/01/89	15.6	15.1	14.7	14.3	13.9	13.9	13.6	13.8	14.1	14.4	14.7	15.1	15.4	15.8	15.9	16.4	16.7	16.8	16.5	16.4	16.1	15.7	15.3	15.0	16.8	13.6	15.2	62.2	56.5	59.4
07/02/89	14.7	14.4	14.1	13.9	13.8	13.7	13.8	13.9	14.4	15.5	16.7	18.0	19.4	20.8	21.9	22.4	22.4	22.0	21.1	20.1	19.3	18.4	17.6	16.8	22.4	13.8	17.5	72.3	56.5	63.4
07/03/89	16.2	15.6	15.1	14.7	14.2	14.0	13.9	14.1	14.8	15.8	17.0	18.3	19.7	21.2	22.4	22.9	23.2	22.7	21.9	20.9	19.9	19.1	18.2	17.4	23.2	13.9	18.1	73.8	57.0	64.5
07/04/89	16.6	16.1	15.6	15.1	14.7	14.2	14.1	14.3	15.0	15.9	17.1	18.2	19.6	20.9	22.0	22.7	22.6	22.0	21.1	20.3	19.3	18.3	17.7	17.1	22.7	14.1	17.9	72.9	57.4	64.3
07/05/89	16.5	16.1	[illegible]	15.4	15.0	14.6	14.4	14.7	15.3	16.2	17.4	18.4	19.9	21.3	22.4	22.8	22.8	22.5	21.8	20.9	19.9	19.0	18.1	17.4	22.8	14.4	18.3	73.0	57.9	64.9
07/06/89	16.6	16.1	15.6	15.1	14.7	14.4	14.2	14.6	15.3	16.3	17.6	18.7	20.2	21.8	22.9	23.8	23.8	23.5	22.6	21.7	20.8	19.9	19.1	18.3	23.8	14.2	18.7	74.3	57.6	65.6
07/07/89	17.6	16.9	16.4	15.9	15.5	15.1	15.0	15.3	15.9	17.0	18.3	19.3	20.8	21.4	22.3	22.9	23.2	22.9	22.0	20.8	20.0	19.2	18.4	17.7	23.2	15.0	18.7	73.8	59.0	65.7
07/08/89	16.8	16.2	15.6	15.3	14.8	14.4	14.3	14.6	15.3	16.2	17.4	18.3	19.8	21.1	22.0	22.8	22.9	22.5	21.7	20.8	19.7	18.9	17.9	16.9	22.9	14.3	18.2	73.2	57.7	64.7
07/09/89	16.2	15.6	15.1	14.7	14.3	13.9	13.8	14.0	14.7	15.8	16.8	17.9	19.4	20.8	21.8	22.6	22.7	22.2	21.7	20.8	20.0	19.2	18.4	17.7	22.7	13.8	17.9	72.9	56.8	64.2
07/10/89	16.9	16.4	15.8	15.3	14.9	14.5	14.4	14.7	15.3	16.2	17.2	18.3	19.8	21.0	22.0	22.8	23.0	22.7	22.0	21.1	20.2	19.3	18.5	17.7	23.0	14.4	18.3	73.4	57.9	65.0
07/11/89	16.9	16.4	15.8	15.4	15.0	14.7	14.5	14.7	15.3	16.2	17.4	18.8	20.2	21.7	22.9	23.7	23.8	23.5	22.8	21.9	21.1	20.3	19.5	18.6	23.8	14.5	18.8	74.8	58.1	65.8
07/12/89	18.0	17.4	16.9	16.5	16.3	16.1	16.0	16.1	16.5	17.1	18.0	18.9	19.9	20.7	21.4	21.8	22.3	22.2	21.9	21.3	20.7	20.1	19.5	18.8	22.3	16.0	18.9	72.1	60.8	66.1
07/13/89	18.3	17.8	17.4	17.0	16.5	16.2	16.2	16.5	17.1	18.0	19.2	20.2	21.7	23.0	24.1	24.8	25.0	24.9	24.2	23.4	22.5	21.7	20.8	20.1	25.0	16.2	20.3	77.0	61.2	68.5
07/14/89	19.3	18.8	18.3	17.8	17.5	17.1	17.0	17.2	17.7	18.8	19.6	20.7	22.0	23.2	23.7	23.2	22.7	22.0	21.3	20.8	20.2	19.7	19.2	18.7	23.7	17.0	19.8	74.7	62.6	67.7
07/15/89	18.3	18.0	17.5	17.1	16.8	16.4	16.2	16.2	16.8	17.8	17.9	18.0	18.6	20.0	20.8	21.5	22.0	21.8	21.4	20.7	19.9	19.3	18.5	17.7	22.0	16.2	18.7	71.6	61.2	65.7
07/16/89	17.1	16.5	16.0	15.5	15.1	14.7	14.6	14.7	15.0	15.5	15.9	16.5	17.1	17.7	17.9	18.2	18.4	18.6	18.5	18.2	17.9	17.7	17.3	17.1	18.6	14.6	16.7	65.5	58.3	62.1
07/17/89	16.8	16.6	16.4	16.3	16.2	16.1	16.1	16.2	16.6	17.7	18.7	19.9	21.3	22.6	23.5	24.3	24.5	24.0	23.4	22.4	21.5	20.7	19.9	19.1	24.5	16.1	19.6	76.1	61.0	67.3
07/18/89	18.5	17.9	17.4	17.1	16.5	16.3	16.2	16.3	16.8	17.4	18.1	19.3	20.8	22.3	23.5	24.6	25.0	24.3	23.7	22.9	22.1	21.4	20.6	19.9	25.0	16.2	20.0	77.0	61.2	67.9
07/19/89	19.2	18.8	18.4	17.9	17.5	17.2	17.1	17.1	17.5	18.3	19.5	20.7	22.0	23.1	23.8	24.9	24.6	24.4	23.7	23.1	22.3	21.5	20.8	20.1	24.9	17.1	20.6	76.8	62.8	69.0
07/20/89	19.4	19.0	18.6	18.1	17.8	17.6	17.4	17.5	18.0	18.7	19.5	20.2	21.4	22.6	23.5	24.0	24.2	23.7	22.7	21.9	21.1	20.2	19.4	18.8	24.2	17.4	20.2	75.6	63.3	68.4
07/21/89	18.0	17.4	16.9	16.5	16.1	15.6	15.3	15.5	16.1	16.8	17.7	18.8	20.2	21.4	22.4	23.0	23.2	22.9	22.3	21.4	20.5	19.5	18.6	17.8	23.2	15.3	18.9	73.8	59.5	66.0
07/22/89	17.1	16.5	15.9	15.4	15.0	14.7	14.4	14.5	15.1	16.1	17.2	18.5	20.0	21.4	22.6	23.4	23.8	23.5	22.9	22.0	21.3	20.5	19.8	19.0	23.8	14.4	18.8	74.8	57.9	65.8
07/23/89	18.3	17.7	17.1	16.7	16.3	15.9	15.8	15.8	16.2	17.3	18.3	19.6	21.0	22.4	23.5	24.3	24.6	24.2	23.5	22.8	22.0	21.1	20.5	19.7	24.6	15.8	19.8	76.3	60.1	67.6
07/24/89	19.1	18.4	17.9	17.5	17.1	16.5	16.4	16.4	16.9	17.8	18.6	19.8	21.1	22.4	23.3	24.0	24.2	24.0	23.2	22.3	21.4	20.8	19.7	19.0	24.2	16.4	19.9	75.6	61.5	67.8
07/25/89	18.3	17.5	17.0	16.5	15.9	15.5	15.2	15.3	16.0	17.0	18.3	19.3	20.7	22.1	23.2	23.8	24.0	23.8	23.2	22.3	21.7	21.0	20.3	19.5	24.0	15.2	19.5	75.2	59.4	67.1
07/26/89	18.8	18.0	17.5	17.0	16.5	16.2	15.9	16.1	16.2	16.5	16.6	17.1	17.7	19.0	20.5	21.6	22.3	22.4	22.1	21.4	20.8	20.2	19.6	19.0	22.4	15.9	18.7	72.3	60.6	65.7
07/27/89	18.5	17.9	17.3	16.9	16.5	16.2	15.9	16.1	16.7	17.7	18.6	19.6	20.8	22.0	23.0	23.8	24.0	23.7	23.0	22.0	21.1	20.3	19.6	18.6	24.0	15.9	19.6	75.2	60.6	67.2
07/28/89	17.9	17.3	16.6	16.1	15.7	15.3	14.9	15.0	15.6	16.6	17.8	18.8	20.2	21.7	22.7	23.5	23.5	23.6	23.0	22.0	21.2	20.5	19.8	19.0	23.6	14.9	19.1	74.5	58.8	66.4
07/29/89	18.1	17.5	16.8	16.4	16.0	15.6	15.3	15.5	16.1	17.2	18.5	19.3	20.8	21.9	22.9	23.5	23.7	23.6	23.1	22.3	21.8	20.8	20.2	19.5	23.7	15.3	19.4	74.7	59.5	67.0
07/30/89	18.8	18.3	17.7	17.2	16.8	16.3	16.1	16.2	16.8	17.9	19.0	19.7	21.0	22.2	23.2	23.7	23.9	23.7	23.0	22.3	21.5	20.8	20.1	19.4	23.9	16.1	19.8	75.0	61.0	67.7
07/31/89	18.7	18.0	17.4	16.9	16.4	16.0	15.7	15.9	16.4	17.4	18.5	19.5	20.6	21.7	22.6	23.1	23.2	22.9	22.1	21.3	20.3	19.6	19.1	18.5	23.2	15.7	19.2	73.8	60.3	66.6
08/01/89	18.0	17.3	16.8	16.3	16.0	15.7	15.6	15.9	16.2	16.2	16.2	16.8	17.9	19.3	20.2	21.1	21.4	21.1	20.6	19.8	19.0	18.5	18.1	17.5	21.4	15.6	18.0	70.5	60.1	64.4
08/02/89	17.1	16.8	16.3	16.2	15.9	15.8	15.7	15.6	15.8	16.4	17.1	18.0	19.1	20.1	20.8	21.1	21.1	20.8	20.3	19.7	19.1	18.6	18.1	17.7	21.1	15.6	18.1	70.0	60.1	64.5
08/03/89	17.2	16.7	16.5	16.2	16.0	15.8	15.8	15.8	16.0	16.5	17.0	17.4	17.9	19.0	20.4	21.1	21.4	21.2	20.7	20.0	19.4	18.7	18.1	17.6	21.4	15.8	18.0	70.5	60.4	64.4
08/04/89	17.0	16.5	16.0	15.6	15.2	14.9	14.7	14.8	15.6	16.5	17.7	18.8	20.0	21.3	22.3	23.0	23.2	22.9	22.4	21.6	20.7	19.9	19.4	18.7	23.2	14.7	18.7	73.8	58.5	65.7
08/05/89	18.0	17.5	16.9	16.5	16.0	15.6	15.4	15.6	16.2	17.4	18.5	19.5	20.7	22.1	23.1	23.8	24.1	23.7	23.2	22.5	21.7	21.0	20.2	19.5	24.1	15.4	19.5	75.4	59.7	67.2
08/06/89	18.9	18.2	17.6	17.2	16.5	16.2	16.0	16.3	16.8	17.9	19.2	20.2	21.4	22.7	23.7	24.1	23.9	23.8	23.4	22.8	22.0	21.8	21.0	20.5	24.1	16.0	20.1	75.4	60.8	68.1
08/07/89	19.9	19.3	18.8	18.3	17.9	17.5	17.3	17.3	17.8	18.8	19.3	20.4	21.7	22.8	23.7	24.4	24.4	24.2	23.5	23.1	22.8	22.1	21.5	21.0	24.4	17.3	20.7	75.9	63.1	69.3
08/08/89	20.8	20.2	19.6	19.2	18.8	18.3	18.1	18.1	18.7	19.9	20.8	21.5	22.6	23.7	24.4	24.4	23.7	23.3	22.8	22.3	21.7	21.2	20.9	20.5	24.4	18.1	21.1	75.9	64.6	69.9
08/09/89	20.2	19.8	19.5	19.2	19.0	18.8	18.6	18.6	18.6	18.8	19.9	21.1	22.2	23.2	24.2	24.7	24.7	24.3	23.6	22.8	22.0	21.4	20.8	20.0	24.7	18.6	21.1	76.5	65.5	69.9
08/10/89	19.5	18.8	18.2	17.7	17.3	17.1	16.7	16.8	17.3	18.4	19.5	20.2	21.2	22.1	23.0	23.6	23.8	22.9	22.6	22.0	21.1	20.5	19.9	19.3	23.8	16.7	20.0	74.8	62.1	68.0
08/11/89	18.8	18.3	17.7	17.3	16.8	16.5	16.2	16.5	17.0	18.0	19.1	19.9	21.0	22.1	22.9	23.5	23.7	23.2	22.8	22.0	21.2	20.6	20.0	19.4	23.7	16.2	19.8	74.7	61.2	67.6
08/12/89	18.7	18.2	17.5	17.0	16.5	16.3	16.2	16.2	17.0	18.0	18.6	18.8	19.1	20.2	21.3	22.2	22.5	22.3	21.7	20.9	20.5	19.8	19.3	18.7	22.5	16.2	19.1	72.5	61.2	66.3
08/13/89	18.3	17.7	17.2	16.8	16.4	16.0	15.7	15.9	16.5	17.7	18.7	19.6	20.8	21.8	22.6	23.2	23.4	23.1	22.5	21.6	20.9	20.2	19.5	18.8	23.4	15.7	19.4	74.1	60.3	66.9
08/14/89	18.1	17.5	17.0	16.5	16.1	15.7	15.4	15.6	16.2	17.1	17.7	18.6	19.3	19.8	20.6	21.1	20.8	20.7	20.3	19.7	19.2	18.8	18.5	18.0	21.1	15.4	18.3	70.0	59.7	64.9
08/15/89	17.7	17.2	16.8	16.4	15.9	15.9	15.8	15.8	16.1	17.0	18.3	19.0	19.9	20.5	21.1	21.5	21.5	21.1	20.5	19.6	18.9	18.3	17.7	17.1	21.5	15.8	18.3	70.7	60.4	65.0
08/16/89	16.5	16.1	15.6	15.2	14.8	14.4	14.2	14.4	15.1	16.3	17.5	18.2	19.6	20.5	21.4	21.9	22.1	21.9	21.4	20.5	19.9	19.2	18.6	18.0	22.1	14.2	18.1	71.8	57.6	64.5
08/17/89	17.4	16.8	16.4	15.9	15.5	15.1	14.8	15.0	15.7	16.8	18.0	18.7	20.0	21.1	22.0	22.6	22.7	22.3	21.8	20.8	20.1	19.5	18.8	18.3	22.7	14.8	18.6	72.9	58.6	65.5
08/18/89	17.7	17.1	16.6	16.1	15.6	15.3	15.0	15.3	15.9	16.9	18.2	19.0	20.3	21.2	22.1	22.8	22.8	22.4	21.9	21.1	20.4	19.7	19.1	18.5	22.8	15.0	18.8	73.0	59.0	65.8
08/19/89	18.0	17.4	16.9	16.5	16.0	15.7	15.6	15.7	16.0	16.4	17.1	18.3	19.3	20.2	21.1	21.8	22.1	21.8	21.4	20.8	20.2	19.6	19.3	19.0	22.1	15.6	18.6	71.8	60.1	65.5
08/20/89	18.5	18.0	17.7	17.4	17.2	17.1	16.9	17.0	17.3	17.9	18.6	19.5	20.8	22.0	22.8	23.2	23.2	22.9	22.2	21.4	20.8	20.2	19.6	19.1	23.2	16.9	19.6	73.8	62.4	67.3
08/21/89	18.6	18.1	17.6	17.3	17.1	16.9	16.8	16.8	17.1	17.8	18.2	18.5	19.0	20.1	20.8	21.1	20.9	20.5	20.2	19.9	19.5	19.2	18.9	18.6	21.1	16.8	18.7	70.0	62.2	65.7
08/22/89	18.3	18.0	17.7	17.4	17.2	17.1	17.0	16.7	16.7	17.0	17.3	17.4	18.0	19.0	19.5	19.3	19.3	18.9	18.5	18.3	17.9	17.5	17.1	16.8	19.5	16.7	17.8	67.1	62.1	64.1
08/23/89	16.5	16.2	16.0	15.9	15.7	15.7	15.6	15.6	15.6	15.6	15.5	15.5	15.3	15.5	15.6	15.6	15.7	15.8	15.7	15.6	15.6	15.5	15.4	15.3	16.5	15.3	15.7	61.7	59.5	60.2
08/24/89	15.3	15.2	15.1	15.0	14.9	14.9	14.9	14.9	15.0	15.1	15.2	15.5	15.9	16.4	16.8	16.6	16.6	16.5	16.3	16.2	16.0	15.9	15.7	15.6	16.8	14.9	15.6	62.2	58.8	60.2
08/25/89	15.6	15.5	15.4	15.5	15.3	15.3	15.3	15.3	15.5	15.9	16.5	16.7	17.2	18.2	18.4	19.1	19.1	19.0	18.6	18.1	17.6	17.1	16.7	16.2	19.1	15.3	16.8	66.4	59.5	62.2
08/26/89	15.7	15.3	15.0	14.7	14.4	14.1	14.0	14.2	14.7	15.8	16.9	17.7	19.0	20.1	21.2	21.8	22.0	21.8	21.2	20.4	19.9	19.4	18.8	18.3	22.0	14.0	17.8	71.6	57.2	64.0
08/27/89	17.6	17.1	16.7	16.2	15.9	15.6	15.3	15.3	15.6	16.5	17.7	18.6	19.7	20.8	21.4	21.5	21.6	21.4	20.7	19.9	19.3	18.5	17.9	17.3	21.6	15.3	18.3	70.9	59.5	64.9
08/28/89	16.8	16.3	15.9	15.8	15.2	15.0	14.7	14.8	15.3	16.3	17.4	18.0	19.3	20.5	21.5	22.2	22.3	22.0	21.4	20.7	20.1	19.5	18.7	18.1	22.3	14.7	18.2	72.1	58.5	64.8
08/29/89	17.4	16.9	16.4	15.9	15.6	15.2	15.0	15.2	15.7	16.5	17.7	18.3	19.0	19.8	20.5	20.7	20.7	20.5	20.2	19.7	19.3	18.7	18.0	17.5	20.7	15.0	17.9	69.3	59.0	64.3
08/30/89	17.1	16.6	16.2	15.9	15.7	15.6	15.5	15.4	15.5	15.7	15.9	16.2	16.8	17.5	16.4	19.5	19.8	19.7	19.3	18.6	18.1	17.7	17.1	16.6	19.8	15.4	17.1	67.6	59.7	62.8
08/31/89	16.1	15.6	15.3	14.9	14.5	14.3	14.0	14.1	14.7	15.6	16.5	17.3	18.6	19.6	20.6	21.2	21.5	21.1	20.5	19.9	19.2	18.6	17.7	17.0	21.5	14.0	17.4	70.7	57.2	63.4
09/01/89	16.4	15.9	15.4	15.0	14.7	14.3	14.1	14.0	14.7	15.6	16.5	17.1	17.9	19.0	19.7	19.6	19.5	19.3	18.9	18.6	18.2	17.7	17.1	16.7	19.7	14.0	16.9	67.5	57.2	62.4
09/02/89	16.3	15.9	15.7	15.4	15.3	15.2	15.0	15.0	15.0	15.1	15.6	16.0	16.6	17.3	18.2	18.7	18.8	18.6	17.9	17.4	16.9	16.3	15.8	15.2	18.8	15.0	16.4	65.8	59.0	61.5
09/03/89	14.7	14.3	13.9	13.6	13.1	13.0	12.8	12.7	13.4	14.4	15.3	16.2	17.5	18.8	19.8	20.5	20.8	20.5	19.7	19.2	18.6	18.0	17.4	16.6	20.8	12.7	16.5	69.4	54.9	61.6
09/04/89	16.0	15.4	15.0	14.5	14.1	13.8	13.5	13.5	14.0	15.0	16.2	17.0	18.2	19.4	20.5	21.2	21.2	21.1	20.5	19.7	19.1	18.4	17.7	17.1	21.2	13.5	17.2	70.2	56.3	62.9
09/05/89	16.5	15.9	15.5	15.2	15.0	15.0	14.9	15.0	15.3	16.2	16.8	16.9	18.0	18.5	19.3	19.9	19.9	19.5	18.7	18.1	17.4	16.9	16.3	15.6	19.9	14.9	16.9	67.8	58.8	62.5
09/06/89	15.0	14.4	13.9	13.6	13.1	13.0	12.8	12.8	13.3	14.3	15.3	15.9	17.1	18.1	19.1	19.6	19.7	19.3	18.5	17.9	17.4	16.8	16.3	15.6	19.7	12.8	15.9	67.5	54.7	60.7
09/07/89	15.1	14.5	13.9	13.6	13.2	12.8	12.6	12.6	13.1	14.0	15.0	15.9	17.1	18.3	19.3	19.9	20.0	19.6	19.1	18.5	18.0	17.4	16.9	16.2	20.0	12.6	16.1	68.0	54.7	61.0
09/08/89	15.6	15.2	14.6	14.1	13.8	13.4	13.1	13.2	13.8	14.5	15.5	16.4	17.6	18.6	19.6	20.3	20.4	20.1	19.6	18.8	18.4	17.8	17.3	16.6	20.4	13.1	16.6	68.7	55.6	61.9
09/09/89	16.1	15.4	15.0	14.5	14.1	13.7	13.4	13.4	13.7	14.5	15.3	16.0	17.1	18.1	19.0	19.5	19.6	19.2	18.4	17.7	17.1	16.5	15.9	15.3	19.6	13.4	16.2	67.3	56.1	61.1
09/10/89	14.6	14.0	13.6	13.1	12.6	12.3	12.1	12.1	12.5	13.2	14.1	15.3	16.5	17.7	18.6	19.2	19.3	18.9	18.3	17.7	17.1	16.5	15.9	15.3	19.3	12.1	15.4	66.7	53.8	59.8
09/11/89	14.6	14.1	13.5	13.1	12.7	12.3	12.1	12.2	12.5	13.4	14.1	15.2	16.2	17.3	18.0	18.6	18.6	18.2	17.4	16.8	16.2	15.6	15.0	14.4	18.6	12.1	15.1	65.5	53.8	59.2
09/12/89	13.8	13.3	12.7	12.2	11.8	11.5	11.1	11.2	11.6	12.6	13.3	14.6	15.8	17.0	18.0	18.8	19.0	18.5	18.1	17.3	16.8	16.1	15.6	15.0	19.0	11.1	14.8	66.2	52.0	58.7
09/13/89	14.5	13.8	13.4	13.0	12.6	12.2	12.1	12.0	12.3	13.2	14.0	15.3	16.8	17.8	19.0	19.5	19.9	19.6	18.9	18.3	17.7	17.1	16.5	15.8	19.9	12.0	15.6	67.8	53.6	60.1
09/14/89	15.1	14.6	14.0	13.5	13.1	12.8	12.5	12.5	13.0	13.9	14.7	16.0	17.4	18.6	19.6	20.2	20.5	20.3	19.6	18.9	18.2	17.6	16.9	16.3	20.5	12.5	16.2	68.9	54.5	61.2
09/15/89	15.6	15.0	14.4	13.8	13.5	13.2	12.8	12.8	13.2	14.0	14.9	16.2	17.4	18.5	19.3	19.8	20.2	19.8	19.3	18.6	18.0	17.4	16.6	16.3	20.2	12.8	16.3	68.4	55.0	61.3
09/16/89	15.6	15.1	14.6	14.1	13.6	13.4	13.1	13.1	13.1	13.8	14.7	15.7	16.5	17.8	18.0	18.2	18.0	17.7	17.4	17.1	16.9	16.6	16.2	15.9	18.2	13.1	15.7	64.8	55.6	60.2
09/17/89	15.6	15.3	14.9	14.6	14.3	14.1	13.9	13.9	13.9	14.1	14.4	14.8	15.1	15.2	15.3	15.3	15.3	15.0	14.9	14.6	14.4	14.3	14.1	14.0	15.6	13.9	14.6	60.1	57.0	58.3
09/18/89	13.9	13.6	13.7	13.6	13.5	13.3	13.1	13.1	13.4	13.8	14.6	15.2	16.1	17.1	18.0	18.5	18.6	18.1	17.4	16.8	16.2	15.6	15.0	14.4	18.6	13.1	15.3	65.5	55.6	59.5
09/19/89	13.9	13.4	13.0	12.6	12.3	12.0	11.6	11.7	12.1	12.7	13.4	14.5	15.7	16.8	17.7	18.3	18.4	18.1	17.4	16.8	16.2	15.6	15.1	14.5	18.4	11.6	14.7	65.1	52.9	58.5
09/20/89	13.9	13.4	13.0	12.6	12.1	11.8	11.6	11.6	11.9	12.5	13.4	14.5	15.6	16.7	17.7	18.2	18.3	18.0	17.3	16.8	16.4	15.9	15.3	14.6	18.3	11.6	14.7	64.9	52.9	58.5
09/21/89	14.2	13.6	13.2	12.8	12.4	12.1	11.8	11.8	12.1	12.8	13.6	14.7	15.9	17.0	18.0	18.6	18.7	18.4	17.9	17.4	17.0	16.5	15.9	15.4	18.7	11.8	15.1	65.7	53.2	59.1
09/22/89	14.7	14.1	13.7	13.3	13.0	12.6	12.3	12.3	12.8	13.3	14.2	15.4	16.7	17.8	18.8	19.4	19.6	19.3	18.8	18.3	17.7	17.1	16.5	15.9	19.6	12.3	15.7	67.3	54.1	60.3
09/23/89	15.2	14.7	14.2	13.8	13.5	13.2	12.9	12.8	13.2	13.7	14.7	15.8	17.0	18.2	19.1	19.7	19.9	19.6	19.0	18.6	18.0	17.4	16.8	16.2	19.9	12.8	16.1	67.8	55.0	61.0
09/24/89	15.7	15.2	14.7	14.3	14.0	13.6	13.4	13.4	13.6	14.2	15.3	16.3	17.4	18.7	19.5	20.0	20.2	19.9	19.4	18.8	18.2	17.6	17.0	16.3	20.2	13.4	16.5	68.4	56.1	61.8
09/25/89	15.8	15.3	14.8	14.6	14.3	14.1	13.9	13.9	14.1	14.5	15.4	16.2	16.9	17.7	18.3	18.7	18.8	18.7	18.2	18.0	17.7	17.3	16.8	16.5	18.8	13.9	16.3	65.8	57.0	61.3
09/26/89	16.0	15.5	15.0	14.7	14.3	13.9	13.5	13.4	13.5	14.1	14.8	15.6	16.2	16.9	17.1	17.3	17.4	17.2	17.0	16.5	16.1	15.7	15.3	14.8	17.4	13.4	15.5	63.3	56.1	59.9
09/27/89	14.4	13.9	13.6	13.4	13.0	12.8	12.5	12.3	12.6	13.1	13.9	15.0	16.1	17.1	18.0	18.4	18.5	18.0	17.6	17.2	16.8	16.5	15.9	15.4	18.5	12.3	15.3	65.3	54.1	59.5
09/28/89	15.0	14.5	14.1	13.9	13.8	13.3	13.1	13.1	13.4	13.7	14.7	15.6	16.8	17.7	18.4	18.9	19.0	18.7	18.2	17.8	17.4	16.9	16.5	15.9	19.0	13.1	15.9	66.2	55.6	60.5
09/29/89	15.4	15.0	14.6	14.2	14.0	13.6	13.4	13.4	13.7	14.3	15.3	16.2	17.4	18.3	19.1	19.5	19.3	18.8	18.4	18.0	17.8	17.6	17.3	16.8	19.5	13.4	16.3	67.1	56.1	61.4
09/30/89	16.5	16.2	15.8	15.6	15.3	15.2	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	14.9	14.8	14.7	14.7	14.6	14.4	14.3	16.5	14.3	15.1	61.7	57.7	59.2

YOU ARE IN TL901368.003.
1 hours / sample
max. = 28.1 degrees C.
min. = -32.2 degrees C.
06/04/90 14:33:00 SN901368 #003

1.0
1.0
28.1
-32.2
6.0 4.0 90.0 14.0 33.0 0.0 ******** 3.0

DIRTO c:\habitat\rm2\
For auto permanent entries
DIRFROM + DIRTO (---> change)

SQUAW CREEK RM 2.0 KEN HALL 2.0

06/04/90 6.0 4.0 90.0

MILITARY TIME

DATE	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000.0	1100.0	1200.0	1300.0	1400.0	1500.0	1600.0	1700.0	1800.0	1900.0	2000.0	2100.0	2200.0	2300.0	2400.0	MAX	MIN	AVE	MAX	MIN	AVE
06/04/90																	14.7	14.5	13.6	12.8	12.3	11.8	11.3	10.8	???	???	???			
06/05/90	10.5	10.3	10.1	9.9	9.8	9.5	9.3	9.5	8.9	10.6	11.2	12.4	13.4	14.2	14.7	15.3	15.6	14.9	14.4	14.1	13.6	13.1	12.8	12.3	15.6	9.3	12.1	60.1	48.7	53.8
06/06/90	12.1	11.6	11.3	11.2	10.8	10.7	10.8	11.0	11.3	11.4	11.9	12.3	12.6	12.8	12.8	12.8	12.8	12.6	12.4	12.4	12.2	12.0	11.8	11.6	12.8	10.7	11.9	55.0	51.3	53.4
06/07/90	11.4	11.2	11.1	11.1	10.8	10.6	10.6	10.7	10.9	11.3	12.0	12.8	13.5	15.0	16.1	15.8	16.2	15.6	14.9	14.1	13.6	13.0	12.5	12.1	16.2	10.6	12.8	61.2	51.1	55.0
06/08/90	11.6	11.2	11.1	11.0	10.8	10.8	10.7	11.0	11.2	11.3	12.1	12.4	12.8	13.7	14.7	15.0	15.0	14.8	14.5	14.2	13.7	13.3	13.1	12.6	15.0	10.7	12.6	59.0	51.3	54.7
06/09/90	12.2	12.0	11.6	11.6	11.4	11.3	11.3	11.5	11.9	12.7	13.6	14.9	16.0	17.1	17.9	18.2	18.2	17.9	17.2	16.6	16.0	15.4	14.8	14.4	18.2	11.3	14.4	64.8	52.3	57.9
06/10/90	13.9	13.6	13.3	12.8	12.7	12.5	12.2	12.0	11.7	11.6	11.8	13.1	14.2	14.9	15.0	14.8	15.0	14.7	13.9.	13.2	12.6	12.2	11.8	11.5	15.0	11.5	13.1	59.0	52.7	55.6
06/11/90	11.3	11.0	10.8	10.6	10.6	10.5	10.5	10.6	10.8	11.1	11.6	12.5	12.8	12.8	13.0	13.6	14.4	14.3	13.7	13.2	12.7	12.4	12.0	11.6	14.4	10.5	12.0	57.9	50.9	53.6
06/12/90	11.4	11.2	11.1	10.9	10.8	10.6	10.7	10.7	10.8	10.9	11.0	11.3	12.1	12.9	14.4	14.7	13.7	13.8	13.4	12.7	12.3	12.1	11.8	11.5	14.7	10.6	11.9	58.5	51.1	53.5
06/13/90	11.3	11.2	11.0	10.9	10.8	10.8	10.8	10.9	11.1	11.5	12.5	13.3	15.1	16.1	16.5	16.9	16.8	16.1	15.2	14.2	13.6	13.1	12.8	12.3	16.9	10.8	13.1	62.4	51.4	55.6
06/14/90	11.8	11.4	11.0	10.6	10.5	10.3	10.1	10.2	10.6	11.4	12.5	13.9	15.0	16.2	16.9	17.5	17.6	17.2	16.2	15.4	14.7	13.9	13.6	13.1	17.6	10.1	13.4	63.7	50.2	56.1
06/15/90	12.7	12.3	11.9	11.6	11.3	11.1	10.9	11.0	11.4	12.4	13.5	14.1	15.0	15.9	16.5	17.6	18.0	17.5	16.7	15.7	15.0	14.5	14.0	13.6	18.0	10.9	13.9	64.4	51.6	57.1
06/16/90	13.2	12.9	12.7	12.5	12.3	12.2	12.0	12.1	12.5	13.3	14.4	15.7	17.1	17.7	18.2	18.7	18.6	18.0	17.2	16.2	15.4	14.9	14.4	13.9	18.7	12.0	14.8	65.7	53.6	58.7
06/17/90	13.5	13.1	12.8	12.6	12.3	12.2	12.1	12.2	12.3	12.2	12.2	12.5	12.9	14.7	16.6	17.2	17.8	17.5	16.8	15.6	14.8	14.4	13.9	13.6	17.8	12.1	14.0	64.0	53.8	57.2
06/18/90	13.3	12.9	12.6	12.4	12.1	11.9	11.8	11.8	12.4	13.4	14.5	16.0	17.6	18.7	20.0	20.4	20.2	19.2	18.0	16.9	16.1	15.6	15.2	14.9	20.4	11.8	15.3	68.7	53.2	59.6
06/19/90	14.6	14.4	14.1	13.9	13.6	13.4	13.4	13.6	13.9	14.7	15.8	17.0	18.6	20.1	20.7	21.2	20.9	20.0	18.9	17.6	16.6	16.1	15.6	15.3	21.2	13.4	16.4	70.2	56.1	61.6
06/20/90	15.1	14.7	14.4	14.0	13.9	13.6	13.4	13.4	13.9	14.8	16.1	17.4	18.9	20.5	21.6	22.0	21.5	20.7	19.4	18.0	17.2	16.5	15.9	15.5	22.0	13.4	16.8	71.6	56.1	62.2
06/21/90	15.0	14.7	14.4	14.1	13.7	13.6	13.4	13.4	14.0	15.1	16.4	18.0	19.5	21.1	22.3	22.7	22.3	21.5	20.2	19.1	18.2	17.4	17.0	16.6	22.7	13.4	17.2	72.9	56.1	63.0
06/22/90	16.3	15.9	15.6	15.4	15.1	15.0	14.8	15.0	15.5	16.2	17.0	17.6	18.4	18.7	19.1	18.6	19.1	18.6	18.7	17.9	17.4	17.0	16.6	16.2	19.1	14.8	16.9	66.4	58.6	62.4
06/23/90	15.8	15.5	15.2	15.0	14.7	14.5	14.4	14.5	15.0	15.9	17.1	18.5	20.2	21.7	22.7	23.2	23.0	22.1	20.7	19.3	18.4	17.6	17.0	16.6	23.2	14.4	17.9	73.8	57.9	64.1
06/24/90	16.2	16.0	15.6	15.3	15.1	14.8	14.7	14.8	15.3	16.2	17.4	18.7	20.3	21.8	23.0	23.3	23.0	21.9	20.9	19.6	18.6	17.8	17.2	16.6	23.3	14.7	18.1	73.9	56.5	64.6
06/25/90	16.1	15.7	15.3	15.0	14.7	14.4	14.3	14.3	14.9	15.9	17.1	18.5	20.2	21.8	23.2	23.6	23.3	22.3	20.7	19.3	18.3	17.8	17.0	16.4	23.6	14.3	17.9	74.5	57.7	64.2
06/26/90	16.0	15.6	15.3	15.0	14.7	14.4	14.2	14.2	14.8	15.8	16.9	18.2	19.8	21.8	22.9	23.5	23.6	21.3	19.9	18.5	17.8	17.1	16.7	16.2	23.6	14.2	17.7	74.5	57.6	63.8
06/27/90	15.7	15.3	14.9	14.6	14.3	14.1	13.9	13.9	14.4	15.6	16.8	18.3	19.9	21.0	21.0	21.1	20.7	20.1	19.0	18.4	17.7	17.1	16.8	16.4	21.1	13.9	17.1	70.0	57.0	62.8
06/28/90	16.1	15.7	15.5	15.2	14.9	14.7	14.5	14.7	15.2	16.2	17.4	19.0	20.4	22.3	23.8	24.2	24.0	22.7	21.0	19.0	18.1	17.3	16.8	16.2	24.2	14.5	18.1	75.6	58.1	64.6
06/29/90	15.8	15.4	15.1	14.9	14.7	14.4	14.3	14.4	15.0	16.2	17.4	19.1	20.8	23.1	24.6	25.0	24.6	23.6	21.8	19.7	18.7	18.0	17.4	16.9	25.0	14.3	18.4	77.0	57.7	65.1
06/30/90	16.5	16.2	15.9	15.6	15.3	15.0	14.9	15.0	15.6	16.6	18.0	19.4	21.1	22.5	21.6	20.8	21.6	22.1	20.6	19.3	18.5	17.9	17.4	16.8	22.5	14.9	18.1	72.5	58.8	64.6
07/01/90	16.4	15.9	15.5	15.1	14.8	14.5	14.4	14.4	15.0	16.2	17.5	19.0	20.5	22.6	23.9	24.6	24.2	23.0	21.3	19.3	18.3	17.5	16.8	16.3	24.6	14.4	18.2	76.3	57.9	64.8
07/02/90	15.8	15.5	15.3	15.0	14.9	14.7	14.7	15.0	15.4	16.0	16.8	16.8	16.9	16.5	16.1	15.7	16.2	16.2	16.3	15.8	15.6	15.3	14.8	14.8	16.9	14.8	15.7	62.4	58.3	60.2
07/03/90	14.2	13.9	13.6	13.3	13.1	12.8	12.7	12.8	13.4	14.7	16.1	17.6	19.1	21.2	22.4	22.2	21.4	19.7	19.6	17.8	17.0	16.2	15.7	15.3	22.4	12.7	16.5	72.3	54.9	61.7
07/04/90	15.0	14.5	14.2	14.0	13.7	13.6	13.7	14.2	15.0	16.1	16.7	17.8	19.0	19.7	21.7	22.7	21.3	20.2	19.4	18.6	17.8	17.1	16.4	15.9	22.7	13.6	17.0	72.9	56.5	62.6
07/05/90	15.6	15.1	14.8	14.7	14.5	14.4	14.5	15.0	15.6	16.2	17.4	18.2	18.9	19.1	20.2	21.4	22.0	21.7	20.3	18.5	17.2	16.6	16.2	16.0	22.0	14.4	17.3	71.6	57.9	63.1
07/06/90	15.6	15.6	15.4	15.3	15.3	15.3	15.3	15.5	15.6	15.8	16.8	16.9	17.4	19.7	20.8	20.8	20.9	20.5	19.6	17.4	16.6	15.8	15.3	14.8	20.9	14.8	17.0	69.6	58.6	62.6
07/07/90	14.5	14.3	14.2	13.9	13.6	13.4	13.3	13.3	13.9	15.3	16.8	18.3	19.9	22.3	23.7	24.4	24.1	22.9	21.0	18.6	17.5	16.8	16.1	15.8	24.4	13.3	17.4	75.9	55.9	63.3
07/08/90	15.1	14.9	14.5	14.3	14.0	13.9	13.8	13.8	14.4	15.9	17.4	19.1	20.7	23.2	24.5	25.4	25.3	24.2	22.3	19.5	18.3	17.4	16.8	16.2	25.4	13.8	18.1	77.7	56.8	64.6
07/09/90	15.7	15.4	15.0	14.8	14.5	14.4	14.4	14.4	15.0	16.6	18.1	19.6	21.4	24.0	25.3	26.2	25.9	25.0	23.4	20.4	18.8	17.8	17.1	16.6	26.2	14.4	18.7	79.2	57.9	65.7
07/10/90	16.1	15.9	15.6	15.5	15.0	14.8	14.8	14.9	15.4	16.7	18.5	20.4	22.3	24.9	26.5	27.1	27.2	25.9	23.9	20.9	19.3	18.2	17.4	16.9	27.2	14.8	19.3	81.0	58.8	66.8
07/11/90	16.5	16.2	16.0	15.6	15.5	15.3	15.3	15.5	15.9	17.6	19.5	21.1	23.4	26.0	27.3	27.6	24.9	22.9	22.0	20.8	19.8	19.1	18.2	17.8	27.5	15.3	19.6	81.7	59.5	67.2
07/12/90	17.5	17.4	17.3	17.2	17.0	16.8	16.4	16.5	17.1	18.5	19.9	21.5	23.8	26.6	25.8	26.8	24.9	24.4	23.5	21.9	20.8	19.9	19.0	18.2	26.8	16.4	20.4	80.2	61.5	68.7
07/13/90	17.7	17.3	17.0	16.8	16.5	16.2	16.3	16.4	16.8	19.0	19.6	21.4	23.4	26.0	27.4	27.0	27.1	26.2	24.6	21.7	19.9	18.5	17.5	16.6	27.4	16.2	20.2	81.3	61.2	68.4
07/14/90	16.0	15.5	15.2	15.0	14.8	14.7	14.5	14.7	15.3	16.8	18.6	20.7	22.9	25.8	26.8	26.8	26.9	25.8	24.1	21.4	20.1	19.1	18.1	17.2	26.9	14.5	19.5	80.4	58.1	67.0
07/15/90	16.7	16.1	15.6	15.3	15.0	15.0	15.0	15.2	15.6	17.0	19.0	21.0	23.5	25.7	26.7	26.9	27.1	26.2	24.6	21.7	20.2	19.1	18.3	17.6	27.1	15.0	19.8	80.8	59.0	67.6
07/16/90	16.9	16.4	15.9	15.6	15.3	15.2	15.2	15.3	15.8	17.1	18.9	20.8	22.8	24.5	26.3	26.3	26.5	25.7	24.1	21.4	19.6	18.8	17.8	17.2	26.5	15.2	19.6	79.7	59.4	67.2
07/17/90	16.5	15.8	15.3	14.9	14.6	14.4	14.4	14.4	14.9	16.3	18.3	20.3	22.3	24.5	25.6	26.5	26.2	25.3	24.0	21.3	19.6	18.6	17.9	17.2	26.5	14.4	19.2	79.7	57.9	66.5
07/18/90	16.6	16.2	15.4	14.9	14.6	14.4	14.1	14.4	14.9	16.5	18.4	20.4	22.2	24.2	26.0	25.4	24.6	24.4	23.2	21.1	19.6	18.7	17.8	17.1	26.0	14.1	19.0	78.8	57.4	66.1
07/19/90	16.5	16.0	15.4	14.8	14.5	14.0	14.1	14.2	14.6	16.1	18.6	20.2	21.4	24.0	24.2	23.8	23.1	22.0	21.1	20.3	19.5	18.6	17.9	17.3	24.2	14.0	18.4	75.6	57.2	65.2
07/20/90	16.8	16.4	15.9	15.4	15.2	14.8	14.7	14.4	14.7	16.0	17.7	19.4	21.6	23.7	23.7	26.2	26.3	25.8	24.5	22.0	20.5	19.3	18.2	17.5	26.3	14.4	19.3	79.3	57.9	66.7
07/21/90	16.9	16.5	16.1	15.8	15.3	14.9	14.8	14.8	15.1	16.1	18.2	20.3	21.9	23.9	26.3	27.3	27.2	26.8	25.0	22.3	20.7	19.4	18.3	17.5	27.3	14.8	19.8	81.1	58.6	67.4
07/22/90	17.0	16.6	16.2	15.9	15.6	15.3	15.3	15.4	15.7	16.5	18.2	20.0	21.8	24.2	26.8	27.3	27.2	26.9	25.4	23.2	21.4	20.3	19.3	18.5	27.3	15.3	20.0	81.1	59.5	68.0
07/23/90	18.1	17.8	17.6	17.4	17.3	17.1	16.8	16.6	16.5	17.0	17.7	19.3	20.3	21.9	23.9	25.4	25.7	24.8	23.1	21.2	19.8	19.0	18.0	17.4	25.7	16.5	19.8	78.3	61.7	67.2
07/24/90	17.2	16.9	16.7	16.4	16.0	15.8	15.6	15.6	15.9	16.6	17.4	18.2	19.0	21.2	22.8	24.1	24.0	23.4	21.5	20.3	19.4	18.6	18.2	17.6	24.1	15.6	18.7	75.4	60.1	65.6
07/25/90	17.3	17.1	16.8	16.5	16.2	16.2	16.1	16.1	16.2	17.0	17.6	18.0	18.3	19.1	20.2	20.8	22.0	21.2	20.2	19.0	18.0	17.5	17.1	16.8	22.0	16.1	18.0	71.6	61.0	64.3
07/26/90	16.5	16.3	16.2	16.1	16.0	16.0	16.0	16.0	16.4	17.0	17.6	18.6	19.9	22.1	24.2	25.0	25.0	24.6	23.0	21.0	19.7	18.6	18.0	17.4	25.0	16.0	19.1	77.0	60.8	66.3
07/27/90	16.9	16.6	16.1	15.8	15.4	15.0	14.8	14.9	15.0	15.7	17.1	18.8	20.3	22.6	25.3	25.9	25.9	25.5	23.9	21.4	19.9	18.8	17.8	17.1	25.9	14.8	19.0	78.6	58.6	66.2
07/28/90	16.6	16.0	15.5	15.1	14.7	14.4	14.4	14.4	14.8	15.6	16.8	18.6	20.8	23.2	25.7	26.8	26.5	26.1	24.2	22.0	20.6	19.5	18.5	17.9	26.8	14.4	19.1	76.9	57.9	66.4
07/29/90	17.4	16.9	16.6	16.2	15.8	15.6	15.3	15.3	15.6	16.2	17.4	19.3	21.4	24.2	26.2	27.3	27.1	26.6	24.8	22.4	21.1	20.0	19.2	18.4	27.3	15.3	19.8	81.1	59.5	67.7
07/30/90	17.9	17.4	17.1	16.7	16.4	16.1	15.9	15.8	16.1	16.7	17.8	19.7	20.7	23.1	25.4	24.7	23.0	21.8	20.8	20.0	19.4	19.0	18.5	18.2	25.4	15.8	19.1	77.7	60.4	66.4
07/31/90	18.0	17.6	17.4	17.1	16.8	16.5	16.2	16.1	16.2	16.6	18.0	19.7	21.3	23.3	25.8	26.9	26.9	26.0	24.0	22.1	20.6	19.6	18.6	17.8	26.9	16.1	20.0	80.4	61.0	67.9
08/01/90	17.4	16.9	16.4	16.0	15.7	15.3	15.0	15.0	15.3	16.0	17.0	18.5	20.5	23.2	25.9	26.5	26.5	25.7	23.8	21.5	20.1	19.1	18.3	17.6	26.5	15.0	19.3	79.7	59.0	66.7
08/02/90	17.1	16.4	15.9	15.3	14.8	14.4	14.0	14.1	14.5	15.2	16.0	17.5	19.7	22.2	24.9	26.3	26.3	25.6	23.8	21.5	19.8	18.5	17.5	16.8	26.3	14.0	18.7	79.3	57.2	65.6
08/03/90	16.2	15.7	15.3	14.8	14.4	14.2	14.0	14.3	14.7	15.4	16.5	18.3	20.4	22.9	25.7	26.8	26.9	26.5	24.3	21.9	20.5	19.3	18.3	17.4	26.9	14.0	18.9	80.4	57.2	66.1
08/04/90	16.9	16.4	16.0	15.6	15.0	14.7	14.4	14.5	15.0	15.7	16.8	18.7	21.2	23.8	26.5	27.5	27.6	26.4	24.6	22.4	20.8	19.5	18.5	17.8	27.6	14.4	19.4	81.7	57.9	67.0
08/05/90	17.2	16.8	16.2	15.9	15.5	15.0	14.8	14.9	15.4	16.1	17.3	19.3	21.7	24.2	27.0	27.8	28.1	27.4	25.5	23.4	21.7	20.4	19.3	18.4	28.1	14.8	20.0	82.6	58.6	67.9
08/06/90	17.7	17.2	16.8	16.4	16.0	15.6	15.3	15.2	15.4	16.2	17.2	18.7	20.8	23.4	26.2	27.5	27.5	26.9	25.0	22.8	21.1	19.8	18.7	18.0	27.5	15.2	19.8	81.5	59.4	67.7
08/07/90	17.3	16.8	16.3	15.9	15.4	15.0	14.8	14.5	14.8	15.6	16.8	18.5	20.7	23.7	26.7	27.7	27.8	27.2	24.6	22.8	21.4	20.1	19.0	18.1	27.8	14.5	19.6	82.0	58.1	67.3
08/08/90	17.5	17.0	16.6	16.2	15.8	15.3	15.1	15.0	15.4	16.4	17.4	19.0	21.1	24.1	26.5	26.0	24.3	23.2	22.3	21.2	20.4	19.6	18.9	18.2	26.5	15.0	19.3	79.7	59.0	66.7
08/09/90	17.8	17.4	17.0	16.8	16.7	16.4	16.1	16.2	16.8	17.7	18.7	19.6	20.4	22.1	24.6	26.2	26.5	26.0	24.0	22.3	21.0	20.0	19.4	19.0	26.5	16.1	19.9	79.7	61.0	67.9
08/10/90	18.5	18.2	18.0	17.9	17.7	17.5	17.4	17.4	17.6	18.0	18.5	19.6	20.2	22.5	24.3	24.6	24.8	24.0	23.2	21.5	20.5	19.7	19.1	18.4	24.8	17.4	20.0	76.6	63.3	67.9
08/11/90	17.9	17.5	17.1	16.8	16.3	16.1	15.7	15.8	15.9	16.7	17.8	19.6	21.5	24.3	26.5	27.4	27.3	26.7	24.7	22.7	21.3	20.2	19.4	18.6	27.4	15.6	20.2	81.3	60.1	68.3
08/12/90	18.2	17.7	17.4	17.1	16.8	16.4	16.1	15.9	16.1	16.8	18.0	19.7	21.7	24.4	26.5	27.6	27.4	26.5	24.7	22.7	21.4	20.3	19.4	18.6	27.6	15.9	20.3	81.7	60.6	68.6
08/13/90	18.0	17.6	17.1	16.7	16.4	16.1	15.8	15.7	16.1	16.8	18.0	19.4	21.1	23.3	25.8	26.5	26.5	25.8	24.3	22.6	21.2	20.2	19.3	18.4	26.5	15.7	19.9	79.7	60.3	67.9
08/14/90	17.7	17.2	16.7	16.1	15.6	15.2	14.9	14.8	15.1	15.9	16.8	18.2	20.0	22.7	25.6	26.2	26.5	25.8	23.7	22.0	20.6	19.8	19.0	18.4	26.5	14.8	19.3	79.7	58.6	66.8
08/15/90	18.1	18.0	17.7	17.4	17.2	16.8	16.4	16.2	16.4	17.2	17.9	18.5	19.6	21.2	22.0	22.0	22.3	22.8	21.7	20.2	19.2	18.3	17.5	16.9	22.8	16.2	18.8	73.0	61.2	65.9
08/16/90	16.4	15.9	15.5	15.1	14.9	14.7	14.5	14.7	15.3	16.2	17.2	18.2	19.6	21.7	22.8	23.8	23.4	23.2	22.0	20.8	19.8	18.6	18.0	17.2	23.8	14.5	18.3	74.8	58.1	65.0
08/17/90	16.7	16.2	15.7	15.3	14.9	14.7	14.4	14.7	15.0	15.8	17.1	18.0	19.3	19.6	19.6	19.5	19.5	19.3	19.1	18.9	18.4	18.0	17.6	17.3	19.6	14.4	17.3	67.3	57.9	63.1
08/18/90	16.8	16.6	16.4	16.1	15.9	15.5	15.3	15.1	15.3	16.5	17.4	18.1	18.6	19.0	19.7	19.8	19.9	19.6	19.2	18.7	18.1	17.5	16.9	16.4	19.9	15.1	17.4	67.8	59.2	63.4
08/19/90	15.9	15.5	15.3	15.3	15.3	15.6	15.4	15.3	15.7	16.5	17.1	18.3	19.0	19.0	18.9	18.5	17.9	18.0	18.0	17.8	17.4	17.1	16.6	16.2	19.0	15.3	16.9	66.2	59.5	62.4
08/20/90	15.6	15.3	15.0	14.9	15.0	15.0	14.8	14.7	14.9	15.6	17.1	18.0	19.0	19.7	19.9	20.3	20.1	20.1	19.7	19.0	18.1	17.4	17.0	16.7	20.3	14.7	17.2	68.5	58.5	63.0
08/21/90	16.5	16.2	16.0	15.8	15.5	15.6	15.6	15.7	16.1	16.4	16.5	16.9	17.0	17.1	17.1	17.1	17.4	17.3	17.0	16.8	16.6	16.6	16.6	16.6	17.4	15.5	16.5	63.3	59.9	61.7
08/22/90	16.4	16.4	16.4	16.4	16.4	16.3	16.3	16.3	16.4	16.7	17.1	17.7	18.5	20.8	22.4	22.5	22.9	22.0	20.5	19.6	18.6	18.0	17.5	17.3	22.9	16.3	18.3	73.2	61.3	65.0
08/23/90	17.1	17.0	16.8	16.7	16.4	16.1	15.9	15.7	15.7	15.6	16.1	17.1	18.6	20.4	22.7	23.6	23.6	22.7	20.2	18.6	17.6	16.8	16.0	15.5	23.6	15.5	18.0	74.5	59.9	64.4
08/24/90	14.9	14.4	13.9	13.7	13.6	13.3	13.1	13.1	13.3	13.6	15.3	17.0	18.6	20.5	22.3	23.1	23.1	22.0	20.2	19.1	18.0	17.0	16.3	16.0	23.1	13.1	16.9	73.6	55.6	62.4
08/25/90	15.7	15.6	15.4	15.2	14.9	14.6	14.5	14.5	14.8	15.3	15.8	17.0	18.3	20.1	21.9	23.2	23.3	22.3	19.9	18.4	17.4	16.8	16.2	15.8	23.3	14.5	17.4	73.9	58.1	63.3
08/26/90	15.5	15.5	15.3	15.1	14.9	14.5	14.1	14.2	14.6	15.3	16.4	17.4	18.2	19.9	21.9	22.7	22.6	21.5	19.8	18.6	17.8	16.9	16.4	15.9	22.7	14.1	17.3	72.9	57.4	63.1
08/27/90	15.5	15.1	14.7	14.5	14.5	14.5	14.5	14.7	15.2	15.9	16.8	17.6	19.2	20.8	23.3	24.4	24.7	23.5	21.2	19.6	18.5	17.6	17.0	16.4	24.7	14.5	17.9	76.5	58.1	64.2
08/28/90	15.9	15.4	14.9	14.5	14.3	14.0	14.1	14.1	14.1	14.6	16.0	17.5	18.9	21.7	24.0	25.1	25.2	23.8	21.6	20.2	19.2	18.2	17.6	17.1	25.2	14.0	18.0	77.4	57.2	64.4
08/29/90	16.6	16.2	15.7	15.3	15.0	14.7	14.6	14.7	15.3	16.2	17.2	18.4	19.3	20.3	21.6	21.2	20.6	20.5	19.9	19.0	18.1	17.5	16.9	16.5	21.6	14.6	17.6	70.9	58.3	63.6
08/30/90	16.1	15.6	15.4	15.3	15.3	15.3	15.3	15.3	15.5	15.6	16.2	17.0	18.4	20.0	21.7	22.0	21.8	21.2	19.7	18.6	17.6	16.8	16.0	15.6	22.0	15.3	17.4	71.6	59.5	63.3
08/31/90	15.0	14.4	13.9	13.6	13.4	13.2	13.1	12.8	13.1	13.6	14.5	16.0	17.4	20.0	22.2	24.1	23.7	22.7	20.5	19.1	18.0	17.1	16.4	15.8	24.1	12.8	16.8	75.4	55.0	62.3
09/01/90	15.3	14.7	14.3	13.9	13.6	13.4	13.3	13.1	13.3	13.7	14.5	15.6	18.0	20.2	22.5	23.8	23.9	22.9	20.7	19.3	18.0	17.3	16.7	16.0	23.9	13.1	17.0	75.0	55.6	62.6
09/02/90	15.6	15.0	14.5	13.9	13.8	13.6	13.5	13.4	13.6	14.1	14.8	15.9	17.4	19.9	22.6	23.6	23.5	22.5	20.3	19.0	17.8	17.1	16.3	15.7	23.6	13.4	17.0	74.5	56.1	62.8
09/03/90	15.3	14.8	14.3	13.9	13.7	13.5	13.4	13.4	13.4	13.9	14.9	16.3	17.7	20.2	22.1	22.9	23.1	22.2	20.4	19.3	18.4	17.6	17.0	16.5	23.1	13.4	17.0	73.6	56.1	62.6
09/04/90	15.9	15.5	15.0	14.7	14.3	14.0	13.7	13.7	13.9	14.4	15.3	16.6	17.8	20.2	22.3	23.5	23.5	22.4	21.1	20.0	19.2	18.3	17.6	17.1	23.5	13.7	17.5	74.3	56.7	63.5
09/05/90	16.6	16.2	15.7	15.4	15.0	14.7	14.4	14.4	14.5	15.0	15.9	17.1	18.8	21.5	23.3	24.4	24.3	23.3	21.4	20.2	19.2	18.2	17.4	17.0	24.4	14.4	18.1	75.9	57.9	64.5
09/06/90	16.4	15.9	15.6	15.1	14.7	14.4	14.1	14.0	14.2	14.7	15.8	17.2	18.6	20.8	22.9	23.8	23.8	22.9	21.3	20.0	18.9	18.1	17.8	17.4	23.8	14.0	17.8	74.8	57.2	64.1
09/07/90	17.1	16.9	16.7	16.3	16.0	15.8	15.3	15.0	14.9	15.3	16.2	17.6	19.6	21.5	21.2	20.5	19.6	19.5	19.1	18.6	18.0	17.4	17.0	16.6	21.5	14.9	17.6	70.7	58.8	63.6
09/08/90	16.2	15.8	15.5	15.3	15.2	15.0	15.0	15.0	15.0	15.4	16.2	17.5	19.0	20.8	22.6	23.5	23.6	22.6	20.9	19.7	18.7	18.0	17.3	16.8	23.6	15.0	17.9	74.5	59.0	64.3
09/09/90	16.3	15.9	15.4	15.1	14.7	14.4	14.3	14.2	14.4	14.6	15.6	16.9	18.6	20.8	22.9	24.0	23.9	22.7	21.0	19.8	18.6	17.7	16.9	16.2	24.0	14.2	17.7	75.2	57.6	63.9
09/10/90	15.8	15.3	14.9	14.4	13.9	13.7	13.6	13.6	13.7	14.1	15.0	16.8	18.3	21.0	23.0	24.4	24.4	23.2	21.4	20.1	19.0	18.0	17.2	16.6	24.4	13.6	17.6	75.9	56.5	63.6
09/11/90	16.2	15.8	15.4	15.0	14.5	14.2	14.0	13.7	13.9	14.4	15.2	16.6	18.4	20.6	22.6	23.8	23.8	22.6	20.9	19.6	18.4	17.5	16.8	16.3	23.8	13.7	17.5	74.8	56.7	63.5
09/12/90	15.9	15.5	15.0	14.6	14.2	13.9	13.6	13.3	13.5	13.7	14.4	15.5	17.0	19.2	21.3	22.2	22.5	21.3	19.5	18.2	17.2	16.4	15.7	15.2	22.5	13.3	16.6	72.5	55.9	61.9
09/13/90	14.5	13.9	13.4	13.1	12.9	12.7	12.5	12.4	12.5	12.8	13.6	15.3	16.8	18.8	21.3	22.2	22.1	21.1	19.4	18.2	17.3	16.5	15.9	15.3	22.2	12.4	16.0	72.0	54.3	60.8
09/14/90	14.7	14.3	13.7	13.4	13.3	13.0	12.7	12.6	12.8	13.1	13.9	15.3	16.9	18.6	20.5	21.9	22.0	21.1	19.5	18.2	17.3	16.4	15.9	15.3	22.0	12.6	16.1	71.6	54.7	61.0
09/15/90	15.0	14.4	13.9	13.7	13.4	13.4	13.1	13.2	13.4	13.8	14.6	15.6	17.1	18.2	19.7	19.6	19.7	19.4	18.0	17.4	16.8	16.2	15.9	15.3	19.7	13.1	15.9	67.5	55.6	60.6
09/16/90	14.9	14.4	14.1	13.8	13.6	13.6	13.6	13.6	13.9	14.4	15.1	15.8	16.2	16.8	17.8	16.3	19.0	18.6	17.9	17.1	16.3	15.7	15.1	14.6	19.0	13.6	15.6	66.2	56.5	60.1
09/17/90	14.3	13.7	13.6	13.7	13.8	13.6	13.1	12.8	12.6	13.0	13.7	15.1	16.3	17.6	20.0	21.0	21.2	19.8	18.3	17.3	16.4	15.7	15.1	14.5	21.2	12.6	15.7	70.2	54.7	60.2
09/18/90	14.0	13.4	13.2	12.7	12.5	12.2	12.1	12.1	12.2	12.5	13.4	15.2	16.4	17.4	20.3	21.3	21.5	19.9	18.3	17.1	16.2	15.5	14.9	14.4	21.5	12.1	15.4	70.7	53.8	59.7
09/19/90	13.8	13.3	12.8	12.6	12.3	12.1	12.1	11.9	12.0	12.4	13.6	15.4	16.5	17.4	19.6	20.5	20.4	19.4	18.0	17.1	16.2	15.5	14.9	14.4	20.5	11.9	15.2	68.9	53.4	59.3
09/20/90	13.9	13.4	13.0	12.7	12.4	12.1	11.9	11.6	11.6	11.9	12.6	13.9	15.3	16.3	18.6	19.9	20.2	18.9	17.4	16.1	15.2	14.4	13.6	13.2	20.2	11.6	14.6	68.4	52.9	58.3
09/21/90	12.5	12.1	11.7	11.6	11.4	11.3	11.1	10.9	11.1	11.4	12.0	13.4	14.8	16.0	18.5	19.9	20.2	19.1	17.7	16.6	15.8	15.0	14.5	14.0	20.2	10.9	14.3	68.4	51.8	57.7
09/22/90	13.5	13.0	12.6	12.3	12.1	12.0	11.9	11.8	11.7	12.1	12.8	13.9	15.3	16.4	19.0	20.2	20.5	19.4	18.2	17.2	16.3	15.6	15.0	14.4	20.5	11.7	14.9	68.9	53.1	58.8
09/23/90	13.9	13.4	13.1	12.6	12.3	12.1	11.9	11.9	11.8	12.0	12.5	13.9	15.4	16.5	19.1	20.5	20.9	19.8	18.3	17.1	16.2	15.7	15.0	14.7	20.9	11.8	15.0	69.8	53.2	59.0
09/24/90	14.1	13.7	13.4	13.1	12.8	12.6	12.5	12.3	12.3	12.5	13.1	14.4	15.8	16.8	19.3	20.7	20.9	19.8	18.5	17.5	16.8	16.0	15.5	15.1	20.9	12.3	15.4	69.6	54.1	59.7

UMATILLA RIVER BELOW CLARK'S PLACE W/ NEW ISCO PLACEMENTT

7/16/90 BY: KEN HALL NEW LOCATION CAS 7.0 16.0 90.0

DATE	MILITARY TIME 0100	0200	0300	0400	0500	0600	0700	0800	0900	1000.0	1100.0	1200.0	1300.0	1400.0	1500.0	1600.0	1700.0	1800.0	1900.0	2000.0	2100.0	2200.0	2300.0	2400.0	MAX	MIN	MEAN	MAX	MIN	MEAN
07/16/90															22.4	22.9	23.0	22.8	22.2	21.4	20.8	20.2	19.8	19.0	???	???	???			
07/17/90	18.8	18.0	17.4	16.9	16.3	15.9	15.6	15.8	16.2	17.1	18.1	19.0	20.1	21.3	22.2	22.8	23.0	22.7	22.3	21.4	20.9	20.2	19.8	19.0	23.0	15.6	19.2	73.4	60.1	66.5
07/18/90	18.8	18.0	17.5	16.9	16.3	15.8	15.7	15.9	16.3	17.1	18.3	18.9	19.9	21.3	22.0	22.4	22.2	22.3	21.7	21.1	20.5	19.9	19.2	18.8	22.4	15.7	19.0	72.3	60.3	66.3
07/19/90	18.2	17.7	17.1	16.5	16.0	15.6	15.3	15.4	15.9	16.8	18.0	18.7	19.7	21.0	21.1	21.3	21.2	21.0	20.7	20.4	19.9	19.4	18.9	18.8	21.3	15.3	18.5	70.3	59.5	65.3
07/20/90	18.1	17.7	17.1	16.8	16.3	15.8	15.8	15.7	16.2	17.1	18.0	19.0	20.1	21.1	22.0	22.5	22.8	22.8	22.0	21.2	20.7	20.1	19.8	19.0	22.8	15.8	19.0	73.0	60.1	66.3
07/21/90	18.7	18.3	17.7	17.2	16.7	16.2	16.0	16.2	16.7	17.5	18.7	19.5	20.5	21.5	22.4	23.1	23.4	23.2	22.8	21.7	21.1	20.5	19.8	19.3	23.4	16.0	19.5	74.1	60.8	67.1
07/22/90	18.8	18.4	17.9	17.4	17.1	16.5	16.5	16.5	17.1	17.9	18.8	19.9	20.9	22.0	22.9	23.4	23.5	23.3	22.8	22.2	21.5	21.0	20.5	20.1	23.5	16.5	19.9	74.3	61.7	67.8
07/23/90	19.8	19.3	18.9	18.7	18.3	17.9	17.5	17.5	18.0	18.5	19.0	19.2	19.8	20.4	21.1	21.9	22.0	21.3	20.8	20.1	19.7	19.3	19.1	18.7	22.0	17.5	19.4	71.8	63.5	67.0
07/24/90	18.3	18.0	17.7	17.4	16.9	16.5	16.4	16.5	16.8	16.8	17.3	17.7	18.7	19.3	20.4	20.8	20.8	20.3	19.7	19.3	19.0	18.8	18.3	18.0	20.8	16.4	18.3	69.4	61.5	64.9
07/25/90	17.7	17.4	17.1	16.9	16.8	16.4	16.2	16.1	16.2	16.4	16.5	16.8	16.9	17.3	17.8	18.8	18.8	18.5	17.9	17.4	17.1	16.9	16.8	16.8	18.8	16.1	17.1	65.8	61.0	62.8
07/26/90	16.5	16.3	16.2	16.0	15.9	15.7	15.6	15.6	15.9	16.3	16.9	18.0	18.8	19.6	20.5	20.8	21.1	20.9	20.5	19.8	19.3	18.9	18.8	18.3	21.1	15.6	18.0	70.0	60.1	64.4
07/27/90	17.8	17.4	17.1	16.5	16.2	15.9	15.6	15.8	16.3	17.1	18.0	18.8	19.7	20.7	21.4	21.9	22.0	21.7	21.1	20.3	19.8	19.3	18.8	18.5	22.0	15.8	18.7	71.8	60.1	65.8
07/28/90	18.0	17.6	17.1	16.5	16.2	15.7	15.5	15.6	16.2	17.1	18.0	18.9	19.8	20.9	21.7	22.1	22.4	22.2	21.7	21.0	20.4	19.9	19.6	19.1	22.4	15.5	18.9	72.3	59.9	66.0
07/29/90	18.8	18.4	18.1	17.8	17.1	16.8	16.5	16.8	17.1	18.0	18.8	19.8	20.8	21.7	22.4	22.8	23.0	22.8	22.2	21.4	21.0	20.5	20.2	19.9	23.0	16.5	19.7	73.4	61.7	67.4
07/30/90	19.4	19.0	18.7	18.3	17.8	17.4	17.3	17.4	17.9	18.8	19.5	19.3	20.2	21.4	22.0	21.4	20.8	20.5	20.2	19.9	19.8	19.5	19.3	19.0	22.0	17.3	19.4	71.8	63.1	66.8
07/31/90	18.8	18.8	18.3	18.0	17.8	17.2	17.1	17.1	17.5	18.4	19.2	20.1	21.0	21.8	22.5	22.9	22.9	22.8	22.5	21.3	20.7	20.2	19.8	19.3	22.9	17.1	19.8	73.2	62.8	67.8
08/01/90	19.0	18.7	18.4	17.8	17.4	17.0	16.7	16.8	17.2	18.0	18.8	19.8	20.5	21.4	22.0	22.3	22.3	21.8	21.1	20.2	19.8	19.5	19.2	18.8	22.3	16.7	19.4	72.1	62.1	66.8
08/02/90	18.5	18.1	17.7	17.1	16.7	16.2	15.9	16.0	16.5	17.2	18.1	18.9	19.8	20.5	21.1	21.8	21.7	21.4	21.0	20.1	19.5	19.0	18.7	18.2	21.7	15.9	18.7	71.1	60.8	65.7
08/03/90	18.0	17.5	17.1	16.7	16.5	15.9	15.7	15.9	16.3	17.1	18.1	19.0	19.9	20.8	21.7	22.0	22.1	22.0	21.4	20.7	20.1	19.6	19.3	18.9	22.1	15.7	18.8	71.8	60.3	65.9
08/04/90	18.8	18.3	17.8	17.3	16.8	16.5	16.2	16.3	16.8	17.7	18.8	19.8	20.5	21.4	22.2	22.8	22.8	22.5	21.8	21.1	20.5	20.0	19.8	19.2	22.8	16.2	19.4	73.0	61.2	66.9
08/05/90	18.8	18.6	18.1	17.7	17.3	16.8	16.8	16.8	17.4	18.3	19.1	20.2	21.1	22.0	22.8	23.2	23.2	23.1	22.5	21.7	21.1	20.7	20.2	19.8	23.2	16.8	19.8	73.8	61.8	67.8
08/06/90	19.3	19.0	18.7	18.3	17.8	17.4	17.2	17.3	17.8	18.8	19.3	20.2	21.1	22.0	22.6	23.0	23.1	22.8	22.1	21.4	20.8	20.2	19.9	19.4	23.1	17.2	20.0	73.8	63.0	67.9
08/07/90	19.1	18.8	18.4	18.0	17.5	17.0	16.8	16.9	17.4	18.2	19.0	20.1	20.8	21.7	22.5	22.9	22.9	22.5	21.9	21.4	20.9	20.5	20.0	19.8	22.9	16.8	19.8	73.2	62.2	67.6
08/08/90	19.1	18.8	18.5	18.0	17.7	17.1	16.9	16.9	17.4	18.0	18.8	19.9	20.9	21.7	22.4	22.0	21.8	21.2	20.9	20.8	20.3	19.9	19.8	19.3	22.4	16.9	19.5	72.3	62.4	67.1
08/09/90	19.0	18.8	18.5	18.3	18.0	17.7	17.4	17.5	17.8	18.1	18.3	18.7	19.0	20.3	21.3	21.8	21.8	21.8	21.1	20.5	20.1	19.8	19.5	19.3	21.8	17.4	19.3	71.2	63.3	66.8
08/10/90	19.0	18.9	18.8	18.8	18.4	18.1	17.9	17.9	18.1	18.3	18.5	18.9	19.1	20.0	20.8	20.8	20.9	20.8	20.4	19.7	19.3	19.2	18.9	18.8	20.9	17.9	19.2	69.8	64.2	66.5
08/11/90	18.8	18.3	18.0	17.7	17.4	17.1	16.8	17.0	17.5	18.3	19.2	20.2	20.9	21.9	22.8	22.9	23.0	22.7	22.2	21.4	20.8	20.3	20.1	19.7	23.0	16.8	19.8	73.4	62.2	67.8
08/12/90	19.3	19.0	18.8	18.5	18.3	17.8	17.5	17.8	18.0	18.8	19.5	20.5	21.4	22.2	22.8	23.1	23.1	22.8	22.1	21.4	20.9	20.5	20.1	19.8	23.1	17.5	20.2	73.8	63.5	68.3
08/13/90	19.5	19.0	18.7	18.4	18.0	17.7	17.4	17.5	17.9	18.8	19.3	20.2	21.0	21.7	22.2	22.8	22.8	22.5	21.7	21.2	20.7	20.2	19.9	19.5	22.8	17.4	19.9	72.7	63.3	67.8
08/14/90	19.0	18.8	18.6	18.2	17.8	17.4	17.0	17.1	17.4	18.0	18.8	19.5	20.3	21.1	21.7	22.1	22.1	22.0	21.4	20.9	20.2	19.8	19.5	19.3	22.1	17.0	19.5	71.8	62.8	67.1
08/15/90	18.8	18.8	18.7	18.5	18.3	17.8	17.7	17.7	17.8	18.4	18.3	18.9	19.3	19.8	20.0	19.8	20.0	20.1	19.8	19.0	18.7	18.4	18.0	17.7	20.1	17.7	18.8	69.2	64.6	65.8
08/16/90	17.5	17.2	16.9	16.8	16.2	15.9	15.7	15.9	16.0	16.8	17.1	18.0	18.9	19.7	19.8	20.1	20.4	20.0	19.8	19.3	18.8	18.6	18.3	18.0	20.4	15.7	18.0	69.7	60.3	64.3
08/17/90	17.7	17.4	17.1	16.7	16.4	15.9	15.7	15.8	16.2	16.7	17.1	17.7	17.8	17.8	17.8	17.7	17.7	17.7	17.7	17.4	17.2	17.1	16.9	16.8	17.9	15.7	17.0	64.2	60.3	62.6
08/18/90	16.8	16.5	16.3	16.1	15.9	15.5	15.3	15.4	16.1	16.5	17.1	17.2	17.4	17.8	18.2	18.0	18.0	17.7	17.5	17.2	16.9	16.8	16.2	16.2	18.2	15.3	16.8	64.8	59.5	62.2
08/19/90	15.8	15.7	15.6	15.4	15.2	15.1	15.0	15.0	15.3	15.7	16.2	16.5	16.8	16.5	16.6	16.3	16.5	16.5	16.3	16.2	15.9	15.7	15.5	15.5	16.8	15.0	15.9	61.8	59.0	60.6
08/20/90	15.3	15.1	14.9	14.7	14.7	14.5	14.3	14.4	14.8	15.3	15.5	16.1	16.5	16.8	17.3	17.7	17.8	17.4	17.4	17.1	16.8	16.5	16.3	16.2	17.7	14.3	16.0	63.9	57.7	60.7
08/21/90	16.0	15.8	15.6	15.3	15.2	15.0	14.8	14.9	15.0	15.1	15.1	15.2	15.3	15.3	15.3	15.5	15.8	15.8	15.5	15.4	15.3	15.3	15.3	15.3	16.0	14.8	15.3	60.8	59.6	59.8
08/22/90	15.3	15.3	15.2	15.2	15.1	15.0	15.0	15.0	15.0	15.3	15.8	16.3	17.3	18.2	18.6	18.8	18.9	18.8	18.1	17.8	17.4	17.1	17.0	16.8	18.8	15.0	16.6	69.0	59.9	61.8
08/23/90	16.7	16.5	16.4	16.2	15.8	15.8	15.3	15.3	15.8	16.0	16.8	17.7	18.4	19.0	19.5	19.9	19.7	19.3	18.8	17.7	17.4	17.1	16.5	16.2	19.9	15.3	17.2	67.8	59.5	63.0
08/24/90	15.8	15.4	15.0	14.8	14.2	13.8	13.4	13.5	13.8	14.7	15.5	16.5	17.4	18.3	18.7	18.8	18.9	18.8	18.0	17.5	17.1	16.8	16.7	16.5	18.9	13.4	16.2	66.0	58.6	61.2
08/25/90	15.4	15.2	15.0	15.8	15.2	14.7	14.8	14.8	14.8	15.3	15.8	17.0	17.7	18.4	18.8	19.2	19.2	18.8	18.0	17.4	16.9	16.7	16.5	16.3	19.2	14.8	16.7	66.8	58.3	62.0
08/26/90	16.1	15.9	15.8	15.5	14.8	14.4	14.2	14.1	14.4	14.9	15.5	16.0	16.9	17.8	18.5	18.8	18.8	18.4	17.9	17.3	16.9	16.5	16.3	16.0	18.8	14.1	16.3	65.8	57.4	61.3
08/27/90	15.7	15.3	15.0	14.8	14.7	14.4	14.3	14.4	14.7	15.4	16.3	17.1	18.1	18.8	19.5	19.9	19.9	19.5	18.8	18.2	17.7	17.4	17.1	16.8	19.9	14.3	16.8	67.8	57.7	62.3
08/28/90	16.5	16.1	15.8	15.5	15.0	14.7	14.4	14.4	14.8	15.8	16.5	17.7	18.4	19.3	19.9	20.2	20.2	19.7	19.2	18.7	18.3	17.9	17.7	17.4	20.2	14.4	17.3	69.4	57.9	63.1
08/29/90	17.1	16.8	16.5	16.1	15.7	15.5	15.2	15.2	15.5	15.9	16.7	17.1	18.0	18.4	18.8	18.8	18.4	18.2	17.9	17.4	17.1	16.9	16.8	16.3	18.8	15.2	16.9	65.8	59.4	62.5
08/30/90	16.1	15.8	15.6	15.5	15.4	15.3	15.1	15.1	15.5	15.9	16.7	17.3	17.7	18.5	19.0	18.8	18.9	18.6	18.0	17.5	17.1	16.8	16.5	16.1	19.0	15.1	16.8	66.2	59.2	62.2
08/31/90	15.7	15.5	15.0	14.7	14.2	13.9	13.8	13.8	14.0	14.8	15.7	16.8	17.7	18.4	18.9	19.2	19.2	19.0	18.2	17.5	17.1	16.7	16.5	16.2	19.2	13.8	16.3	66.8	58.5	61.4
09/01/90	15.9	15.8	15.3	14.9	14.5	14.1	13.8	13.9	14.1	15.0	15.9	16.8	17.7	18.5	19.0	19.3	19.3	19.0	18.4	17.7	17.2	17.1	16.8	16.5	19.3	13.9	16.5	66.7	57.9	61.7
09/02/90	16.2	15.9	15.8	15.2	14.9	14.5	14.1	14.1	14.4	15.2	16.1	17.0	17.8	18.5	19.0	19.3	19.3	18.9	18.3	17.7	17.1	16.8	16.5	16.2	19.3	14.1	16.8	66.7	57.4	61.8
09/03/90	15.9	15.7	15.3	15.0	14.8	14.2	13.9	13.9	14.4	15.0	15.9	16.8	17.7	18.5	18.9	19.2	19.2	18.8	18.3	17.6	17.4	17.0	16.8	16.5	19.2	13.9	16.5	66.8	57.0	61.7
09/04/90	16.3	16.0	15.8	15.4	15.0	14.7	14.4	14.4	14.7	15.5	16.3	17.2	18.0	18.8	19.2	19.4	19.3	19.1	18.7	18.3	17.8	17.5	17.3	17.1	19.4	14.4	16.9	66.9	57.9	62.5
09/05/90	16.8	16.5	16.2	15.9	15.8	15.3	15.0	15.0	15.3	15.9	17.0	18.0	18.8	19.3	19.8	20.3	20.2	19.8	19.1	18.8	18.1	18.0	17.8	17.3	20.3	15.0	17.5	66.5	59.0	63.5
09/06/90	17.1	16.7	16.5	16.0	15.8	15.3	15.0	15.0	15.3	15.9	17.0	17.8	18.8	19.1	19.7	19.9	20.0	19.7	19.0	18.4	18.0	17.8	17.7	17.5	20.0	15.0	17.4	66.0	59.0	63.4
09/07/90	17.5	17.4	17.1	16.7	16.5	16.1	15.7	15.8	15.9	16.7	17.6	18.6	19.0	19.0	19.4	19.4	19.0	18.8	18.2	17.8	17.8	17.2	17.1	16.8	19.4	15.8	17.3	66.2	60.1	63.1
09/08/90	16.5	16.2	15.9	15.7	15.8	15.3	15.0	15.0	15.3	15.9	16.8	17.7	18.8	19.1	19.5	19.8	19.8	19.5	18.8	18.3	18.0	17.7	17.4	17.1	19.8	15.0	17.3	67.8	59.0	63.1
09/09/90	16.8	16.8	16.3	15.9	15.8	15.3	15.0	15.0	15.2	15.8	16.8	17.7	18.8	19.2	19.7	19.8	19.8	19.4	18.8	18.2	17.7	17.4	17.0	16.8	19.8	15.0	17.3	67.8	59.0	63.1
09/10/90	16.5	16.1	15.8	15.3	15.0	14.8	14.5	14.2	14.8	15.3	16.2	17.4	18.3	19.0	19.5	19.8	20.0	19.8	19.2	18.7	17.7	17.4	17.1	17.0	20.0	14.2	17.0	66.0	57.1	62.8
09/11/90	16.8	16.5	16.1	15.8	15.3	15.0	14.7	14.8	14.9	15.5	16.5	17.4	18.3	18.9	19.3	19.7	19.8	19.3	18.8	17.9	17.4	17.1	16.9	16.8	19.7	14.8	17.0	67.5	58.3	62.7
09/12/90	16.5	16.1	15.8	15.5	15.1	14.7	14.4	14.3	14.5	15.0	15.9	16.7	17.4	18.0	18.5	18.7	18.8	18.6	17.4	16.7	16.2	15.9	15.8	15.5	18.7	14.3	16.3	65.7	57.7	61.3
09/13/90	15.0	14.7	14.5	14.0	13.8	13.3	13.0	12.8	13.2	13.8	14.7	15.8	16.7	17.4	18.0	18.1	18.1	17.7	17.1	16.5	15.9	15.5	15.3	15.2	18.1	12.8	15.4	64.8	55.0	59.7
09/14/90	14.8	14.8	14.1	13.6	13.8	12.8	12.8	13.2	13.8	14.7	15.8	16.5	17.1	17.7	18.0	18.0	17.8	18.9	18.3	15.8	15.5	15.3	15.2	15.2	18.0	12.8	15.3	64.4	56.0	59.5
09/15/90	15.0	14.7	14.5	14.3	14.0	13.8	13.4	13.4	13.6	14.1	15.0	15.8	16.2	16.5	16.5	16.8	16.8	16.5	15.8	15.5	15.3	15.1	15.0	14.9	16.8	13.4	15.1	62.2	58.1	59.2
09/16/90	14.8	14.4	14.1	13.8	13.8	13.6	13.4	13.4	13.5	14.1	14.8	14.8	15.3	15.9	16.2	16.5	16.5	16.1	15.7	15.3	15.0	14.7	14.5	14.3	16.5	13.4	14.8	61.7	58.1	58.8
09/17/90	14.1	13.8	13.9	13.8	13.5	13.1	13.0	12.8	13.1	13.8	14.8	15.4	16.2	16.8	17.4	17.5	17.4	16.8	16.2	15.5	15.1	14.8	14.8	14.4	17.5	12.8	14.9	63.5	55.0	58.8
09/18/90	14.1	13.8	13.8	13.2	13.0	12.8	12.9	12.2	12.5	13.1	14.0	15.0	15.8	16.5	17.0	17.2	17.1	16.7	15.9	15.3	14.9	14.6	14.4	14.1	17.2	12.2	14.5	63.0	54.0	58.2
09/19/90	13.7	13.7	13.4	13.1	12.8	12.4	12.0	12.1	12.3	13.0	13.9	14.8	15.8	16.4	16.7	17.1	16.8	16.5	15.8	15.1	14.7	14.5	14.3	14.0	17.1	12.0	14.4	62.8	53.8	57.8
09/20/90	13.8	13.8	13.2	12.8	12.7	12.3	12.0	11.8	12.1	12.8	13.8	14.3	15.1	15.7	16.2	16.4	16.1	15.8	15.0	14.4	13.9	13.5	13.3	13.1	16.4	11.8	13.9	61.5	53.2	57.0
09/21/90	12.8	12.5	12.2	11.8	11.8	11.3	11.1	10.9	11.2	11.8	12.7	13.7	14.8	15.3	15.9	16.0	15.9	15.5	15.0	14.3	14.1	13.7	13.8	13.4	16.0	10.9	13.4	60.8	51.8	56.1
09/22/90	13.3	13.0	12.7	12.4	12.2	11.9	11.7	11.5	11.8	12.4	13.4	14.4	15.1	15.9	16.5	16.8	16.7	16.2	15.6	15.0	14.8	14.4	14.1	13.9	16.8	11.5	14.0	62.2	52.7	57.2
09/23/90	13.8	13.4	13.2	12.8	12.8	12.2	12.0	11.8	12.1	12.8	13.8	14.8	15.4	16.2	16.7	16.8	16.7	16.2	15.8	15.1	14.7	14.4	14.2	14.1	16.8	11.8	14.2	62.2	53.2	57.5
09/24/90	13.9	13.7	13.4	13.1	12.8	12.8	12.5	12.2	12.4	13.1	13.9	15.0	15.8	16.4	16.8	17.1	17.0	16.5	15.9	15.3	15.0	14.7	14.5	14.4	17.1	12.2	14.5	62.8	54.0	58.1
09/25/90	14.2	14.1	13.8	13.6	13.4	13.1	12.9	12.7	12.9	13.5	14.4	15.3	16.1	16.8	17.1	17.0	16.8	16.4	15.9	15.6	15.3	15.2	15.0	14.9	17.1	12.7	14.8	62.8	54.9	58.7
09/26/90	15.0	14.7	14.4	14.1	13.8	13.5	13.4	13.3	13.4	13.8	14.9	15.8	16.5	17.1	17.1	17.2	17.1	16.2	15.7	15.3	15.0	14.9	14.7	14.7	17.2	13.3	15.0	63.0	55.9	59.1
09/27/90	14.5	14.4	14.1	13.9	13.8	13.4	13.1	13.0	13.1	13.7	14.4	15.3	15.9	16.5	17.0	17.1	17.0	16.8	16.0	15.5	15.0	14.8	14.8	14.4	17.1	13.0	14.9	62.8	55.4	58.8
09/28/90	14.1	13.9	13.7	13.5	13.1	12.8	12.6	12.3	12.5	13.0	13.8	14.7	15.5	16.1	16.5	16.5	16.3	15.8	15.2	14.7	14.3	14.0	13.9	13.8	16.5	12.3	14.3	61.7	54.1	57.7
09/29/90	13.4	13.1	12.8	12.8	12.3	12.0	11.9	11.7	11.7	12.4	13.3	14.1	15.0	15.8	16.1	16.2	16.1	15.8	15.0	14.4	14.1	13.8	13.8	13.4	16.2	11.7	13.8	61.2	53.1	56.8
09/30/90	13.3	13.0	12.8	12.4	12.1	11.8	11.5	11.3	11.5	11.8	12.7	13.6	14.3	14.8	15.3	15.5	15.3	14.8	14.2	13.8	13.2	13.2	12.7	12.5	15.5	11.3	13.2	59.9	52.3	56.8