A GEOMORPHIC ASSESSMENT OF SUBADULT HUMPBACK CHUB HABITAT IN THE COLORADO RIVER THROUGH GRAND CANYON

by

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ABSTRACT

A Geomorphic Assessment of Subadult Humpback Chub Habitat

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I examined subadult humpback chub (*Gila cypha*) densities along 24 kilometers of the Colorado River in Grand Canyon to address three objectives: 1) identify geomorphic differences in the study area at two spatial scales, 2) determine associations between subadult humpback chub habitat use and geomorphic differences and 3) determine how changes in the post-dam flow regime affect the physical habitat condition.

Habitat was categorized at two nested spatial scales: geomorphic reach and shoreline type. Within reaches, shoreline types were categorized according to localized dominance of bedrock, cobble, debris fan, sand, talus and riparian vegetation. I measured water depth, velocity and cover attributes along all shoreline types over a range of discharges to determine if habitat quality of reaches and shoreline types varied with discharge.

The resistent lithology of Reaches 1 and 3 created narrow, deep corridors, and the erodible lithology of Reach 2 created a wide, shallow reach. Among shoreline types, depth, velocity and cover varied; however differences were not consistent between reaches. For example, mean depth along bedrock shorelines in Reach 1 were twice that of other shoreline types, whereas in Reach 2, bedrock shoreline depth was comparable to other shorelines. Cobble shorelines showed a similar pattern for velocity. Cover along debris fan, talus and vegetated shorelines was consistently high. However, cover along bedrock shorelines was high in Reach 1 but low in Reach 2.

Among shoreline types, highest densities of subadult humpback chub were within vegetation, talus and debris fan shorelines but varied between reaches in a pattern similar to that of cover. In addition, subadult humpback chub presence was associated with a high frequency of cover regardless of shoreline designation. Although statistically significant, relationships between densities of subadult humpback chub and geomorphology explained little of the overall variation in subadult densities.

Lack of a strong association between fish density and geomorphology may be partially due to a relationship between discharge and habitat quality. The overall trend along all shorelines (without regard to type) showed that cover decreased with increasing discharge, whereas depth and velocity. However, no consistent pattern was evident when depth, velocity and cover of individual shoreline types were examined.

Vegetated shorelines, which consisted mainly of tamarisk (*Tamarix chinensis*), had nearly twice the fish densities of talus and debris fan. Subadult humpback chub may

occupy naturalized habitat like vegetated shorelines for three reasons: 1) flow regulation has modified natural habitat conditions such that they are unsuitable under the current flow regime; 2) original pre-dam habitats, such as backwaters, are not formed or maintained under the current flow regime; and 3) vegetation provides better habitat than what naturally occurred in the Colorado River through Grand Canyon. In this manuscript, I discuss the implications of these possibilities to humpback chub recovery and management of the Colorado River through Grand Canyon.

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INTRODUCTION

In 1967, the U.S. Fish and Wildlife Service (USFWS) listed the humpback chub (*Gila cypha*) and the Colorado squawfish (*Ptychocheilus lucius*) as endangered species following a decline in numbers in the oversubscribed Colorado River (Minckley, 1992). Since then, the USFWS has listed two other Colorado River fishes, the bonytail (*Gila elegans*) and the razorback sucker (*Xyrauchen texanus*). The Endangered Species Act of 1973, as amended, required the USFWS to promote sustainable populations and to protect critical habitat (Rohlf 1989), thereby prompting a number of studies in the Colorado River system designed to describe the ecology and determine the status of humpback chub (Vanicek et al. 1970; Holden and Stalnaker 1975; Carothers and Minckley 1981; Valdez and Clemmer 1982; Kaeding and Zimmerman 1983; Berry and Pimentel 1985; Miller and Hubert 1990; Minckley 1992; Valdez et al. 1992). Despite twenty-five years of investigation, much remains to be learned about this fish.

Humpback chub are difficult to study because of their rarity and residence in swift, turbid and inaccessible riverine environments. Of over 70 studies of the humpback chub, only 21 have been published in peer-reviewed journals (Appendix 1). The remainder are federal, state or private agency documents, many of which are progress or final reports for the USFWS recovery program. Several studies have addressed the life history and ecology of humpback chub (Kaeding and Zimmerman 1983; Valdez and Clemmer 1982; Valdez et al. 1992); however, few have investigated early life-history stages in their natural environment (Gorman et al. 1994; Valdez and Ryel 1995). Without a better understanding of juvenile humpback chub habitat needs, the USFWS cannot make

appropriate recommendations towards the recovery and sustainability of humpback chub populations.

Another component of recovery of the Grand Canyon humpback chub population relates to flow regulation. Decisions about operations of Glen Canyon Dam are being made with consideration of humpback chub and other endangered fish populations in Grand Canyon. Dam operations directly affect the Colorado River in Grand Canyon through temperature change, turbidity change, flow fluctuations, sediment transport and vegetation dynamics (Stanford and Ward 1991). Because of the endangered status of humpback chub, operations of Glen Canyon Dam must be condusive to the recovery and sustainability of this population.

I developed this study to address three objectives: 1) identify geomorphic differences among reaches and among shoreline types within reaches; 2) determine if subadult humpback chub were associated with these geomorphic differences; and 3) determine if a change in flow regime in the post-dam era has altered subadult humpback chub habitat availability and use.

LITERATURE REVIEW

General Biology of the Humpback Chub

In early fish surveys of the Colorado River system, the vernacular term 'bonytail' was assigned to all three closely related *Gila* species (*G. cypha, G. elegans and G. robusta*), thereby confounding confirmation of humpback chub locality presence before 1970 (Banks 1964; Vanicek and Kramer 1969 Holden and Stalnaker 1970; cf. Douglas et al. 1989; Rosenfeld and Wilkinson 1989; Minckley 1991; Quarterone 1993; Dowling and DeMarais 1993). The humpback chub was not scientifically described until 1945 (Miller 1946); the holotype is a speciman taken from the Colorado River in Grand Canyon, Arizona. The USFWS has since confirmed six populations of humpback chub in the Colorado River Basin (Valdez and Clemmer 1982; USFWS 1990).

Historically, humpback chub were thought to have ranged throughout the Colorado River system in swift canyon reaches that are now inundated or decimated by water development projects. Presently, these populations are confined to canyon reaches. The largest and most stable population resides in Grand Canyon in and near the confluence of the Little Colorado River (LCR). The other five populations are in the Green and Colorado Rivers of the Upper Colorado River Basin (above Glen Canyon Dam) (USFWS 1990).

The humpback chub evolved in seasonally warmed and turbid water and is thought to be negatively phototactic (Valdez et al. 1992). The optimal spawning and growth

temperature is approximately 20 °C (Hamman 1982). Very little is known about other spawning requirements except that adults spawn on the descending limb of the annual spring hydrograph, most likely in gravel substrates (Valdez and Clemmer 1982; Kaeding and Zimmerman 1983). After emergence from gravels, larvae do not drift; rather, they swim in an upstream direction and adhere to near bottom surfaces (Marsh 1985). They are known to then disperse one to three months after emergence (Valdez and Ryel 1995). Humpback chub mature in two to three years (approximately 200 mm in total length), and they may live 20 to 30 years (Valdez et al. 1992). They feed mainly on macroinvertebrates and algae and, as adults, occasionally on fish (Kaeding and Zimmerman 1983; Valdez and Hugentobler 1993).

The Grand Canyon humpback chub population consists of two aggregates: one is resident to the main channel Colorado River; the other is resident to and spawns in the LCR. Main channel residents either attempt to spawn in the main channel, the success of which is unassessed, or they migrate into the LCR to spawn between March and June (Valdez and Hugentobler 1993).

Conservation Status of the Humpback Chub

Most of what is known about humpback chub has been discovered in the past 20 years, since the fish was listed as federally endangered. Enactment of the Endangered Species Act (ESA) prompted studies into life history and ecology to promote the species continued existence. The ESA, as ammended, ensures government agencies involvement

in studying the status and needs of the humpback chub in the Colorado River system.

According to section 7 of the ESA, the USFWS must evaluate any federal activity that affects the endangered humpback chub or its habitat with a biological opinion. The biological opinion is a USFWS assessment of a proposed activity on an endangered species. The opinion can be either jeopardy, meaning the activity will harm the species, or no jeopardy. In the case of a jeopardy opinion, the concerned agency must propose conservation measures to ensure no harm from or compensation for their proposed activity (Rohlf 1989).

In 1978, the USFWS determined that operation of Glen Canyon Dam was likely to jeopardize the continued existence of the humpback chub. Consequently, the USFWS required an investigation of the effects of dam operations on the resources of Grand Canyon, including the endangered humpback chub. In 1982, the U.S. Bureau of Reclamation (USBR) authorized the multiagency Glen Canyon Environmental Studies (GCES) to conduct an intensive investigation on the river ecosystem below Glen Canyon Dam. Data from Phase I of GCES, which lasted from 1983 to 1988, suggested that fluctuating flows and extreme ramping rates were detrimental to the ecosystem. The USBR initiated Phase II in 1988 to identify causative factors and ways to minimize effects (Wegner 1991; eg: National Research Council 1991). One result of these studies was the implementation of Interim Flow Operating Criteria (Interim Flows) in August 1991 to reduce the effects of fluctuating flows. A second result of GCES studies was implementation of an ecological assessment of the humpback chub in Grand Canyon

(Valdez et al. 1992). The USFWS has assimilated findings from ongoing humpback chub studies into the Glen Canyon Dam Environmental Impact Statement (U.S. Department of Interior 1995).

Habitat Relationships

In lotic systems, habitat changes spatially along and across river channels (Vannote et al. 1980) and temporally in response to different flows (Stalnaker 1978; Hawkins et al. 1993). Early life-history stages of fish often use different habitats than those of mature stages (Schlosser 1987; Wootton 1992). In Grand Canyon, adult humpback chub use large eddy complexes and deep pools, whereas subadults primarily occupy shoreline areas (USFWS 1990; Valdez and Hugentobler 1993; Gorman et al. 1994). Although shoreline habitat is affected by flow fluctuations, habitat use and the effects of discharge variability on habitat have not been investigated. Effective management and protection of subadult humpback chub require an understanding of relationships between shoreline habitat and discharge in the channel margins.

Assessing Habitat Requirements

The first step in assessing habitat requirements of an organism is to establish spatial and temporal correlations between the characteristics of different habitats and the abundance of the organism. Such correlations can be developed at one or more spatial and temporal scales. Multi-scaled studies are particularly valuable, because they may reveal important habitat relationships that go unnoticed with a single-scale study. One

level of analysis may detect limiting qualities of habitat, such as food abundance but be insensitive to other attributes, such as those providing cover (Orians and Wittenberger 1991).

After choosing appropriate scales to measure habitat parameters of interest, classification methods can be developed to discern habitat units. Aquatic scientists are advocating classification methods that partly use hydraulic criteria to distinguish habitat units (Stalnaker 1978; Bisson et al. 1981; eg: Frissell 1986; Hudson et al. 1988; Hawkins et al. 1993). However, most of these methods were developed for sixth order or smaller rivers. Few studies have investigated the validity of hydraulic habitat units such as pools, eddies and riffles for fish in larger rivers.

Riverine Habitat

In large rivers, hydraulic units such as runs and eddies can be orders of magnitude larger than those in small rivers; therefore, small fish probably are not responding to the overall conditions of the hydraulic unit but to a subset of local conditions. For example, a fish in a third or fourth order stream pool may respond to average local velocity, depth and cover attributes of the pool (Gorman and Karr 1978). However, in a pool of a large river, a fish most likely is responding only to these conditions within a few meters. These local conditions may be influenced by variation in shoreline and bed complexity or hydraulic attributes within the pool. Therefore, researchers need methods of classifying components of large riverine habitat at a scale relevant to individual organisms.

Several studies have examined fish habitat dynamics in the Colorado River. Carter

et al. (1985) found that the size of certain hydraulic units in the Colorado River was related to flow. Although this study was one of the few attempts to examine spatial and temporal changes in riverine habitat, the authors did not correlate fish presence or abundance with habitat types. Valdez et al. (1992) also related flow to habitat area, bathymetry and fish location and found that adult humpback chub occupy large eddies and pools and that certain flows maximized availability and quality of these habitats. However, subadults were not examined in this study. In a different region, Rabeni and Jacobson (1993) determined that centrarchid distribution in Ozark streams was influenced by geomorphology on a reach scale and velocity, depth and substrate at a local scale.

Correlations between Abundance and Habitat Conditions

Correlation between an organism's abundance and habitat characteristics do not necessarily reveal the mechanisms causing the distribution of the organism. The actual factors responsible for creating correlations between habitat features and abundance of organisms undoubtedly are more complex as unmeasured factors may affect the observed distributional pattern. These limitations make correlation models inappropriate for general application. For example, Bowlby and Roff (1986) found that a trout-habitat model developed by Binns and Eiserman (1979) for Wyoming streams was inadequate for predicting trout biomass in streams of Ontario, Canada. Different variables seem to limit the abundance of fish in different systems, and it is seldom appropriate to use correlation models outside of the area in which they were developed. Still, correlations are useful where neither the abundance of the organism or the availability of habitat can be

manipulated (Peters 1991).

In this study, it was important to develop correlative relationships for several reasons. Because humpback chub are endangered and live in logistically difficult areas to access, possible field manipulations are limited. Also, according to ESA legislation, wild humpback chub cannot be readily retained for laboratory experimentation, and no hatchery stock is currently available. Furthermore, humpback chub are endemic to a river system that is geologically and biologically unique. Local environments may be more uniform among humpback chub populations than those of a less unique system or a more ubiquitous species. Most importantly, the critical status of this species requires immediate action towards its recovery.

STUDY AREA

Hydrology and Mangement

This study took place in a 24 kilometer reach of the Colorado River that flows through Grand Canyon beginning at the confluence with the LCR (Figure 1). Hydrology of the Colorado River through Grand Canyon is regulated by Glen Canyon Dam, approximately 25 kilometers upstream of Lee's Ferry, Arizona. For consistency with published maps, river distances refer to river miles (RM) below Lee's Ferry (Belknap and Evans 1989). RM is the standard distance metric used in Grand Canyon to describe location (Valdez and Ryel 1995).

Historically, the Colorado River was a highly turbid, highly fluctuating system. Temperature varied seasonally from near freezing to almost 30 °C. Flows could range annually from approximately 60 m^3/s (2,000 cfs) during winter months to over 3000 m^3/s (100,000 cfs) (U.S. Department of Interior 1995). The dam has altered the hydrology of the river by eliminating large, annual flood events, by maintaining artificially high base flows, by trapping sediment and by altering physico-chemical parameters (Stanford and Ward 1991). Water discharged from the dam is approximately 7 to 11 °C and warms an average of 1 degree every 50 kilometers downstream in the summer (Valdez and Ryel 1995). Seasonal and daily fluctuations in flow also result from dam operations. From the period of dam closing in 1962 to 1991, discharge fluctuated within a range of 60 to 850 m^3/s (2,000 to 30,000 cfs) with unrestricted ramping rates. To reduce the magnitude

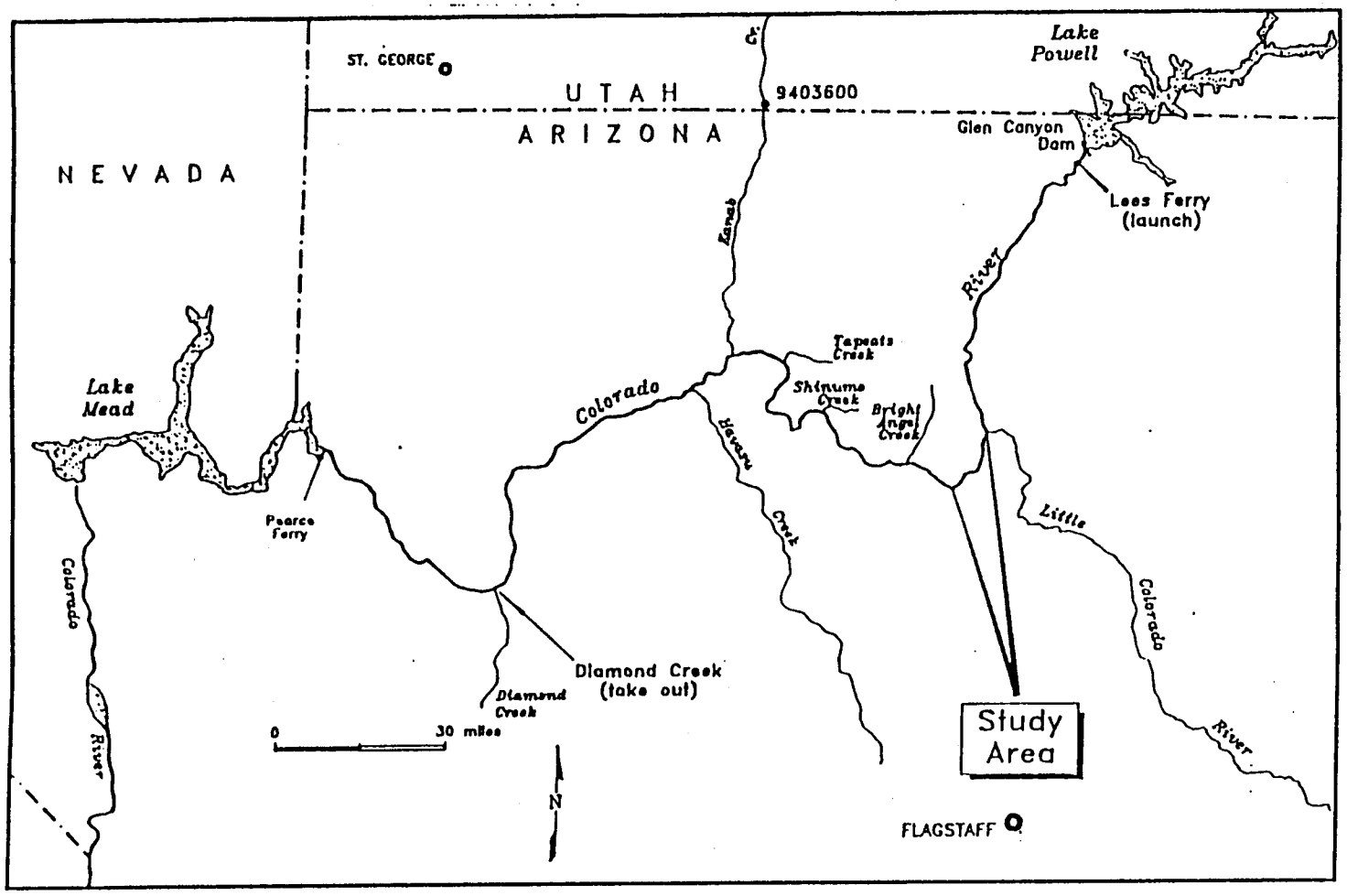


Figure 1: Map of the Colorado River through Grand Canyon showing the Study Area.

of these fluctuations, the USBR implemented Interim Flows in August of 1991. This operating regime requires a minimum 225 m^3/s (8,000 cfs) and a maximum of 550 m^3/s (20,000 cfs). Up-ramping (rate of discharge increase) cannot exceed 70 m^3/s /hr (2,500 cfs /hr), and down-ramping (rate of discharge decrease) cannot exceed 45 m^3/s /hr (1,500 cfs /hr) (U.S. Department of Interior 1995).

Two major perennial tributaries enter the Colorado River in Grand Canyon that regularly add sediment to the river in the study area. The Paria River enters the Colorado River at Lee's Ferry (RM 0.5). Suspended sediment input from the Paria River occurs during flood events and greatly increases turbidity of the Colorado River (Andrews 1991). However, at baseflow, the Paria's sediment input is minimal, and the Colorado River has extremely low turbidity for the first 120 kilometers of the canyon (RM 61.4). At river mile 61.4, the LCR, a calcium carbonate enriched, spring fed tributary, enters the main Colorado River. The LCR flows clear except during heavy, upland rainstorms when it floods and becomes sediment laden. With a base flow of 5.5 m^3/s (200 cfs) and a ten year recurrance interval flood of 425 m^3/s (10,000 cfs), the LCR is the largest tributary entering the Colorado River in Grand Canyon.

Geomorphology

Grand Canyon is the result of concurrent uplifting of the Colorado Plateau and downcutting of the Colorado River through more than 1,500 meters of sedimentary and metamorphic rock (Beus and Morales 1990). The river through Grand Canyon drops over

500 meters in 450 km (279 miles) as a series of long, flat stretches interrupted by steep drops. Half of the drop in elevation is in rapids, which constitute only nine percent of the total distance. Most of the rapids are formed by debris fans at the mouths of ephemeral tributaries that deposit poorly sorted debris ranging in size from huge boulders to sand. These debris fans form where local fractures or faults transect the canyon at the river (Dolan and Howard 1978). Debris flows and tributaries deposit enough sediment to constrict the river, forming rapids. Associated with rapids are large downstream zones of recirculation known as eddy complexes (Schmidt and Graf 1990).

Channel slope and morphology in Grand Canyon changes along the river corridor with shifts in local geology and tributary influence (Leopold 1969; Kieffer 1990). More resistant lithology creates a narrow, deep corridor, whereas it is wider and shallower in regions of locally erodible lithology (Howard and Dolan 1981). I used changes in geologic conditions to designate three contiguous reaches that constitute the 24 kilometer study reach (Figure 2).

Reach 1

In Reach 1, Tapeats Sandstone dominates the geology at the river surface where the LCR flows into the main channel (RM 61.4). Tapeats is a medium to coarse grained sandstone formation (Middleton and Elliot 1990). The layers of sandstone within Tapeats have differentially eroded but generally are resistant. These attributes give Tapeats characteristic ledges and cliffs 30 to 100 meters above the river surface in a narrow river corridor (Middleton and Elliot 1990).

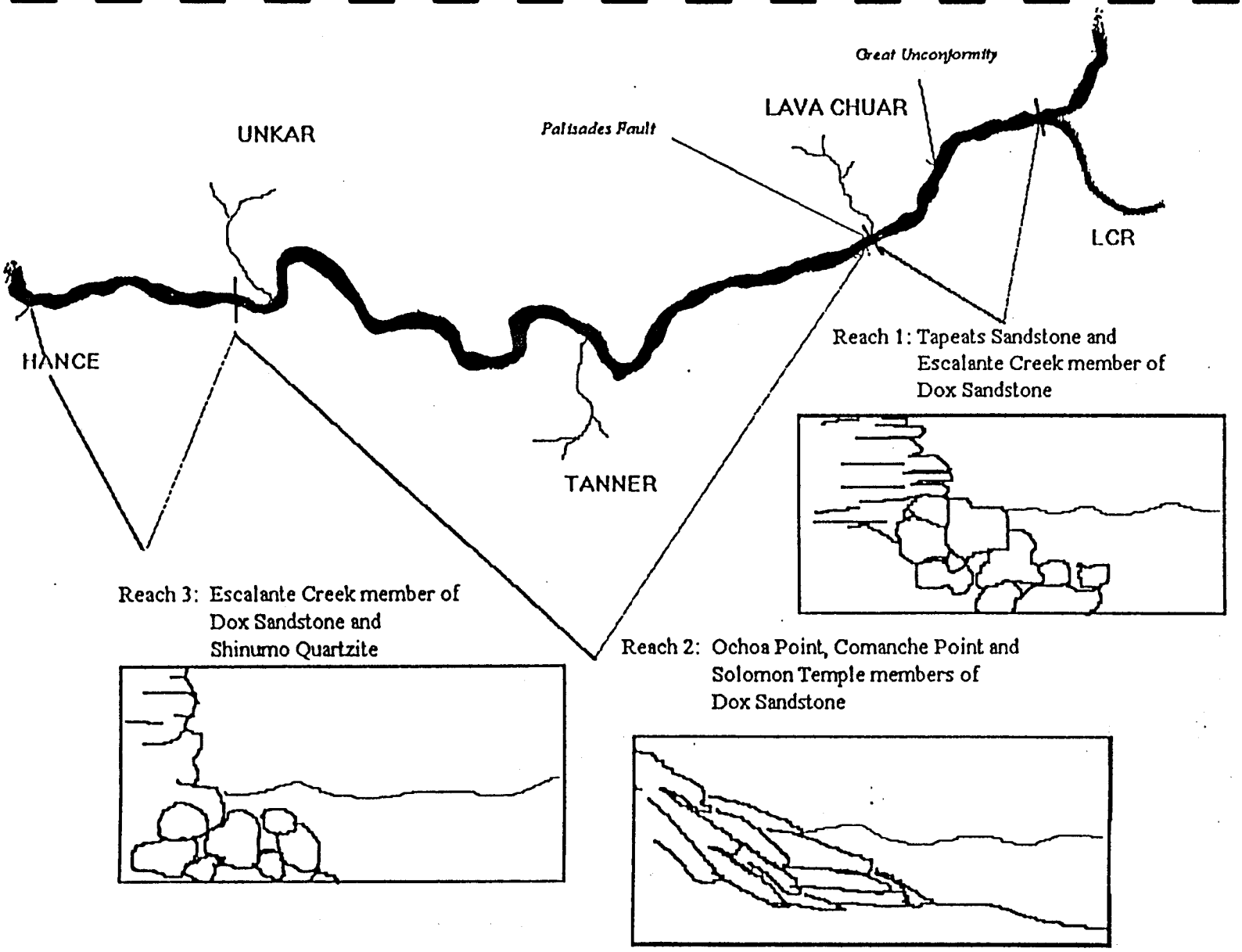


Figure 2: Map of the study area showing the geology of the 3 reaches.

Below river mile 63, the geology shifts to the Dox Formation consisting of four members: Ochoa Point, Comanche Point, Solomon Temple and Escalante Creek in descending order. Because these underlying strata are tilted, the lower Escalante Creek member of Dox Formation is the first Dox strata encountered at river level. The Escalante Creek member, similar to Tapeats Sandstone, is cliff forming, so the river corridor remains narrow (Hendricks and Stevenson 1990).

Reach 2

At Lava Chuar Canyon (RM 65.5), the river crosses the Palisades Fault. At this point, the geologic strata are displaced, and upper, more erodible members of Dox Sandstone emerge at river level. The river becomes shallower and the corridor widens in this reach as the river cuts into the shaley, more erodible Ochoa Point, Comanche Point and Solomon Temple members of Dox Formation (Billingsley and Elston 1989). The channel continues as such to below Unkar Rapid (RM 73.4).

Reach 3

Below Unkar Rapid, the lower Escalante Creek member of Dox resurfaces (Billingsley and Elston 1989). Here, the river channel narrows again and continues as such through resistant Shinumo Quartzite (RM 75.4). Hakatai Shale then dominates the shoreline at RM 76, about one kilometer upstream of Hance Rapid (RM 76.5). The brief emergence of the erodible shale does not affect the channel morphology, and the corrider remains narrow through the end of the study area at Hance Rapid (RM 76.5).

METHODS

Study Design

This study was one component of a larger project that focused on the ecology of the humpback chub in the Colorado River through Grand Canyon (Valdez and Ryel 1995). To address the objectives of my study, three types of data were collected at two nested spatial scales: reach and shoreline. First, I quantified physical habitat conditions for six shoreline types within two reaches (Reaches 1 and 2). Shoreline type designations, based on differences in structure and geomorphology, included bedrock (shelves and vertical cliffs), cobble, debris fan, sand, talus and vegetation (Table 1). Second, I used stratified random sampling to estimate relative fish densities in all six shoreline types within all reaches (Reaches 1, 2 and 3). Finally, I collected data on discharge variability and estimated how habitat changed as a consequence of flow variation. Both physical measurements and fish sampling were conducted over the range of discharges from Glen Canyon Dam that represented Interim Flows. Data collection was conducted for one to two weeks per month from October of 1990 to November of 1993 (except Decembers) and in July of 1994 (Valdez and Ryel 1995).

To determine geomorphic differences among reaches, I calculated total availability of shoreline types, total riffle area and width-to-depth ratios of Reaches 1, 2 and 3. To quantify differences in habitat at both spatial scales (reach and shoreline), I measured water depth, velocity and cover along each shoreline type within Reaches 1 and 2.

Table 1. Definitions of Shoreline Types

Bedrock	Any rock that is in its original location and has not been transported or broken up by any means. This includes shear walls and laterally or vertically emerging ledges.
Cobble	Rocks transported by main channel activity that are characteristically well rounded and imbircated. They may show some embeddedness.
Debris fan	Debris, predominantly boulder, transported from a tributary during a flooding event. It is characterized by boulders with some degree of embeddedness, intermittent sand beaches, and a small percentage of gravel. The angle of repose is generally flatter than that of talus. The boulders are more rounded as inferred by the process of transportation.
Sand	Minimum length of 50m of predominantly exposed sand. Beaches can have very steep banks or be very flat.
Talus	Colluvium, predominantly boulder, deposited by rockfall or rockslide activity on the canyon walls. It is characteristically not embedded and has a steeper angle of repose than a debris fan. May have some intermittent sand. Debris is more angular as inferred by its process of transportation.
Vegetation	This can be rooted or inundated vegetation. The vegetation along the shoreline must be in or directly over the water on the shoreline. Vegetation may have intermittent stretches of other shoreline types.

Because Reach 3 was added midway through the study, shoreline habitat data were collected in Reaches 1 and 2 only. Physical habitat sample sites were stratified among Reaches 1 and 2 to include all shoreline types but were randomly chosen within reaches. Because I was logistically limited in where, when and how often certain data could be collected, sample numbers among reaches and shoreline types is not balanced (Table 2).

Fish sampling was stratified among the six shoreline types and randomly chosen

within all 3 reaches. Although 664 electrofishing efforts were conducted (Table 3), only 173 electrofishing samples that had spatially concurrent habitat measurements could be used to analyze direct associations of fish with habitat.

To account for changes in habitat condition and habitat use with discharge, I used discharge data from two USGS gage stations. For analysis of physical habitat changes within the study area, I used discharge data from the gage station located above the confluence of the Little Colorado River (Station number 9383100). The discharge at this station most closely reflected the actual discharge within the study area at the time of data collection.

Table 2: Number of transects measured among reaches and shoreline types

	Shoreline Type						
Reach	Bedrock	Cobble	Debris Fan	Sand	Talus	Vegetation	Total
1	4	2	7	11	7	9	40
2	3	7	2	3	7	7	29
Combined	7	9	9	14	14	16	69

Table 3: Number of electrofishing samples among reaches and shoreline types

	Shoreline Type						
Reach	Bedrock	Cobble	Debris Fan	Sand	Talus	Vegetation	Total
1	69	21	92	36	164	63	445
2	27	15	20	7	49	56	174
3	2	2	5	4	12	20	45
Combined	98	38	117	47	225	139	664

For analysis of long term changes in the overall flow regime, I used data from the gage station located at Lee's Ferry (Station number 9380000), because this station maintained the longest period of record. I used the latter data to derive flow duration curves (see Data Collection) for pre- and post-dam periods of the Colorado River in Grand Canyon, which allowed me to compare differences in the flow regime since construction of Glen Canyon Dam.

Data Collection

Geomorphic Reaches

To quantify differences in reach geomorphology, I mapped total length of each of the shoreline types, mapped surficial riffle area along the entire 24 kilometer study area and calculated mean width-to-depth ratios of each reach. Surficial riffle area was defined as a relatively shallow area that was characteristically broken or rippled by fast water moving over underlying cobble but that lacked standing waves. I mapped the total available shoreline of each type on mylar overlays of 1:24,000 scale aerial photographs. I then mapped percent riffle area in reaches and verified shoreline mapping in the field. I used channel transect data of Schmidt and Graf (1990) taken at arbitrary cross sections throughout the study area to derive an average width to depth ratio for the three geomorphic reaches.

Shoreline Longitudinal Transects

I quantified three habitat variables along 100 meter lengths within different shoreline types. I refer to one set of measurements as a longitudinal transect. At each 10 meter interval along a transect, I measured water depth, water velocity (at 0.6 of depth) and recorded the

presence of cover types. I assumed that shoreline structure most strongly influenced channel hydraulic conditions within 2.5 m of the shoreline and therefore, measured depth, velocity and cover at three distances from shore: 0.5, 1.5 and 2.5 m. The presence of 3 cover types was recorded: lateral (L), instream (I) and overhead (O) (Table 4). Cover was based on lateral, emergent or overhead shelter from hydraulic or visual exposure. I tallied the presence of each cover type at each point, and then summarized the frequency of cover for each longitudinal transect. Each longitudinal transect comprised 90 data points: 3 variables (depth, velocity and cover), 3 distances from shore at 10 m intervals along 100 m of shoreline.

With these data, mean transect depth, velocity and total cover were derived for Reaches 1 and 2 and for all six shoreline types. A total of 69 longitudinal transects among all shoreline types were measured: 40 in Reach 1, and 29 in Reach 2 (Table 2). Discharge at the time transects were measured was obtained from the gage station located above the confluence of the LCR.

Table 4: Definition of cover types

Cover Type	Definition
Lateral	Any laterally emerging instream structure that obstructs flow and provides shelter from the main current above, below or beside it.
Instream	Any instream structure emerging vertically from the river bottom that obstructs flow and provides shelter from the current in its wake.
Overhead	Any structure from the shore that hangs above the water in the channel margins.

Fish Sampling

I used electrofishing catch rates to estimate relative densities of subadult humpback chub within all three geomorphic reaches and each of the six shoreline types (Table 3). Electrofishing was conducted from Achilles SU-16 research boats equipped with Mark XX ® Complex Pulse Systems, as described in Valdez and Ryel (1995). The time required to sample each shoreline was recorded, and catch per unit effort (CPE) was expressed as number of fish caught per 10 h of fishing. Because I assumed a one to one time to area fish-sampling ratio, I used the catch data as a measure of relative density. Time of day and turbidity were recorded for each sample (Valdez and Ryel 1995). I used only samples from high turbidity, nighttime or crepuscular periods to reduce confounding effects of light on catch rates (Valdez and Hugentobler 1994).

Flow Duration Curves

I used mean daily discharge data from the Lee's Ferry gage to derive pre- and post-dam flow duration curves. Flow duration curves characterize the temporal flow regime by showing the temporal flow distribution as a discharge occurring over a percent of time for a period of record (Leopold et al. 1964). I used 22 randomly chosen years between 1922 and 1960 to construct the pre-dam curve and 22 randomly chosen years between 1965 and 1994 to construct the post-dam curve. To construct these curves, discharge was ranked from highest to lowest and plotted against cumulative percent time.

Analyses

Physical Differences among Geomorphic Reaches and Shoreline Types

My first objective was to quantify physical differences among reaches and shoreline types. To determine if reaches were geomorphically different, I examined the availability of shoreline types, width-to-depth ratio and total riffle area of the three reaches. To determine if depth, velocity and cover varied between reaches (blocks) and among shoreline types (treatments) and to determine if shoreline conditions depended on reach (interaction), I used a Generalized Randomized Block Multiple Analysis of Variance (GRB MANOVA) (Neter and Wasserman 1974). Because I was specifically interested in physical differences among only these reaches and my inferences would be limited to this system, I considered the reach effect as fixed. This assumption allowed me to use the residual error term as the mean square error when calculating F-ratios (Neter and Wasserman 1974). Mean transect depth and velocity were $\log_{10}$-transformed to correct for heteroscedasticity in the MANOVA (Zar 1984). I used an a priori α value of 0.1 (10% chance of type I error) for all statistical analyses.

Relationships between Subadult Humpback Chub and Geomorphology

To determine if subadult humpback chub were associated with reach and shoreline differences (Objective 2), I examined associations of fish with specific depth, velocity and cover conditions and compared relative densities of subadults among reaches and shoreline types. Initially, I wanted to determine if the longitudinal distribution of subadult humpback chub could

be explained by something other than habitat selection (e.g., passive dispersion). I, therefore, examined how densities varied throughout the 3 reaches for each shoreline type. Downstream distributions of subadult humpback chub densities within each shoreline type were fitted with a LOWESS line-of-best-fit (Systat, Inc. © 1992). A monotonic decline in density would be consistent with the distribution expected from passive dispersion. Other types of distributions might imply mechanisms other than habitat selection.

I used Discriminant Functions Analysis (DFA) to determine if the presence of fish within sample units was associated with differences in mean depth, velocity and cover. For this analysis, I only used fish samples that were spatially concurrent with a longitudinal transect (n=173) and thus had associated habitat information.

To determine if variation in fish densities was associated with differences among reaches or shoreline types, I conducted a GRB ANOVA with reach as blocks and shoreline type as the treatment. An interaction term between reach and shoreline type was included in this model. Block effects were also considered fixed in this analysis. Densities of subadult humpback chub were $\log_{10}$-transformed to correct for heteroscedasticity (Zar 1984).

To compare the total relative abundance of subadult humpback chub within each reach, I multiplied the available shoreline length by the fish density in a specific shoreline type for each of the 3 reaches.

Effects of Flow Regime Changes on Habitat Conditions

To assess how changes in flow regime may have affected habitat conditions (Objective 3),

I first examined changes in habitat condition associated with discharge and then examined how the temporal flow regime has been altered by flow regulation. I used a Multivariate Simple Linear Regression (MSLR) to determine if habitat conditions (mean depth, velocity and cover) changed over the range of Interim Flow discharges. I conducted separate tests for effects of discharge, shoreline type and the interaction between discharge and shoreline type. I then compared Colorado River flow duration curves for pre- and post-dam periods to examine flow regime changes and to assess the overall effect of flow regulation on habitat conditions.

RESULTS

Physical Differences among Geomorphic Reaches and Shoreline Types

Reaches 1 and 3 were geomorphically similar and differed from Reach 2 in that width-to-depth ratio was nearly two times greater in Reach 2 (Table 5). Percent total riffle area was three to four times greater in Reach 2 (21%) than in Reach 1 (4%) or Reach 3 (6%). These results led me to suspect that either the distribution of or the physical condition of shoreline types may be influenced by reach. In fact, although habitat conditions appeared to vary significantly both among shoreline types and between reaches, a significant interaction between reach and shoreline type suggested differences among shoreline types were not consistent between reaches (Table 6; Figure 3).

Univariate tests showed that this interaction was largely influenced by substantial differences in depth and cover between bedrock shorelines in Reaches 1 and 2. For example, in Reach 1, mean depth of bedrock shorelines (2.39 m) were clearly different from that of all other shoreline types (0.30 to 1.0 m), whereas in Reach 2, depths of all shoreline types were uniform (0.25 to 0.60 m) (Figure 3a). Bedrock shorelines also had a high frequency of cover in Reach 2 only, whereas cover of debris fan, talus and vegetated shorelines was high in both Reaches 1 and 2, and cover of cobble and sand shorelines was low in both Reaches 1 and 2 (Figure 3b).

Table 5: Width to Depth ratios (W:D) measured at arbitrary cross-sections (Schmidt and Graf 1990) summarized by reach.

REACH	RM	W:D	Average W:D
Reach 1	62	20.7	
	63.4	16.8	
	64.1	21.7	
	65	19.2	19.6
Reach 2	67.1	13.6	
	67.8	66.5	
	68.2	31.6	
	70.2	20.6	
	70.7	24.1	
	71.2	29.6	
	71.8	49.7	
	73.5	36.9	34.0
Reach 3	73.8	13.2	
	74.2	20.1	
	74.6	19.2	
	76.1	15.4	17.0

Table 6: Results of Generalized, Randomized Block MANOVA for mean depth, velocity and cover and shoreline types among reaches (for Reaches 1 and 2 only). DF = degrees of freedom.

Source	DF	Wilks' λ	F	P
Shoreline (S)	15, 152	0.198	8.09	<0.001
Reach (R)	3, 55	0.611	11.68	<0.001
R x S	15, 152	0.554	2.42	0.003

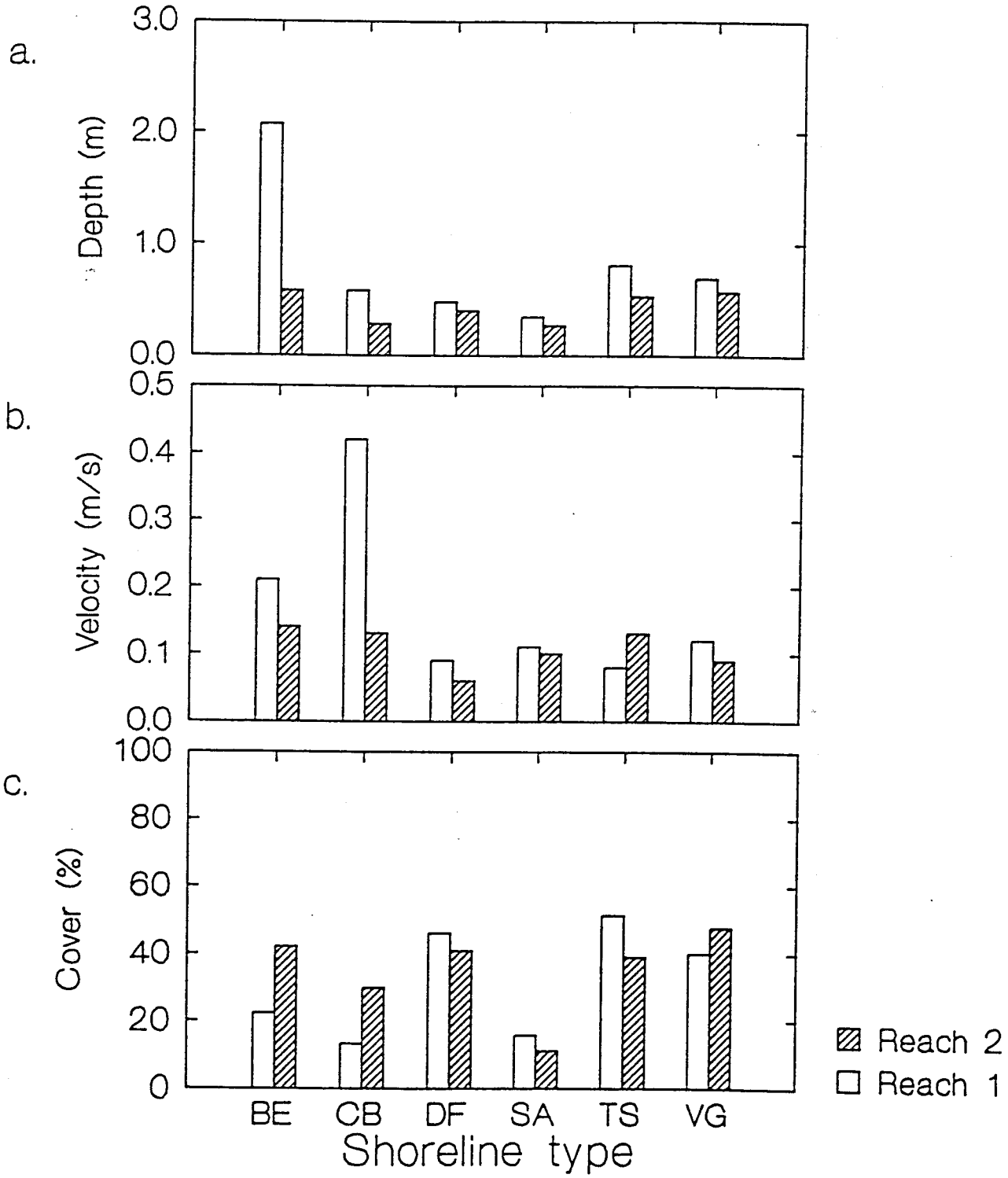


Figure 3. Physical differences in a) depth, b) velocity and c) cover among shoreline types and between Reaches 1 and 2.

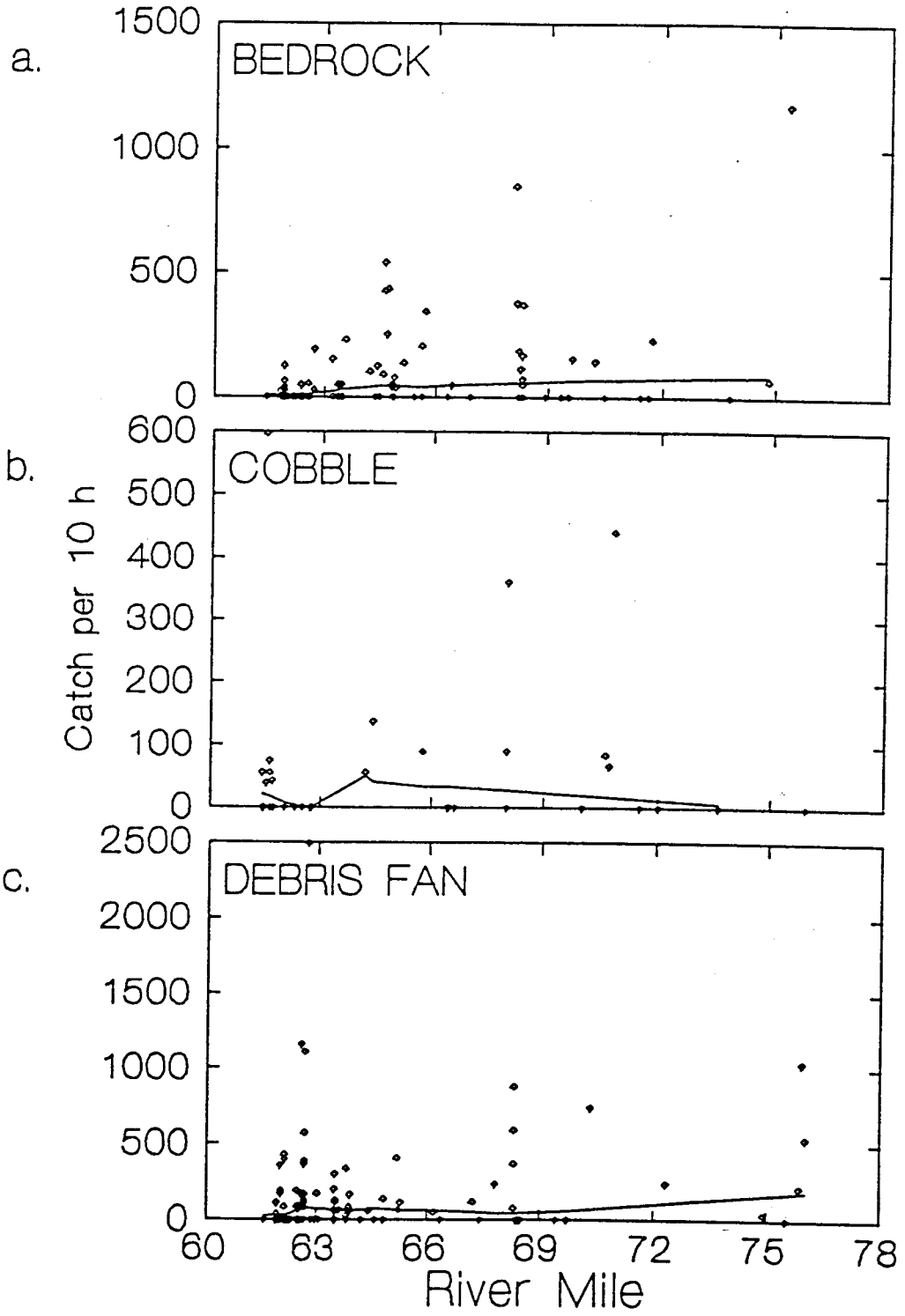
Relationships between Subadult Humpback Chub and Geomorphology

Fish densities did not monotonically decline from upstream to downstream or show any other recognizable pattern, however mean relative density varied substantially among shoreline types (Figure 4a-f). These results suggest that subadults were dispersing and then using specific shoreline types along the river corridor while avoiding others.

Discriminant Functions Analysis showed that subadult humpback chub used locations that were physically different than unoccupied areas (Table 7). Areas with fish had more cover than those without. Depth and velocity did not differ appreciably between locations with and without fish (Table 7).

Estimates of overall fish abundance, based on shoreline availability and shoreline use were highest in Reach 3 (82 fish caught per 10 h of fishing), intermediate in Reach 1 (50 fish caught per 10 h fishing), and were lowest in Reach 2 (33 fish caught per 10 h fishing). However, a GRB ANOVA showed a significant interaction between reach and shoreline type suggesting that the pattern of shoreline selection varied between reaches (Table 8).

Overall, densities were highest in vegetated shorelines, followed by talus and debris fan shorelines. Bedrock, cobble and sand shorelines had low densities of subadults. However, when considering the interaction with reach, relative densities in bedrock shorelines in Reach 2 were high compared with bedrock shorelines in Reaches 1 and 3, whereas relative densities in talus


a.
BEDROCK
1500
1000
500
0
b.
COBBLE
600
500
400
300
200
100
0
Catch per 10 h
c.
DEBRIS FAN
2500
2000
1500
1000
500
0
60
63
66
69
72
75
78
River Mile

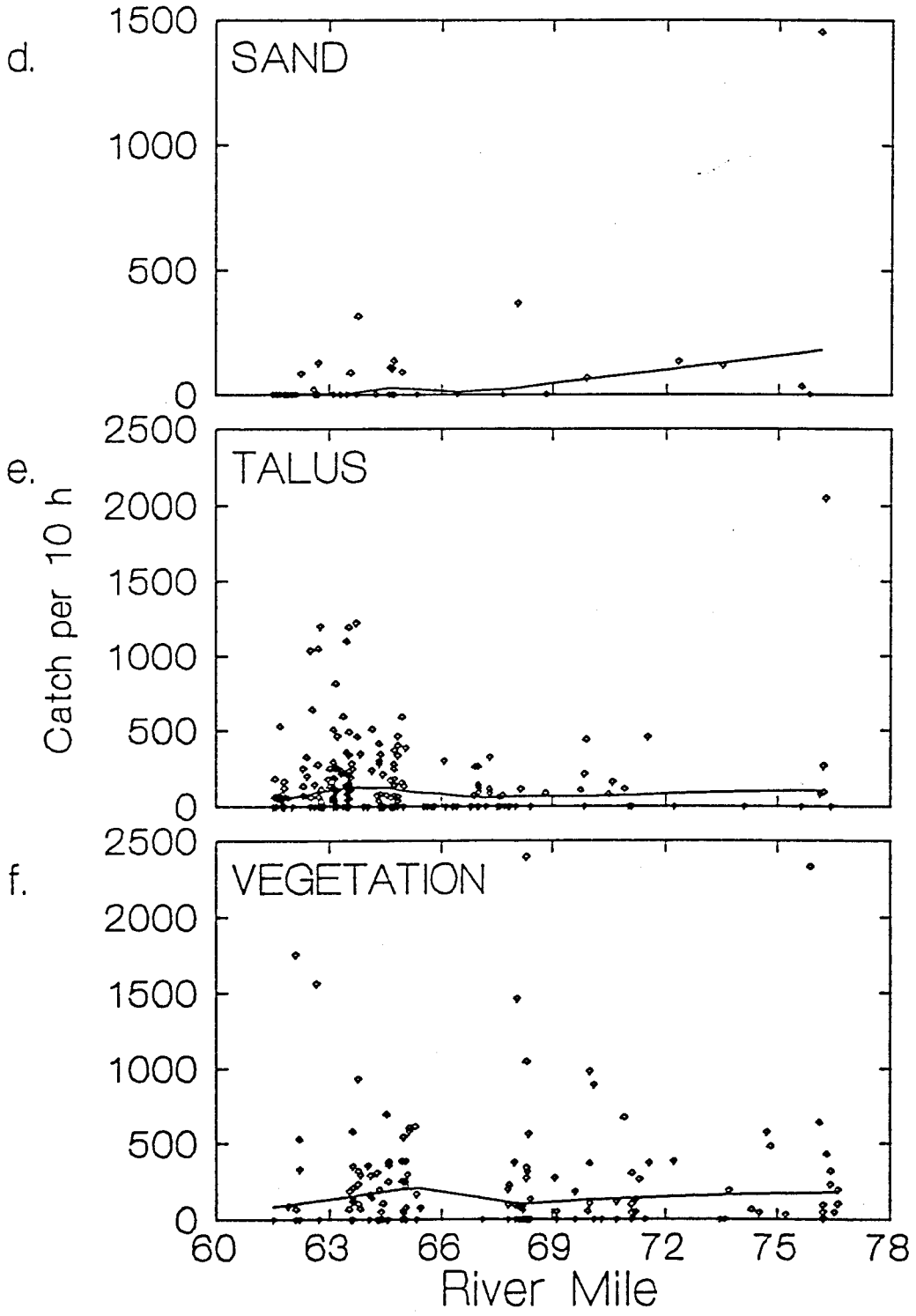


Figure 4. Downstream distribution of individual electrofishing samples for a) Bedrock, b) Cobble, c) Debris Fan, d) Sand, e) Talus and f) Vegetation shoreline types.

Table 7: Results of the Discrimant Functions Analysis. UFP = P value for univariate F- test. MV= results of multivariate test.

Variable	Fish	No Fish	UFP	Wilks' λ	P
Depth (m)	2.61	2.67	0.84		
Velocity (m/s)	0.11	0.13	0.10		
Cover (%)	43	33	<0.001		
MV				0.89	<0.001

Table 8: Results of 2-way ANOVA showing differences in subadult humpback chub densities among reaches and shoreline types in Figure 5.

Source	DF	MS	F	P	R^2
Shoreline (S)	5	6.249	5.366	<0.001	.12
Reach (R)	2	0.148	0.126	0.88	
R x S	10	2.083	1.776	0.06	
Error	642	1.173			

shorelines in Reach 2 were low compared with Reaches 1 and 3. This pattern of habitat use was similar to patterns of cover frequency among shoreline types (cf. Figure 3c and Figure 5a,b). Shorelines with the highest relative densities within reaches also had the highest frequencies of cover, and cover was found to be the main factor influencing fish presence (Table 7). Subadult humpback chub appeared to be associated with certain physical conditions of cover, yet the significant relationship between reach and shoreline geomorphology and fish densities explained little of the overall variation in subadult humpback chub densities (R^2= 12%; Table 8).

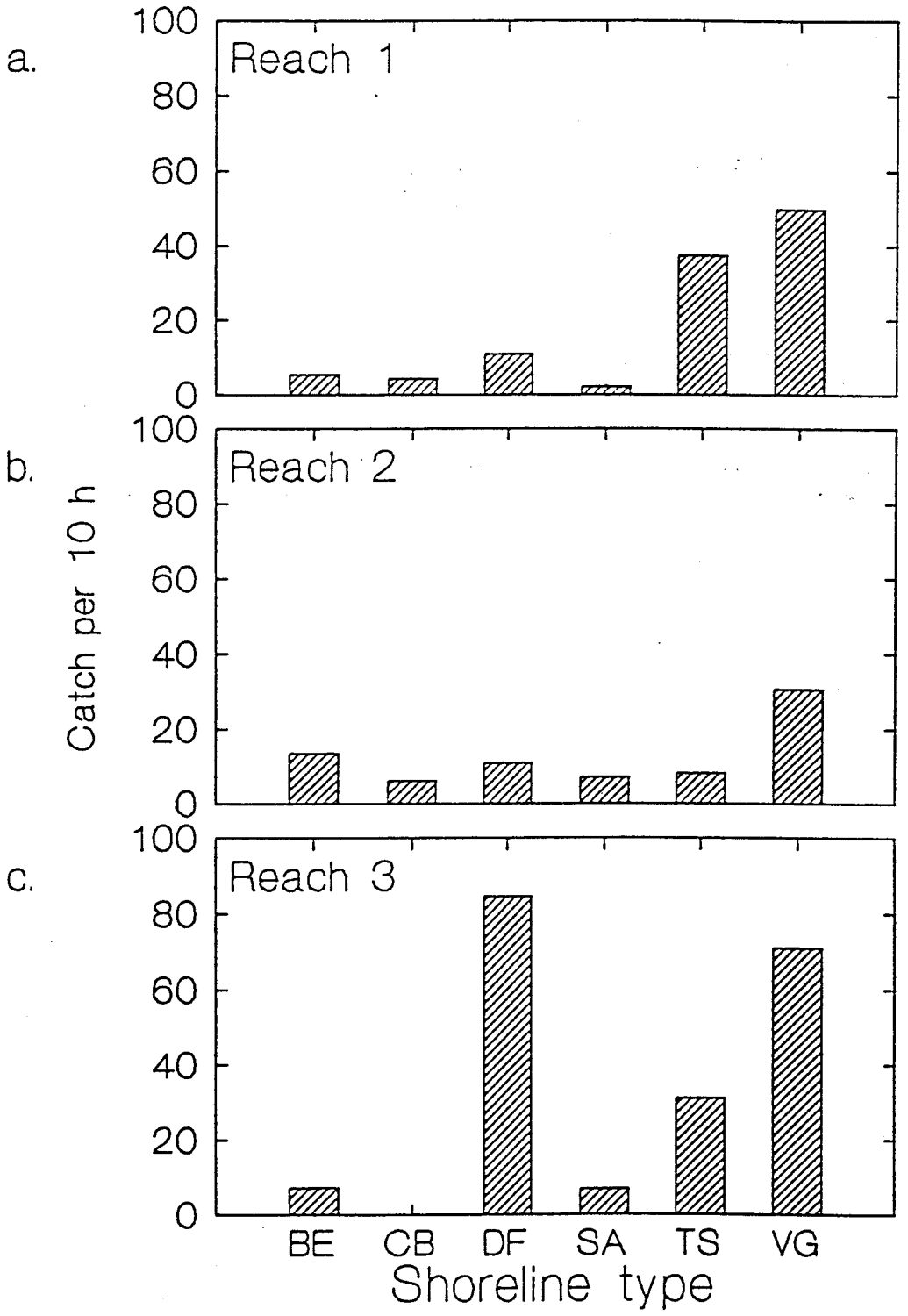


Figure 5. Relative densities of subadult humpback chub among shoreline types in a) Reach 1, b) Reach 2, and c) Reach 3.

Relationships between Discharge and Habitat Condition

Habitat conditions varied significantly with discharge for certain shoreline types according to the MSLR (Table 9). Overall, mean shoreline depth and velocity increased with increasing discharge (Figure 6a & b), whereas mean cover decreased (Figure 6c). However, this trend was not consistent among shoreline types. Mean depth and velocity of bedrock, debris fan, cobble and vegetation shorelines tended to increase with increasing discharge, whereas they decreased within sand and talus shoreline types (Figure 7a & 7b). Total cover within bedrock, talus and debris fan shorelines decreased with increasing discharge, yet total cover within cobble, sand and vegetation shorelines remained constant or increased slightly (Figure 7c).

When considered in conjunction with changes in the discharge regime, these results suggest that habitat quality (as defined by a high frequency of cover) has decreased in the post-dam era. A comparison of the flow duration curves for the pre- and post-dam periods show that the temporal distribution of discharge has changed such that mean daily discharges are less extreme more of the time (Figure 8). Prior to dam closure, discharge was less than 140 m^3/s (5000 cfs) twenty percent of the time and less than 225 m^3/s (8000 cfs) more than fifty percent of the time. Since construction of Glen Canyon Dam, flows less than 140 m^3/s (5000 cfs) have occurred only three percent of the time, and flows less than 225 m^3/s (8,000 cfs) have occurred only twelve percent of the time.

Table 9: Results of Multivariate Simple Linear Regression showing changes in depth, velocity and cover with discharge. DF=degrees of freedom of the numerator and denominator.

Source	DF	Wilks' λ	F	P
Discharge (Q)	3, 55	0.539	15.69	<0.001
Shoreline (S)	15, 152	0.359	4.56	<0.001
Q x S	15, 152	0.366	4.46	<0.001

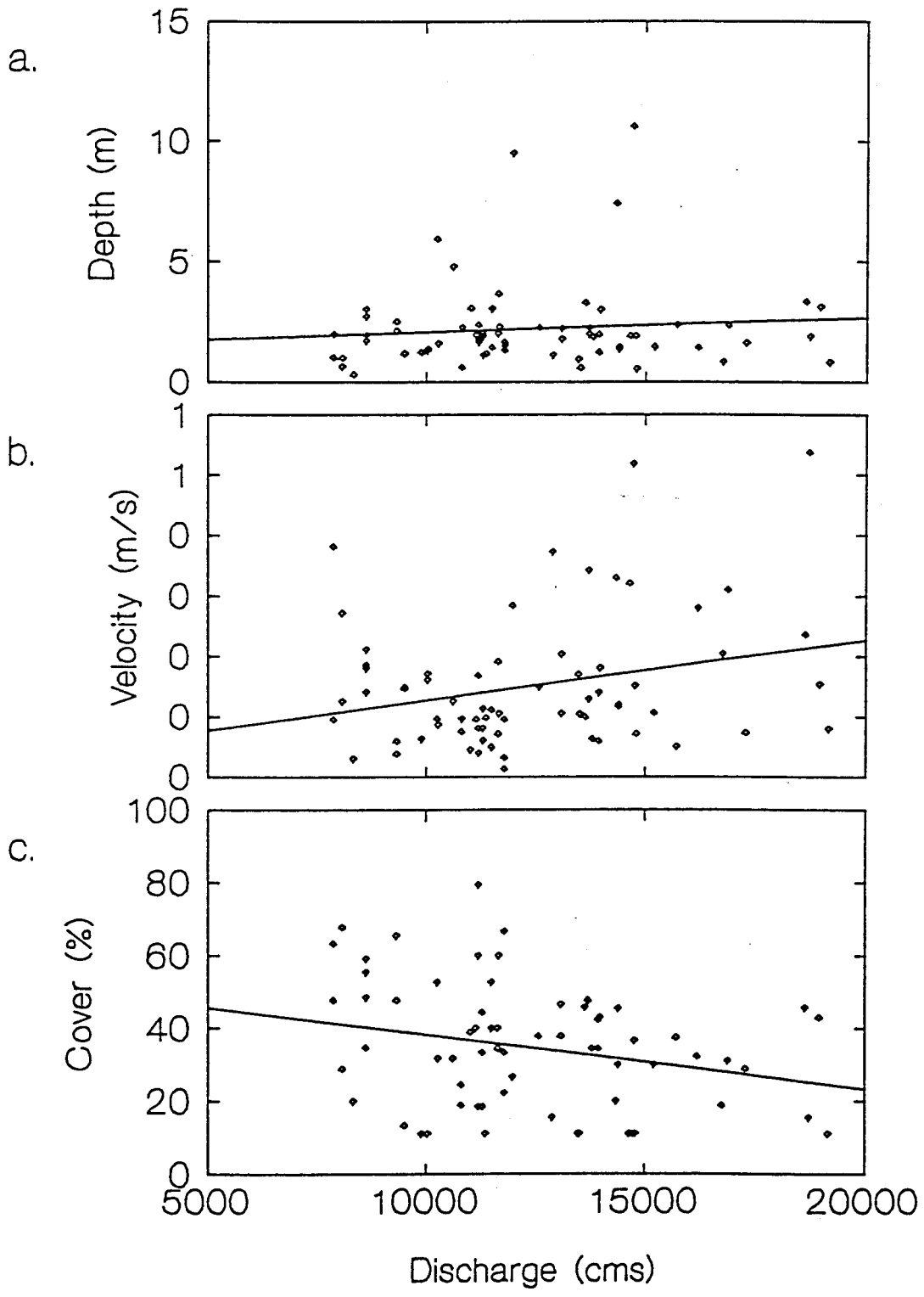


Figure 6. Change in a) depth, b) velocity and c) cover with discharge.

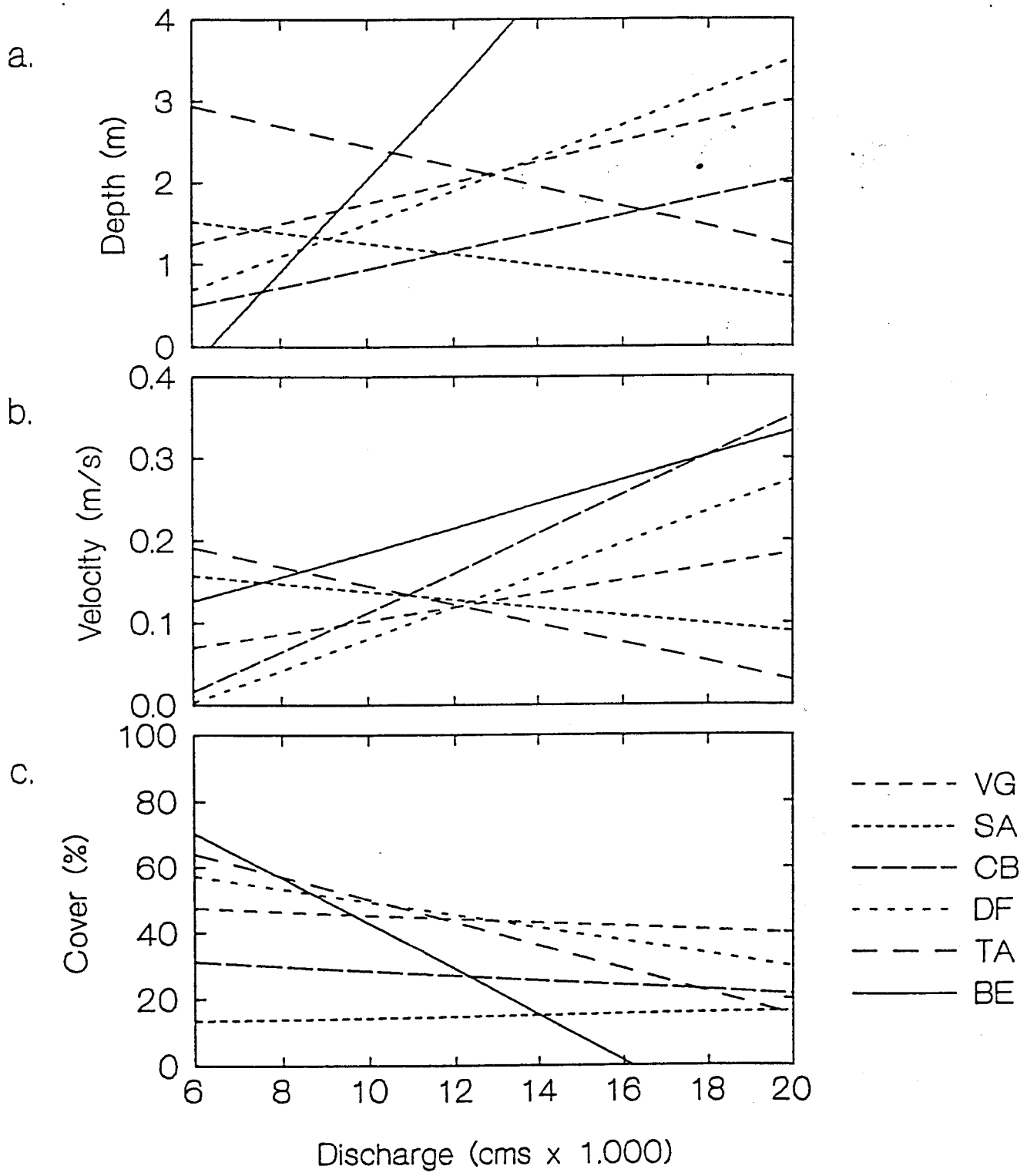


Figure 7. Change in a) depth, b) velocity and c) cover with discharge for each shoreline type. Data points are not shown to facilitate interpretation of trends.

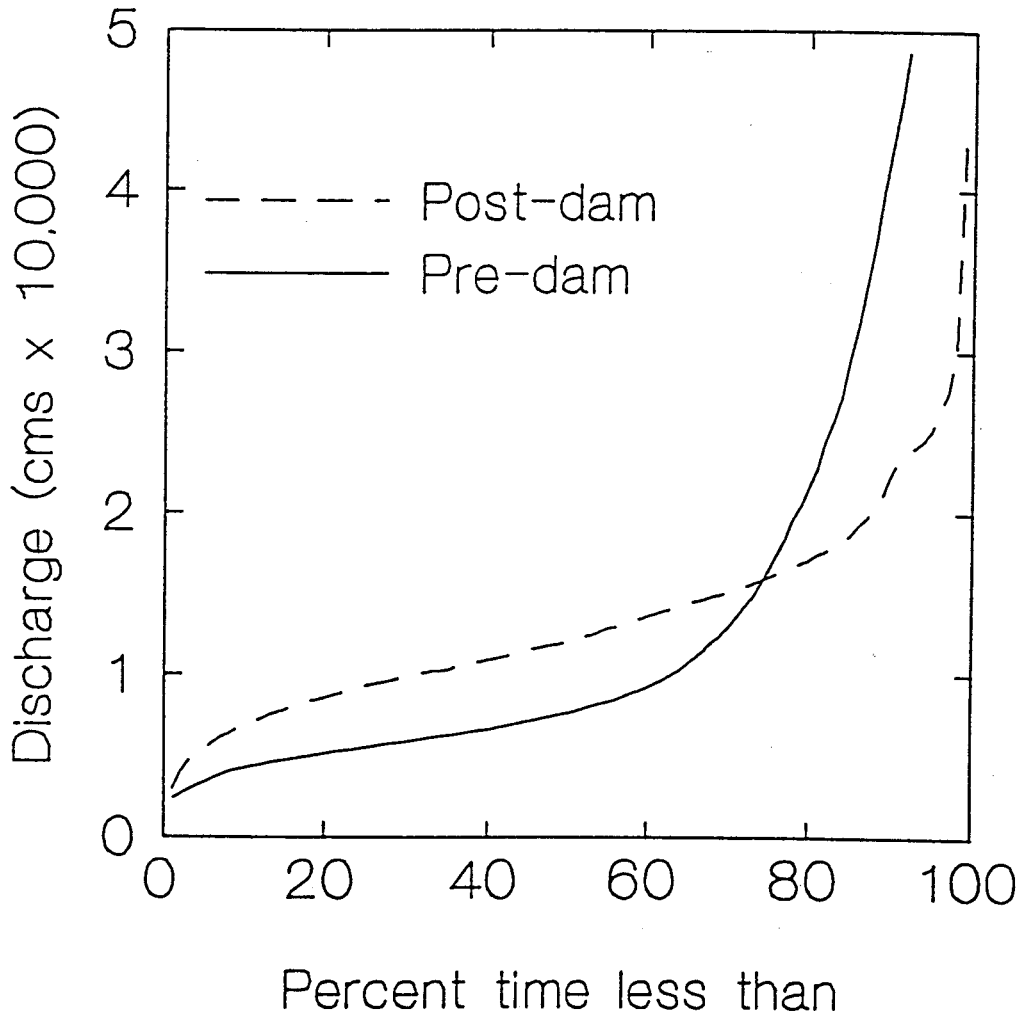


Figure 8. Flow duration curve of the Colorado River at Lee's Ferry gage.

DISCUSSION

Relationships between Humpback Chub and Geomorphology

Because of the strong influence of geology on the Colorado River ecosystem and the endemic nature of the native fish community, relationships between aquatic habitat and river geomorphology must be understood to manage for the welfare of resident fish populations. These relationships seem particularly important to the humpback chub because of its apparently strong evolutionary and ecological ties to geomorphic structure at different life-history stages and different spatial scales (Valdez and Clemmer 1982; Valdez and Hugentobler 1993; Valdez and Ryel 1995).

In this study, I showed that reaches and shoreline types differed physically and that subadult humpback chub presence and abundance in Grand Canyon was related to these geomorphic differences, particularly among shoreline types. This study also demonstrated that subadult humpback chub were specifically associated with a high frequency of cover in channel margins. In fact, the pattern of fish distribution and abundance among shorelines parallels the frequency of cover among shorelines, with vegetation, talus and debris fan shorelines having more cover and greater fish densities than bedrock, cobble and sand shorelines.

The Importance of Cover as an Attribute of Habitat

Numerous studies have demonstrated the importance of cover as a habitat attribute (Fraser and Cerri 1982; Fraser 1983; Power et al. 1985; Schlosser 1987). Cover may be

important for several reasons. First, fish may seek out cover to avoid light (Lewis 1969; Cunjak 1988). This possibility seems likely for native fish of the Colorado River which evolved under turbid conditions. Secondly, small fish may find it easier to avoid predation in areas with greater cover (Fraser and Emmons 1984; Mesick 1988). Historically, the endangered Colorado squawfish may have been a natural predator, and the more recent introduction of nonnative salmonids, catfish and other piscivorous sport fish has added a substantial source of predation that did not exist historically (Marsh and Douglas 1994; Valdez and Ryel 1995). Also, cover is frequently the result of some laterally or vertically emergent object that obstructs flow, thereby providing refuge from high current velocities (Fausch 1984; McMahon and Hartman 1989).

In this study, selection for cover appears to override any association with water depth or velocity in channel margins. However, I did not address mechanisms that explain why subadult humpback chub used areas with greater cover. Although undetected in this study, I suspect that the presence of cover affects local conditions of water depth and velocity in channel margins. I chose 2.5 m as the channel margin width that was influenced by shoreline structure. It is possible that this distance is too broad to detect associations of fish with conditions of depth and velocity; small fish may be responding only to conditions within 0.5 to 1 m of the waters edge. An unperceived association between fish and depth or velocity may have been masked by main channel hydraulic conditions. A better approach would be to analyze the physical conditions only within the channel margin area that subadult humpback chub use which may vary among shoreline types, rather than a specific distance from shore.

Historic and Present Habitat Conditions

This study also demonstrated that mean depth, velocity and cover of shorelines vary with discharge. Consequently, higher base flows, which occur a greater proportion of the time in the current flow regime, may reduce subadult humpback chub habitat quality in natural habitats compared with pre-dam conditions in the Colorado River through Grand Canyon. Reduced habitat quality may partially explain why subadults use naturalized habitats, like vegetated shorelines, that did not exist historically more than natural habitats, like talus and debris fan shorelines.

Vegetated Shoreline Habitat

Shoreline vegetation in Grand Canyon consists mainly of overhanging tamerisk (*Tamarix chinensis*) that has stabilized sand deposits. Tamerisk is an exotic riparian plant that has been present in the Colorado River since the early part of this century but was not able to stablize sand at the waters edge until the onset of flow regulation in 1962. Before that time, annual floods scoured shorelines of any perennial vegetation, leaving extensive sand beaches (Turner and Karpiscak 1980).

Relatively high use of vegetated shorelines by subadult humpback chub implies that subadults may prefer these new areas over natural habitats, like talus or debris fan. Naturalized vegetation may be used more than natural habitats for three reasons: 1) original shoreline conditions may have been modified by flow regulation such that they currently provide only marginally acceptable conditions; 2) previously important shoreline types are no longer present; or

3) vegetated shorelines simply provide better habitat conditions than naturally exist.

Modified Shoreline Conditions

Flow regulation may alter a suite of physical or biological shoreline conditions thereby limiting subadult humpback chub habitat quality. Changes in discharge cause basic hydraulic changes in the river (Leopold et al. 1964). Before dam operations, base flows of the Colorado River were two to five times less than the current average base flow. My results suggest that higher base flows in the current flow regime increase mean depth, velocity and decrease cover. At-a-station hydraulic geometry predicts that depth and velocity increase as discharge increases (Richards 1977), however it is unclear why the occurance of cover decreases with increasing discharge.

An examination of the cover/discharge relationship for individual shoreline types partially explains this phenomenon. The presence of cover is the result of structural heterogeneity along the wetted perimeter of the channel. ① The structure of bedrock, debris fan and talus shoreline types depends on morphology of local geology and the shoreline angle of repose along the waters edge. These are geologically dependent shoreline types. As basic geomorphology predicts (Leopold et al. 1964; Ritter 1978), the angle of repose decreases as colluvium accumulates at the toe of the slope. At higher discharges, the channel margins may encounter more uniform or massive colluvium and higher angles of repose, or shoreline availability may shift to more bedrock and sheer walls; consequently, structural heterogeneity would decrease with increasing discharge among these shoreline types.

② In contrast, cobble, sand and vegetation shoreline types are formed from main channel

activity at high discharges and are exposed as water levels recede. The structure of these shorelines is not as dependant on local lithology; therefore, these shorelines are geologically independent. Because these shorelines are formed by alluvial deposits, their structure and angle of repose at the waters edge is more homogenous at all discharges encountered in this study (Figure 9). I expect, however, that this relationship is sinusoidal since cobble, sand and vegetation become exposed at some discharge lower and inundated at some discharge higher than those observed in this study.

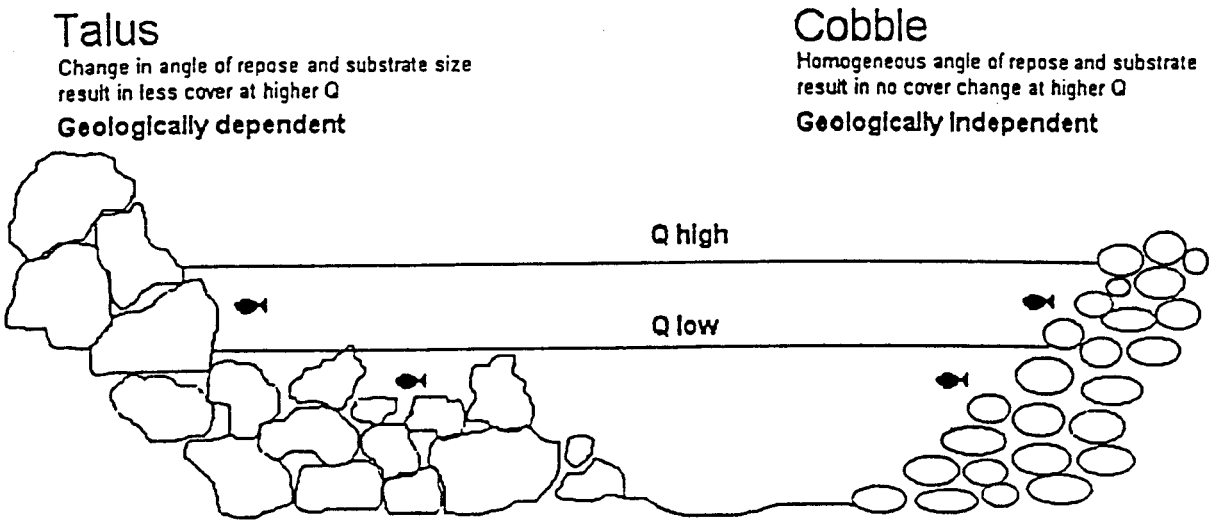


Figure 9. Channel cross section demonstrating difference of how cover changes with discharge between geologically dependent and independent shoreline types.

Although food abundance was not considered in this study, regulation by Glen Canyon Dam has altered food availability and the food web dynamics in the Colorado River through Grand Canyon (Blinn and Cole 1991). Glen Canyon dam traps allochtonous debris thereby shifting the foodbase from allochtonous to primarily autochtonous. Such alterations may alter or limit food availability in channel margins. However, vegetated shorelines may provide allochtonous debris from riparian vegetation and consequently, more macroinvertebrates may be associated with such inputs. Fish may select vegetation for this reason only, or more likely, they may be attracted to a combination of habitat conditions that include greater food availability and specific physical conditions.

Loss of Historic Habitat

Another possible explanation for subadult humpback chub occurring along vegetated shorelines rather than natural shoreline types is that certain habitat types have been lost with the onset of flow regulation. Because flow and sediment transport regimes in the Colorado River through Grand Canyon have been altered, sand deposits are less extensive and structurally more simple (less sinuous perimeter and less complex bedforms) than those that occurred in the pre-dam era (Graf et al. 1987; Schmidt and Rubin 1995). Sand deposits may have historically provided complex, sinuous shoreline habitat, such as backwater habitat, that no longer exists or is currently infrequent and ephemeral. Shoreline complexity in sand deposits (e.g., backwater habitat) is known to provide harbored depths and velocities for fish and greater protection from predators (Tyus 1991; Arizona Game and Fish 1994). The few backwaters that are permanent in Grand Canyon can have very high densities of young native fish, but fish presence in backwaters

...ids on high turbidity conditions (personal observation; Arizona Game and Fish Department 1994; Valdez and Ryel 1995).

Implications of Flow Regulation on Survival of Subadult Humpback Chub

When compounded with other changes in the river ecosystem, decreased habitat quality may limit survival of subadult humpback chub in the Colorado River through Grand Canyon. In addition to a general reduction in physical habitat quality, the dam has altered water temperature. Historically, temperatures ranged from 2 to 18°C. The Colorado River temperature now averages from 9 to 11°C at the LCR (Bureau of Reclamation 1995; Valdez and Ryel 1995). Consequently, growth, reproduction and survival of native fish have almost certainly been affected. Bulkley et al. (1982) showed extreme compromises in swimming abilities and growth rates of humpback chub in temperatures ranging from 5 to 15°C. In response to these changes, young fish may have to occupy very different environments, in which they expend less energy to survive. For example, subadult humpback chub may be forced to occupy a portion of the channel margin nearer to shore, which has more cover and refuge from high velocities to reduce energy expenditure, or young fish may shift to naturalized vegetated shorelines that consistently provide these conditions at a range of discharges.

These thermal constraints together with a decrease in habitat quality due to artificially high base flows have probably inflicted an extreme and detrimental post-dam environmental change on subadult humpback chub in the Colorado River through Grand Canyon that limits their growth and survival. Yet, to date, the effect of artificially elevated base flows has not been included in

..aluation of Glen Canyon Dam operations on native fish habitat in the Colorado River through Grand Canyon.

Based on results of this study, I recommend the following actions: 1) the effects of high base flows on habitat conditions and consequently, on growth and survival of humpback chub should be researched in a controlled setting; 2) managers should consider an operating criteria of Glen Canyon Dam that integrates low releases during periods most critical to subadult humpback chub survival and 3) managers must consider compounded effects of presumedly unrelated factors, like temperature and discharge, in the management and conservation of complex, human-altered ecosystems, like the Grand Canyon.

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APPENDICES

Appendix A
Literature review of
humpback chub studies

Table 10. Summary of documented humpback chub studies.
u = unpublished and p = published

AUTHOR	TITLE AND SUBJECT	
Archer et al., 1985b	Endangered fish of Upper Colorado River	u
Archer et al., 1985a	Endangered fish of Upper Colorado River	u
Arizona Game and Fish Dept., 1994	Glen Canyon Environmental Studies Phase II1993 Annual Report	u
Banks, 1964	Fish species distribution in Dinosaur National Monument, 1961 and 1962.	u
Brown et al., 1995	Grand Canyon Fisheries Integrated Database; Life history and ecology of Humpback Chub in the Colorado R., Grand Canyon.000	u
Bulkley et al., 1982	Tolerance preferences of Colorado River endangered fishes to selected habitat parameters	u
Burdick and Kaeding, 1985	Reproductive ecology of humpback chub and roundtail chub in Upper Colorado R.	u
Carter et al., 1985	Fisheries habitat dynamics in the Upper Colorado River	p
Chart, 1995	Humpback chub reproduction and recruitment, Westwater Canyon: 1992-1994	u
Clarkson et al.,	Management of discharge, temperature, and sediment in Grand Canyon for native fishes	u
Douglas, 1993	Analysis of sexual dimorphism in an endangered cyprinid fish (*Gila cypha*)	p
Douglas et al., 1989	Qualitative characters identification of Colorado River chubs and the art of seeing well	p
Douglas and Marsh, 1992	Semi-annual report on ecology and conservation biology of humpback chub in the Little Colorado River	u

Dowling and DeMarais, 1993	Evolutionary significance of introgressive hybridization of cyprinid fishes	p
Gorman et al., 1993 & 1994	GCES Phase II annual reports	u
Hamman, 1981	Hybridization of three species of chub in a hatchery	p
Hamman, 1982	Spawning and culture of humpback chub	u
Haynes and Muth, 1981	Lordosis in *Gila*, Yampa River	u
Haynes et al., 1985	Identification of habitat needs and limiting factors for Colorado squawfish and humpback chub	u
Heggen and Radant, 1980	Habitat monitoring performance report	u
Holden, 1980	Relationship between flows in the Yampa R. and success of rare fish populations in the Green R.	u
Holden and Stalnaker, 1975	Distribution and abundance of fishes of Middle and Upper Colorado River Basin, 1967-1973	p
Holden and Stalnaker, 1970	Systematics studies of *Gila* in the Upper Colorado River Basin	p
Jacobi and Jacobi, 1981	Fish stomach content analysis	u
Kaeding and Zimmerman, 1983	Life history and ecology of humpback chub in the Little Colorado River	u
Kaeding et al., 1990	Temporal and spatial relations between the spawning humpback chub and roundtail chub in the Upper Colorado R.	p
Karp and Tyus, 1990	Humpback chub (*Gila cypha*) in the Yampa and Green rivers	p
Kubly, 1990	The endangered humpback chub (Gila cypha) in Arizona: a review of past and present suggestions for future research	u

Lupher and Clarkson, 1994	Temperature tolerance of humpback chub and Colorado squawfish	u
Maddux et al., 1987	Effects of varied flow regimes on aquatic resources of Glen and Grand Canyons	u
Maddux et al., 1985	Current research on native fishes of Grand Canyon	u
Maddux et al., 1990	Colorado River endangered fishes critical habitat	u
Marsh, 1985	Effects of incubation temperature on survival of embryos of native Colorado River fishes	p
Marsh and Pisano, 1985	Influence of temperature on development of hatching success of native Colorado River fishes	u
Miller, Tyus and Carlson, 1982	Fishes of the Upper Colorado River System	u
Miller, 1946	Gila cypha, a new species of cyprinid from the Colorado River in Grand Canyon	p
Miller et al., 1982	Colorado River Fishery Project Part 3 final report	u
Miller and Smith, 1984	Fish remains from Stanton's Cave, Grand Canyon of the Colorado, Arizona	p
Minckley, 1979	Additional studies on the Little Colorado River population of humpback chub	u
Minckley, 1978	Recovery of the humpback chub and observations on that species, 1978	u
Minckley, 1989	Final report on research conducted on the Little Colorado River population of the humpback chub	u
Minckley, 1991	Native fishes of the Grand Canyon region: an orbituary?	u
Minckley, 1992	Observed growth and movement in individuals of the Little Colorado River population of the humpback chub	u

Minckley, 1992	Synthesis of information on the federally endangered humpback chub in the Colorado River Basin	u
Moretti et al., 1989	Distribution and abundance of Gila spp. In Desolation and Gray Canyons of the Green R. 1985-1986	u
Muth, 1990	Ontongeny and taxonomy of humpback chub, bonytail and roundtail chub larvae and early juveniles	u
Pimental and Bulkley, 1983	Concentrations of total dissolved solids preferred or avoided by endangered Colorado River fishes	p
Prats and Valdez, 1995	Use of scales for determination of subadult humpback chub size at transition into the Colorado R., Grand Canyon	p
Resource Consultants Inc, 1985	Biological assessment, Green Mountain Reservoir water marketing program	u
Rosenfeld and Wilkinson, 1989	Biochemical genetics of the Colorado River Gila complex	p
Smith et al., 1979	Species relationships among fishes of the genus *Gila* in the upper Colorado River drainage	u
Stanford, 1994	Instream flows to assist the rcovery of endangered fishes of the upper Colorado River Basin	u
Starnes, 1995	Colorado River Basin *Gila* taxonomy project	u
Suttkus and Clemmer, 1977	The humpback chub in the Grand Canyon area of the Colorado River	u
Tyus et al., 1982	Fishes of Upper Colorado River Basin	p
Tyus and Karp, 1989	Habitat use and flow needs for rare Colorado River fish	u
Tyus and Minckley, 1988	Migrating Mormon crickets as food for stream fishes	p

USFWS, 1987	Recovery implementation program for endangered fish species in the Upper Colorado River Basin	u
USFWS, 1984	Endangered Colorado River habitat utilization curves	u
USFWS, 1990	Humpback chub recovery plan	u
Valdez, 1990	Endangered fishes of Cataract Canyon	u
Valdez et al., 1982	Upper Colorado River Investigations	u
Valdez and Nilson, 1982	Radiotelemetry as a means of assessing movement and habitat selection of humpback chub	p
Valdez et al., 1992	Characterization of the life history and ecology of the humpback chub in Grand Canyon annual report	u
Valdez et al., 1987	Habitat suitability curves for endangered fish of the Upper Colorado River Basin	u
Valdez and Clemmer, 1982	Life history and recovery of bonytail chub and humpback chub	p
Valdez and Hugentobler, 1993	Characterization of the life history and ecology of the humpback chub in Grand Canyon. Annual report	u
Valdez and Masslich, 1995	Reproduction of humpback chub in a warm spring along the Colorado River in Grand Canyon	p
Valdez and Ryel, 1995	Characterization of the life history and ecology of the humpback chub in Grand Canyon. Final report	u
Valdez, 1980	Status of distribution and taxonomy of humpback chub in the Upper Colorado River	u
Wasowicz and Yard, 1993	Predation by osprey on endangered humpback chub	p
Wick and Hawkins, 1989	Observations on the use of the Little Snake River in Colorado by Colorado squawfish and humpback chub	u
Wick, 1975	Can the humpback chub be saved; a report on the possible find of a remnant population of *Gila cypha*	

Appendix B
Lengths of shoreline types
summarized by river mile

Table 11. Mapped shoreline lengths (m) and total riffle area (m^2) as determined from aerial photographs and field mapping summarized by river miles (RM). BE = Bedrock, CB = Cobble, DF = Debris Fan, SA = Sand, TS = Talus, VG= Vegetation, and RA = Riffle area.

RM	BE	CB	DF	SA	TS	VG	TOTAL	RA
62.4	1408	512	846	219	187	289	3461	9805
63.4	1496	693	1095	204	1039	0	4527	8011
64.4	76	147	901	433	1535	842	3934	396
65.4	396	828	0	119	969	1421	3733	0
66.4	342	0	1593	121	1427	160	3643	17963
67.4	272	1681	635	176	1720	330	4814	27101
68.4	297	1050	297	176	781	1117	3718	15073
69.4	711	1329	799	375	286	1405	4905	68687
70.4	574	11	939	330	628	796	3278	71128
71.4	203	767	595	276	162	1226	3229	18261
72.4	831	796	221	321	405	1624	4198	10114
73.4	509	1685	463	347	840	243	4087	89205
74.4	946	174	200	488	286	976	3070	5543
75.4	623	103	613	382	570	1585	3876	11695
76.4	763	421	262	698	1264	420	3828	13082
TOTAL	9447	10197	9459	4665	12099	12434		

Appendix C
Catch rates of subadult humpback chub summarized by reach

Table 12. Catch rates (CR; catch per 10 h fishing) of subadult humpback chub in Reach 1 summarized by shoreline types (ST): BE = Bedrock, CB = Cobble, DF = Debris Fan, SA = Sand, TS = Talus, VG = Vegetation. River Mile (RM) and date of sampling (year/month/day) are also shown.

ST	RM	CR	Date
BE	61.40	0.00	931109
BE	61.40	0.00	921107
BE	61.40	0.00	910717
BE	61.80	0.00	921107
BE	61.80	0.00	920714
BE	61.80	3.23	911111
BE	61.80	3.97	920915
BE	61.80	0.00	930114
BE	61.80	4.38	920912
BE	61.85	0.00	931013
BE	61.85	0.00	931109
BE	61.85	0.00	930316
BE	61.85	0.00	920307
BE	61.89	0.00	921108
BE	61.90	0.00	930715
BE	61.90	0.00	920714
BE	61.90	0.00	920117
BE	61.90	3.39	920815
BE	61.90	3.74	910913
BE	61.90	4.85	910913
BE	61.90	4.16	920714
BE	61.90	2.97	911110
BE	61.90	3.25	911111
BE	61.92	0.00	930116
BE	61.95	0.00	920308
BE	62.00	0.00	920714
BE	62.00	0.00	920815
BE	62.10	0.00	930413
BE	62.15	0.00	931108
BE	62.15	0.00	920307
BE	62.20	0.00	931013
BE	62.30	0.00	920916
BE	62.34	0.00	920916
BE	62.35	0.00	921106
BE	62.35	3.89	920307
BE	62.40	1.05	920815
BE	62.50	0.00	930715
BE	62.50	0.00	930715
BE	62.50	0.00	930317
BE	62.55	0.00	921106
BE	62.55	4.00	920309
BE	62.55	0.00	920717
BE	62.60	0.00	920716
BE	62.60	0.00	920309
BE	62.60	0.00	920512
BE	62.70	3.45	930415
BE	62.70	5.25	930414
BE	62.70	3.26	930413
BE	63.20	5.03	920716
BE	63.33	0.00	930117
BE	63.35	3.94	920717
BE	63.40	0.00	940717
BE	63.40	3.85	930517
BE	63.40	0.00	920717
BE	63.40	0.00	920313
BE	63.45	3.93	921106
BE	63.48	0.00	920917
BE	63.50	0.00	910916
BE	63.55	5.44	930117
BE	63.70	0.00	910915
BE	64.20	4.63	921109
BE	64.35	0.00	930117
BE	64.40	4.83	920120
BE	64.45	0.00	930719

Table 12.-Continued.

ST	RM	CR	Date
BE	64.55	4.51	930117
BE	64.60	6.29	920718
BE	64.60	6.05	920119
BE	64.65	0.00	940719
BE	64.65	5.53	940718
BE	64.70	6.07	930415
BE	64.80	3.68	920119
BE	64.80	3.98	921108
BE	64.80	3.86	911113
BE	64.80	0.00	920312
BE	64.85	4.37	920312
BE	64.85	0.00	930612
BE	64.90	3.62	930117
BE	65.10	4.92	910915
CO	61.40	0.00	930715
CO	61.40	0.00	930316
CO	61.40	0.00	930512
CO	61.40	4.03	920117
CO	61.40	0.00	911111
CO	61.40	0.00	940716
CO	61.45	0.00	921107
CO	61.45	6.39	930816
CO	61.50	3.68	910912
CO	61.57	0.00	930512
CO	61.59	0.00	930216
CO	61.60	4.31	931109
CO	61.60	4.02	930215
CO	61.67	3.77	930816
CO	61.68	0.00	930316
CO	61.70	0.00	940715
CO	61.70	0.00	910718
CO	61.70	0.00	930514
CO	61.70	0.00	931109
CO	61.70	3.75	911111
CO	62.00	0.00	920117
CO	62.30	0.00	931109
CO	62.50	0.00	910913
CO	62.70	0.00	920815
CO	62.75	0.00	931014
CO	64.20	4.04	911113
CO	64.40	4.93	920313
DF	61.40	0.00	911111
DF	61.50	0.00	930613
DF	61.55	4.16	930917
DF	61.55	0.00	921107
DF	61.60	0.00	930413
DF	61.60	3.95	920714
DF	61.60	0.00	930413
DF	61.60	4.21	920913
DF	61.75	4.38	921105
DF	61.85	0.00	930514
DF	61.85	0.00	930316
DF	61.85	0.00	940715
DF	61.89	0.00	930215
DF	61.90	3.71	921106
DF	61.90	0.00	920913
DF	61.90	4.73	930414
DF	61.98	0.00	930316
DF	61.99	5.88	940716
DF	62.00	5.15	920912
DF	62.00	0.00	910718
DF	62.00	0.00	920309
DF	62.00	0.00	920307
DF	62.00	0.00	921105
DF	62.00	5.21	930715
DF	62.00	0.00	930216
DF	62.00	0.00	920916
DF	62.00	0.00	920714
DF	62.10	0.00	920912
DF	62.10	0.00	930612

Table 12.-Continued.

ST	RM	CR	Date
DF	62.10	0.00	921108
DF	62.10	4.44	920714
DF	62.10	0.00	930815
DF	62.10	6.07	931013
DF	62.11	5.99	930216
DF	62.11	0.00	930316
DF	62.15	0.00	920913
DF	62.15	0.00	920913
DF	62.15	0.00	931109
DF	62.15	0.00	931108
DF	62.15	0.00	930512
DF	62.15	0.00	920307
DF	62.18	0.00	930216
DF	62.21	0.00	930512
DF	62.23	0.00	930316
DF	62.30	4.90	930915
DF	62.30	0.00	940716
DF	62.30	5.52	930915
DF	62.40	5.30	930917
DF	62.40	5.79	930917
DF	62.45	4.48	930715
DF	62.45	0.00	930317
DF	62.46	5.26	920309
DF	62.50	4.21	920716
DF	62.50	6.95	930917
DF	62.50	0.00	920916
DF	62.50	4.07	920912
DF	62.50	0.00	910718
DF	62.50	4.09	910718
DF	62.55	0.00	930815
DF	62.55	5.17	930217
DF	62.55	4.56	930317
DF	62.55	0.00	930513
DF	62.55	7.06	920713
DF	62.55	0.00	930318
DF	62.55	4.41	921106
DF	62.60	5.11	920815
DF	62.65	5.13	921106
DF	62.65	0.00	920309
DF	62.65	4.86	920716
DF	62.65	0.00	930514
DF	62.65	5.96	940716
DF	62.65	4.75	930513
DF	62.65	7.01	930714
DF	62.65	4.39	930317
DF	62.65	5.91	930217
DF	62.65	0.00	930318
DF	62.65	6.35	930815
DF	62.70	0.00	920716
DF	62.70	4.13	920713
DF	62.70	7.82	931014
DF	62.70	0.00	930613
DF	62.77	3.48	921105
DF	62.77	4.70	920716
DF	62.85	0.00	920714
DF	62.95	5.18	920717
DF	62.95	0.00	930316
DF	63.00	5.15	930818
DF	63.05	0.00	940716
DF	63.10	4.25	920912
DF	63.10	4.86	920913
DF	63.10	4.77	921106
DF	63.10	4.72	920913
DF	63.10	4.64	920916
DF	63.10	3.89	921105
DF	63.10	3.59	920815
DF	63.10	5.16	920912
DF	63.10	0.00	930613
DF	63.20	4.64	920816
DF	63.45	4.44	920917

Table 12.-Continued.

ST	RM	CR	Date
DF	63.45	4.11	930718
DF	63.47	5.31	940717
DF	63.47	0.00	930517
DF	63.47	0.00	930322
DF	63.47	0.00	930219
DF	63.48	0.00	930322
DF	63.49	5.71	930117
DF	63.50	0.00	930819
DF	63.50	4.53	910916
DF	63.50	4.64	930415
DF	63.50	5.82	920917
DF	63.50	0.00	920120
DF	63.50	4.74	921109
DF	63.50	0.00	921109
DF	63.50	4.72	920716
DF	63.50	5.04	920120
DF	63.50	4.87	920717
DF	63.50	5.33	920513
DF	63.50	0.00	920313
DF	63.50	3.96	920917
DF	63.55	4.65	920917
DF	63.55	4.73	920719
DF	63.60	4.21	920816
DF	63.80	0.00	911112
DF	63.80	5.85	910914
DF	63.80	5.68	910915
DF	63.80	0.00	910915
DF	63.80	4.30	911112
DF	63.80	0.00	930219
DF	63.80	3.31	911112
DF	63.80	5.83	911112
DF	63.87	4.44	921109
DF	63.90	5.12	930718
DF	63.90	0.00	911113
DF	63.91	4.08	930517
DF	64.20	0.00	930519
DF	64.35	5.84	930918
DF	64.40	4.10	920313
DF	64.40	5.35	920514
DF	64.40	4.11	920718
DF	64.55	0.00	930616
DF	64.57	0.00	920312
DF	64.60	4.10	930920
DF	64.60	5.64	911113
DF	64.70	0.00	921109
DF	64.70	5.52	920919
DF	64.70	4.94	921109
DF	64.70	5.91	911113
DF	64.80	5.81	920716
DF	64.80	0.00	920818
DF	64.80	4.93	921108
DF	64.95	0.00	920313
DF	65.15	6.01	930717
DF	65.20	0.00	920121
DF	65.20	4.17	930218
DF	65.25	4.73	930817
SA	61.40	0.00	931109
SA	61.50	0.00	930415
SA	61.50	0.00	930415
SA	61.50	0.00	930613
SA	61.60	0.00	930613
SA	61.70	0.00	931108
SA	61.70	0.00	930512
SA	61.80	0.00	921107
SA	61.85	0.00	931013
SA	61.85	0.00	930715
SA	61.85	0.00	930114
SA	61.90	0.00	930414
SA	62.00	0.00	940716
SA	62.10	0.00	931108

Table 12.-Continued.

ST	RM	CR	Date
SA	62.25	4.44	920309
SA	62.60	0.00	920818
SA	62.60	0.00	930414
SA	62.60	3.11	920513
SA	62.65	0.00	920716
SA	62.70	4.86	930413
SA	62.70	0.00	920512
SA	63.10	0.00	930714
SA	63.10	0.00	930215
SA	63.20	0.00	9209
SA	63.27	0.00	921105
SA	63.28	0.00	930215
SA	63.45	0.00	930718
SA	63.50	0.00	910916
SA	63.55	4.49	921109
SA	63.70	0.00	920818
SA	63.75	5.76	930116
SA	64.20	0.00	920313
SA	64.20	0.00	920313
SA	64.55	0.00	920312
SA	64.60	4.71	920718
SA	64.65	4.67	930717
SA	64.65	0.00	930517
SA	64.70	4.92	910719
SA	64.70	0.00	910719
SA	64.70	0.00	921109
SA	64.80	5.22	911113
SA	64.90	4.51	921108
SA	65.30	0.00	920516
TS	61.50	0.00	921105
TS	61.55	0.00	931109
TS	61.55	5.22	921105
TS	61.60	0.00	930715
TS	61.60	0.00	920308
TS	61.65	4.06	930715
TS	61.70	4.27	920714
TS	61.70	3.92	920509
TS	61.70	6.27	931013
TS	61.72	0.00	930514
TS	61.75	0.00	920117
TS	61.80	0.00	940715
TS	61.80	5.09	930715
TS	61.80	0.00	930514
TS	61.80	4.00	920308
TS	61.80	0.00	930215
TS	61.80	0.00	930316
TS	61.80	4.80	931013
TS	61.81	0.00	930815
TS	61.90	4.03	911111
TS	62.30	4.28	920511
TS	62.55	6.46	931014
TS	62.60	4.96	920511
TS	62.60	0.00	920510
TS	62.68	5.62	940716
TS	62.70	6.96	930714
TS	62.75	7.09	931014
TS	62.77	0.00	920916
TS	62.80	0.00	920818
TS	62.85	0.00	930316
TS	63.00	4.87	920817
TS	63.00	5.51	920817
TS	63.10	0.00	930513
TS	63.10	0.00	930316
TS	63.10	4.25	930815
TS	63.10	0.00	930316
TS	63.10	5.25	930714
TS	63.10	0.00	930215
TS	63.10	4.70	920816
TS	63.10	0.00	940716
TS	63.10	6.23	920512

Table 12.-Continued.

ST	RM	CR	Date
TS	63.10	4.08	920816
TS	63.10	5.67	920817
TS	63.10	0.00	930714
TS	63.11	3.84	930215
TS	63.12	0.00	930513
TS	63.12	5.52	930513
TS	63.12	3.44	930514
TS	63.13	5.20	930318
TS	63.15	6.70	931014
TS	63.15	4.62	930117
TS	63.20	5.53	920715
TS	63.20	6.14	920511
TS	63.30	5.37	930718
TS	63.30	5.46	930219
TS	63.35	6.39	940717
TS	63.35	0.00	930815
TS	63.40	4.93	930517
TS	63.44	0.00	930117
TS	63.45	4.38	930819
TS	63.45	3.77	930317
TS	63.45	4.96	930617
TS	63.45	0.00	930516
TS	63.45	7.01	931014
TS	63.45	5.88	930918
TS	63.45	0.00	930219
TS	63.45	5.35	930318
TS	63.47	0.00	930317
TS	63.48	3.81	940719
TS	63.50	5.44	920718
TS	63.50	4.53	930818
TS	63.50	4.75	940717
TS	63.50	3.84	920718
TS	63.50	4.92	930518
TS	63.50	0.00	920818
TS	63.50	0.00	930116
TS	63.50	6.20	940718
TS	63.50	7.09	931014
TS	63.51	4.97	930318
TS	63.51	3.99	930219
TS	63.51	4.81	930516
TS	63.52	0.00	930516
TS	63.55	5.25	930921
TS	63.58	5.64	920918
TS	63.60	5.51	930918
TS	63.70	7.11	931016
TS	63.72	6.13	931016
TS	64.00	0.00	920817
TS	64.10	5.48	920515
TS	64.11	6.24	931017
TS	64.25	4.30	930517
TS	64.30	4.13	910719
TS	64.30	3.79	910719
TS	64.30	0.00	910719
TS	64.30	5.71	910719
TS	64.30	6.03	930321
TS	64.30	0.00	930321
TS	64.30	5.64	930817
TS	64.30	3.48	930719
TS	64.30	3.70	920817
TS	64.34	4.39	930517
TS	64.35	0.00	930320
TS	64.40	0.00	910719
TS	64.40	0.00	920313
TS	64.40	0.00	920313
TS	64.45	0.00	921109
TS	64.45	0.00	930322
TS	64.50	4.32	930320
TS	64.60	5.16	930320
TS	64.60	0.00	930117
TS	64.60	0.00	930616

Table 12.-Continued.

ST	RM	CR	Date
TS	64.65	0.00	930516
TS	64.67	0.00	930817
TS	64.70	4.96	930217
TS	64.70	4.94	910720
TS	64.70	4.27	920515
TS	64.70	5.63	930717
TS	64.70	5.20	920312
TS	64.70	6.07	910916
TS	64.70	4.89	920312
TS	64.70	4.27	910720
TS	64.70	0.00	910720
TS	64.75	5.71	930818
TS	64.75	0.00	930818
TS	64.80	0.00	930516
TS	64.80	6.14	931018
TS	64.80	5.99	930516
TS	64.80	3.65	930322
TS	64.80	0.00	910720
TS	64.80	3.64	910720
TS	64.80	4.19	930717
TS	64.90	5.04	920312
TS	64.90	6.38	931017
TS	64.95	4.89	930322
TS	65.00	5.96	931017
VG	61.50	0.00	930415
VG	61.90	4.51	930414
VG	62.05	0.00	930816
VG	62.10	4.25	930715
VG	62.10	0.00	930715
VG	62.10	7.47	930916
VG	62.20	6.27	930116
VG	62.20	5.81	931013
VG	62.20	0.00	930512
VG	62.21	0.00	930816
VG	62.35	5.89	930816

ST	RM	CR	Date
VG	62.65	7.35	930918
VG	62.70	0.00	920309
VG	62.70	0.00	930613
VG	63.50	4.25	920718
VG	63.50	5.35	910916
VG	63.52	5.23	920918
VG	63.55	0.00	920918
VG	63.59	4.80	930518
VG	63.59	0.00	930517
VG	63.60	5.34	930819
VG	63.60	5.86	931016
VG	63.60	4.92	930921
VG	63.60	6.36	930718
VG	63.60	0.00	930617
VG	63.60	0.00	930317
VG	63.60	5.32	940718
VG	63.70	0.00	930617
VG	63.75	5.77	930819
VG	63.75	5.45	940718
VG	63.75	6.84	930919
VG	63.75	4.65	920718
VG	63.80	5.31	910916
VG	63.80	5.68	910915
VG	63.80	4.30	920513
VG	63.90	5.66	910915
VG	64.00	5.87	930718
VG	64.03	0.00	930321
VG	64.05	5.10	930516
VG	64.05	5.49	930818
VG	64.07	5.67	930321
VG	64.10	4.99	931017
VG	64.20	5.50	931110
VG	64.25	5.73	930719
VG	64.25	0.00	930616
VG	64.29	0.00	930517

Table 12.-Continued.

ST	RM	CR	Date
VG	64.30	0.00	920313
VG	64.30	5.29	930416
VG	64.35	3.95	920718
VG	64.40	4.68	930415
VG	64.40	0.00	920119
VG	64.40	0.00	920119
VG	64.50	6.34	930817
VG	64.50	5.07	930819
VG	64.50	0.00	920313
VG	64.50	6.54	930920
VG	64.50	0.00	920718
VG	64.53	0.00	940719
VG	64.53	0.00	930519
VG	64.54	5.52	930322
VG	64.55	5.88	930920
VG	64.55	5.94	930322
VG	64.90	5.53	930717
VG	64.90	5.95	930817
VG	64.90	0.00	930218
VG	64.90	5.34	910916
VG	64.90	0.00	920121
VG	64.93	4.10	930321
VG	64.95	6.30	930617
VG	64.95	3.81	930516
VG	65.00	0.00	920121
VG	65.00	5.54	930415
VG	65.00	0.00	930615
VG	65.00	4.36	940717
VG	65.00	5.40	910915
VG	65.00	5.96	910916
VG	65.05	5.69	920314
VG	65.10	6.37	920516
VG	65.10	6.41	931018
VG	65.25	6.42	930717
VG	65.30	0.00	910720
VG	65.30	5.12	920314

Table 13. Catch rates (CR; catch per 10 h fishing) of subadult humpback chub in Reach 2 summarized by shoreline types (ST): BE = Bedrock, CB = Cobble, DF = Debris Fan, SA = Sand, TS = Talus, VG = Vegetation. River Mile (RM) and date of sampling (year/month/day) are also shown.

ST	RM	CR	Date
BE	65.40	0.00	920516
BE	65.60	0.00	930118
BE	65.60	5.32	910914
BE	65.70	5.84	910914
BE	66.30	0.00	930118
BE	66.40	3.89	930720
BE	66.90	0.00	940719
BE	68.10	6.74	940720
BE	68.20	5.22	930922
BE	68.20	0.00	930616
BE	68.25	4.73	931114
BE	68.30	3.58	911115
BE	68.30	4.27	920715
BE	68.30	5.91	911115
BE	68.30	3.91	921111
BE	68.30	0.00	930118
BE	68.30	5.11	920918
BE	68.90	0.00	940721
BE	69.30	0.00	940721
BE	69.50	0.00	940721
BE	69.60	5.04	931114
BE	70.20	4.96	930722
BE	70.45	0.00	930821
BE	71.40	0.00	940722
BE	71.61	0.00	930119
BE	71.70	5.44	940721
CO	65.75	4.50	930719
CO	66.40	0.00	930720
CO	66.45	0.00	940719
CO	66.50	3.47	931113
CO	66.60	0.00	940719
CO	68.00	0.00	930721
CO	68.00	4.51	940720
CO	68.00	5.89	931018
CO	70.00	0.00	921031
CO	70.50	0.00	931105
CO	70.60	4.43	930923
CO	70.70	4.21	930722
CO	70.80	6.09	930822
CO	71.50	0.00	930823
CO	71.50	0.00	940722
CO	72.00	0.00	940721
DF	65.70	0.00	921110
DF	66.15	3.93	930118
DF	66.35	0.00	921110
DF	66.80	0.00	930922
DF	66.85	0.00	931113
DF	67.00	4.80	921110
DF	67.15	0.00	931113
DF	67.20	0.00	930118
DF	67.20	4.77	930921
DF	67.40	0.00	921110
DF	67.40	0.00	911114
DF	67.50	0.00	920110
DF	67.80	0.00	911115
DF	67.80	5.46	930821
DF	67.80	0.00	911114
DF	68.00	0.00	911115
DF	68.00	0.00	920110
DF	68.15	5.93	930821
DF	68.30	6.78	930821
DF	68.30	6.38	930821
DF	68.30	5.91	930721
DF	68.30	3.47	911115

Table 13.-Continued

ST	RM	CR	Date
DF	68.35	0.00	930118
DF	68.40	0.00	921111
DF	68.40	0.00	920918
DF	68.40	0.00	930616
DF	68.40	0.00	921111
DF	68.45	0.00	930118
DF	69.40	0.00	930119
DF	69.70	0.00	930822
DF	69.71	0.00	930119
DF	70.00	0.00	921031
DF	70.30	6.61	921031
DF	71.50	6.12	921030
DF	72.30	5.48	940721
SA	66.40	0.00	930922
SA	67.65	0.00	940720
SA	68.20	0.00	911115
SA	68.80	0.00	940721
SA	69.80	0.00	931106
SA	69.90	4.20	931105
SA	72.30	4.89	940721
TS	65.50	0.00	930719
TS	65.60	0.00	930320
TS	65.80	0.00	930719
TS	66.05	5.71	930921
TS	66.10	0.00	921110
TS	66.30	0.00	930320
TS	66.40	0.00	930921
TS	66.75	0.00	930320
TS	66.80	0.00	920515
TS	66.85	4.31	930320
TS	66.90	5.56	940719
TS	66.90	4.30	930721
TS	66.95	0.00	930118
TS	67.00	4.95	930320
TS	67.00	4.54	930720
TS	67.00	0.00	930320
TS	67.00	5.58	930820
TS	67.30	5.78	930720
TS	67.30	4.45	930721
TS	67.30	4.73	920516
TS	67.50	0.00	931019
TS	67.55	4.10	930118
TS	67.60	0.00	930320
TS	67.60	0.00	930819
TS	67.60	0.00	930721
TS	67.65	4.29	940720
TS	67.70	0.00	921110
TS	67.85	0.00	930320
TS	68.15	4.72	930721
TS	68.80	4.48	930822
TS	69.75	4.67	930119
TS	69.85	5.36	940721
TS	69.85	0.00	940721
TS	69.90	6.08	930722
TS	70.50	4.38	940722
TS	70.60	5.07	930722
TS	70.90	4.73	930722
TS	71.00	0.00	940722
TS	71.10	0.00	930822
TS	71.90	5.34	930723
TS	72.20	0.00	930119
VG	65.40	4.37	910916
VG	65.40	5.77	910916
VG	67.00	5.99	930720
VG	67.05	0.00	931113
VG	67.10	0.00	930720
VG	67.80	5.29	930820
VG	67.80	0.00	930617
VG	67.80	4.60	940720
VG	67.80	0.00	920109

Table 13.-Continued

ST	RM	CR	Date
VG	67.80	0.00	930721
VG	67.85	5.42	930721
VG	68.00	4.37	931113
VG	68.00	0.00	911115
VG	68.00	0.00	940720
VG	68.00	0.00	930416
VG	68.00	4.54	930721
VG	68.05	5.91	930821
VG	68.05	7.29	931018
VG	68.10	4.46	930923
VG	68.11	0.00	920110
VG	68.20	0.00	920111
VG	68.20	4.45	920110
VG	68.20	4.08	920109
VG	68.20	0.00	920110
VG	68.30	5.60	930922
VG	68.30	5.83	931113
VG	68.30	0.00	930616
VG	68.30	6.95	930922
VG	68.30	7.78	931114
VG	68.32	5.75	930819
VG	68.35	0.00	940720
VG	68.35	6.33	930721
VG	68.40	4.89	930923
VG	68.40	0.00	920110
VG	69.05	5.62	930821
VG	69.10	0.00	930119
VG	69.10	3.95	930119
VG	69.60	0.00	930923
VG	69.60	5.21	930722
VG	69.95	4.00	930821
VG	70.00	5.91	930821
VG	70.00	6.89	930822
VG	70.00	4.67	931114
VG	70.10	0.00	940722
VG	70.10	6.79	930722
VG	70.50	0.00	931105
VG	70.70	4.76	930722
VG	70.70	0.00	940722
VG	70.90	6.51	930923
VG	71.10	3.81	921031
VG	71.10	5.04	930723
VG	71.10	0.00	921031
VG	71.10	4.60	930924
VG	71.10	5.72	930722
VG	71.20	4.87	930822
VG	71.20	3.89	940722
VG	71.30	5.57	940722
VG	71.45	0.00	940722
VG	71.55	5.92	930823
VG	72.20	5.94	930822

Table 14. Catch rates (CR; catch per 10 h fishing) of subadult humpback chub in Reach 3 summarized by shoreline types (ST): BE = Bedrock, CB = Cobble, DF = Debris Fan, SA = Sand, TS = Talus, VG = Vegetation. River Mile (RM) and date of sampling (year/month/day) are also shown.

ST	RM	CR	Date
BE	73.75	0.00	930711
BE	74.80	4.22	930712
BE	75.00	0.00	930712
BE	75.30	7.07	930823
CO	73.60	0.00	940723
CO	75.90	0.00	930823
DF	74.90	0.00	930711
DF	75.50	0.00	910907
DF	75.60	0.00	920910
DF	75.85	5.38	930912
DF	75.90	6.95	930823
DF	76.00	6.29	930911
DF	76.20	5.58	930912
DF	76.20	4.55	930911
DF	76.40	0.00	920911
SA	73.50	4.77	920710
SA	75.60	3.51	920910
SA	75.80	0.00	920910
SA	75.80	0.00	910907
SA	76.10	7.28	930823
TS	74.10	0.00	930711
TS	74.90	3.64	930712
TS	75.15	4.30	930712
TS	76.10	4.39	940723
TS	76.20	5.60	940723
TS	76.25	7.63	930824
VG	73.45	0.00	930711
VG	73.60	0.00	930711
VG	73.70	5.25	920711
VG	74.20	0.00	930711
VG	74.30	4.18	920710
VG	74.50	0.00	930711
VG	74.50	3.78	930711
VG	74.50	0.00	930711
VG	74.55	3.51	930711
VG	74.60	0.00	930711
VG	74.70	6.35	930823
VG	74.80	6.17	931114
VG	75.20	3.49	920711
VG	75.85	7.75	930823
VG	76.10	6.47	930911
VG	76.20	4.55	910908
VG	76.20	0.00	920910
VG	76.20	2.66	910907
VG	76.20	3.86	910907
VG	76.20	2.91	920911
VG	76.30	6.07	930913
VG	76.40	5.77	930912
VG	76.40	5.43	940724
VG	76.50	3.86	910908

Appendix D
Longitudinal transects
summarized by reach

Table 15. Codes that describe data sets in Tables 16 and 17.

Key Code	Description	Data Codes
ID	Sample identification which is comprised of Year-Month-Day-Sample number	
INT	10 m interval at which habitat measurements were made	
RM	River mile designation at sample site	
ST	Shoreline type	1 = Bedrock 2 = Talus 3 = Debris Fan 4 = Cobble 5 = Sand 6 = Vegetation
D1	Water depth at 0.5 m from shore	
D2	Water depth at 1.5 m from shore	
D3	Water depth at 2.5 m from shore	
FD1	Flow direction at 0.5 m from shore	0 = no flow 1 = downstream 2 = upstream
V1	Absolute value of water velocity at 0.5 m from shore	
FD2	Flow direction at 1.5 m from shore	
V2	Absolute value of water velocity at 1.5 m from shore	
FD3	Flow direction at 2.5 m from shore	
V3	Absolute value of water velocity at 2.5 m from shore	
C1	Cover at 0.5 m from shore	0 = no cover 1 = lateral 2 = instream 3 = overhead 4 = L & I 5 = L & O 6 = I & O 7 = L, I & O 9 = not recorded
C2	Cover at 1.5 m from shore	
C3	Cover at 2.5 m from shore	
Q	Discharge at time of measurements	

Table 16. Longitudinal transect data for Reach 1. Table 15 describes codes used for this data set.

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9109001	1	62.5	1	1.2	1.6	2.5	1	0.17	1	0.04	1	0.23	9	9	9	11349
9109001	2	62.5	1	0.9	1.7	4.1	1	0.02	1	0.06	1	0.35	9	9	9	11349
9109001	3	62.5	1	0.6	2.4	3.9	1	0.15	1	0.02	1	0.03	9	9	9	11349
9109001	4	62.5	1	1.3	4.9	9.3	0	0	1	0.01	1	0.05	9	9	9	11349
9109001	5	62.5	1	1.1	5.3	5.9	0	0	1	0.12	1	0.23	9	9	9	11349
9109001	6	62.5	1	1.4	3	4.9	0	0	1	0.02	1	0.12	9	9	9	11349
9109001	7	62.5	1	1.3	5.9	5.1	0	0	0	0	1	0.02	9	9	9	11349
9109001	8	62.5	1	1.5	2.4	3.9	1	0.02	1	0.05	1	0.16	9	9	9	11349
9109001	9	62.5	1	1.4	1.9	2.2	1	0.18	1	0.01	1	0.03	9	9	9	11349
9109003	1	63.05	1	4.2	7.3	8.4	1	0.09	1	0.1	1	0.42	9	9	9	11349
9109003	2	63.05	1	3.4	5.6	8.3	1	0.64	1	0.26	1	0.06	9	9	9	9728
9109003	3	63.05	1	1.9	9.2	11	1	0.16	1	0.16	1	0.37	9	9	9	9728
9109003	4	63.05	1	8.6	11	11	2	0.03	2	0.04	1	0.58	9	9	9	9728
9109003	5	63.05	1	6.3	11	11	1	0.09	1	0.05	1	0.55	9	9	9	9728
9109003	6	63.05	1	11	11	11	2	0.06	1	0.34	1	0.47	9	9	9	9728
9109003	7	63.05	1	11	11	11	1	0.04	1	0.46	1	0.28	9	9	9	9728
9109003	8	63.05	1	11	11	11	2	0.03	1	0.02	1	0.21	9	9	9	9728
9209009	5	64.65	1	1.4	2.3	2.5	9	0.26	9	0.25	9	0.35	9	9	9	12756
9209009	6	64.65	1	2.2	3.4	3.7	9	0.1	9	0.32	9	0.41	9	9	9	12756
9209009	7	64.65	1	0.8	4.1	4	9	0.12	9	0.57	9	0.33	9	9	9	12756
9209009	8	64.65	1	1	1.8	3.1	9	0.01	9	0.05	9	0.41	9	9	9	12756
9306001	1	62.5	1	1.5	9	9	2	0.23	2	0.2	2	0.04	5	5	1	12756

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9306001	2	62.5	1	2.3	9.3	7.3	0	0	2	0.19	2	0.2	5	1	0	12756
9306001	3	62.5	1	0.5	6.5	6.9	2	0.08	2	0.43	2	0.36	5	1	0	12756
9306001	4	62.5	1	7.2	9.1	10.4	2	0.01	2	0.06	2	0.06	1	0	0	12756
9306001	5	62.5	1	0.9	1.6	4.5	0	0	2	0.14	2	0.11	5	1	0	12756
9306001	6	62.5	1	2.2	3.8	5.5	2	0.12	2	0.15	2	0.22	5	1	0	12756
9306001	7	62.5	1	0.4	1	1.6	0	0	0	0	2	0.03	0	0	0	12478
9307001	1	63.45	1	0.5	2	3.4	1	0.05	1	0.18	1	0.3	0	0	0	12478
9307001	2	63.45	1	7.1	6.5	7.3	1	0.45	1	0.52	1	0.51	3	0	0	12478
9307001	3	63.45	1	7.8	8.6	9	1	0.5	1	0.11	1	0.17	3	0	0	12478
9307001	4	63.45	1	11	11	11	1	0.29	1	0.7	1	0.43	3	0	0	12478
9307001	5	63.45	1	11	11	11	1	0.22	1	0.2	1	0.57	3	0	0	12478
9307001	6	63.45	1	4	11	11	1	0.7	1	0.6	1	0.09	3	0	0	12478
9307001	7	63.45	1	0.1	11	11	1	0.5	1	0.6	1	0.5	0	0	0	12478
9307001	8	63.45	1	7.8	9.5	11	2	0.05	2	0.09	2	0.02	0	0	0	12478
9307001	9	63.45	1	0.7	3.5	9	2	0.02	2	0.01	2	0.45	1	0	0	11422
9307001	10	63.45	1	5.9	6.1	3.1	2	0.5	2	0.19	2	0.37	5	0	0	11422
9307006	1	62.5	1	11	7.2	6.6	0	0	1	0.04	1	0.06	0	0	0	11422
9307006	2	62.5	1	11	11	11	2	0.1	2	0.2	1	0.12	0	0	0	11422
9307006	3	62.5	1	11	11	11	1	0.07	1	0.3	1	0.56	0	0	0	11422
9307006	4	62.5	1	11	11	11	1	0.71	1	0.88	1	0.93	0	0	0	11422
9307006	5	62.5	1	11	11	11	1	0.75	1	0.92	1	0.38	0	0	0	11422
9307006	6	62.5	1	11	11	11	1	0.83	1	1	1	0.86	0	0	0	11422
9307006	7	62.5	1	11	11	11	1	0.59	1	0.78	1	0.81	0	0	0	11422
9309001	1	61.9	1	11	11	11	1	0.35	1	0.39	1	0.27	5	0	0	11422

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9309001	2	61.9	1	11	11	11	1	0.27	1	0.3	1	0.28	1	0	0	11222
9309001	3	61.9	1	4.9	4.5	5.3	1	0.02	2	0.03	1	0.16	5	0	0	11222
9309001	4	61.9	1	2.7	3.3	11	1	0.25	1	0.33	2	0.02	1	1	1	11222
9309001	5	61.9	1	1	11	11	2	0.06	1	0.44	1	0.45	1	0	0	11222
9309001	6	61.9	1	11	11	11	1	0.44	1	0.55	1	0.39	1	0	0	11222
9309001	7	61.9	1	11	11	11	1	0.27	1	0.36	1	0.54	1	0	0	11222
9309001	8	61.9	1	11	11	11	1	0.1	1	0.6	1	0.58	1	0	0	11222
9309001	9	61.9	1	11	11	11	2	0.07	1	0.19	1	0.52	1	0	0	11222
9309001	10	61.9	1	11	11	11	2	0.15	2	0.11	2	0.05	5	0	0	11222
9109002	1	63.1	2	1	2	3.1	0	0	1	0.04	0	0	9	9	9	11222
9109002	2	63.1	2	1	2.9	3	0	0	1	0.03	1	0.02	9	9	9	11569
9109002	3	63.1	2	2.9	2.4	2	1	0.02	1	0.06	1	0.07	9	9	9	11569
9109002	4	63.1	2	1	1.8	10	1	0.01	1	0.05	1	0.01	9	9	9	11569
9109002	5	63.1	2	0.9	2.4	4.3	0	0	1	0.02	0	0	9	9	9	11569
9109002	6	63.1	2	0.8	2.4	5	0	0	1	0.12	1	0.17	9	9	9	11569
9109002	7	63.1	2	0.6	3.3	5.1	0	0	1	0.03	1	0.07	9	9	9	11569
9109002	8	63.1	2	0.6	0	0.8	1	0.01	0	0	1	0.02	9	9	9	11569
9109002	9	63.1	2	0.6	2.3	4	2	0.09	2	0.17	2	0.15	9	9	9	11569
9204001	1	61.3	2	0.3	0.4	0.5	2	0.16	2	0.04	2	0.02	9	9	9	11569
9204001	2	61.3	2	0.8	1.6	2.8	0	0	0	0	2	0.14	9	9	9	10610
9204001	3	61.3	2	0.5	0.2	1.1	2	0.09	2	0.18	2	0.18	9	9	9	10610
9204001	4	61.3	2	0.2	1.6	3.4	0	0	1	0.18	2	0.14	9	9	9	10610
9204001	5	61.3	2	4.5	7.6	8	2	0.5	2	0.19	2	0.05	9	9	9	10610
9204001	6	61.3	2	0.5	1.8	6.8	0	0	1	0.01	1	0.02	9	9	9	10610

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9204001	7	61.3	2	2.4	3.6	4.7	0	0	2	0.06	2	0.1	9	9	9	10610
9204001	8	61.3	2	4.9	5.5	7.8	2	0.06	2	0.24	2	0.07	9	9	9	10610
9204001	9	61.3	2	0.8	1	1.1	0	0	0	0	0	0	9	9	9	14715
9204001	10	61.3	2	1.1	1.1	1.6	0	0	0	0	0	0	9	9	9	14715
9205001	1	61.2	2	3.9	5.9	7	2	0.06	1	0.13	1	0.08	9	9	9	14715
9205001	2	61.2	2	0.6	0.9	0.9	0	0	0	0	0	0	9	9	9	14715
9205001	3	61.2	2	1.3	4.7	12	1	0.05	1	0.02	1	0.13	9	9	9	14715
9205001	4	61.2	2	1.1	1.9	3	1	0.01	0	0	0	0	9	9	9	14715
9205001	5	61.2	2	2.2	2.6	4	0	0	1	0.01	1	0.01	9	9	9	14715
9205001	6	61.2	2	0.5	1.1	1.9	0	0	1	0.06	1	0.08	9	9	9	19162
9205001	7	61.2	2	0.5	1	3.1	0	0	1	0.02	1	0.06	9	9	9	19162
9205002	2	64.2	2	1.5	0.8	1.9	0	0	9	0.04	9	0.03	9	9	9	19162
9205002	3	64.2	2	0.2	0.2	0.3	9	0.03	9	0.02	9	0.06	9	9	9	19162
9205002	6	64.2	2	0.3	0.7	0.4	9	0.02	9	0.15	9	0.16	9	9	9	19162
9205002	7	64.2	2	0.3	0.4	0.4	0	0	9	0.01	0	0	9	9	9	19162
9206002	1	63.75	2	1.0	1.3	1.4	0	0	0	0	9	0.01	9	9	9	19162
9206002	2	63.75	2	1.0	1.1	1.4	9	0.01	9	0.01	0	0	9	9	9	19162
9206002	3	63.75	2	0.6	0.4	2.1	9	0.07	9	0.04	0	0	9	9	9	18633
9206002	4	63.75	2	0.8	9.6	10.0	9	0.07	9	0.07	9	0.07	9	9	9	18633
9206002	5	63.75	2	1.2	2.7	3.5	0	0	9	0.01	9	0.04	9	9	9	18633
9206002	6	63.75	2	0.7	2.1	3.7	0	0	9	0.01	9	0.02	9	9	9	18633
9206002	7	63.75	2	0.9	2.0	3.3	9	0.08	9	0.01	0	0	9	9	9	18633
9206002	8	63.75	2	1.0	1.8	1.9	0	0	9	0.07	9	0.07	9	9	9	18633
9206002	9	63.75	2	1.3	3.2	3.9	9	0.07	9	0.2	9	0.17	9	9	9	18633

Table 16.-Continued

9206002	10	63.75	2	0.8	1.8	2.6	0	0	9	0.01	9	0.01	9	9	9	18633
9206007	1	61.35	2	0.34	0.32	0.51	0	0	1	0.07	1	0.08	9	9	9	14781
9206007	2	61.35	2	0.42	0.48	0.56	0	0	1	0.07	1	0.11	9	9	9	14781
9206007	3	61.35	2	0.27	0.12	0.7	0	0	1	0.05	1	0.05	9	9	9	14781
9206007	4	61.35	2	0.42	0.72	1.2	0	0	1	0.01	1	0.08	9	9	9	14781
9206007	5	61.35	2	0.55	0.93	1.33	1	0.02	1	0.02	1	0.06	9	9	9	14781
9206007	6	61.35	2	0.51	0.7	1.17	1	0.07	1	0.01	0	0	9	9	9	14781
9206007	7	61.35	2	0.61	0.92	1.23	1	0.09	1	0.09	1	0.15	9	9	9	14781
9206007	8	61.35	2	0.16	0.53	0.55	1	0.06	1	0.08	1	0.04	9	9	9	14781
9206007	9	61.35	2	0.63	0.85	1.17	1	0.16	1	0.37	1	0.28	9	9	9	13969
9206007	10	61.35	2	0.26	0.6	0.8	1	0.13	1	0.18	1	0.14	9	9	9	13969
9209001	1	61.8	2	0.4	1	1.3	0	0	1	0.11	2	0.17	9	9	9	13969
9209001	2	61.8	2	1.1	1.6	1.7	2	0.06	2	0.05	2	0.03	9	9	9	13969
9209001	3	61.8	2	0.6	0.5	1.3	0	0	0	0	0	0	9	9	9	13969
9209001	4	61.8	2	0	1.5	2.2	0	0	0	0	0	0	9	9	9	13969
9209001	5	61.8	2	2.6	2.6	2.5	2	0.03	2	0.24	0	0	9	9	9	13969
9209001	6	61.8	2	2.3	2.7	4.1	0	0	2	0.09	2	0.02	9	9	9	13969
9209001	7	61.8	2	0.9	0.9	2.8	0	0	0	0	1	0.01	9	9	9	11987
9209001	8	61.8	2	0.7	1.9	4	2	0.03	2	0.06	0	0	9	9	9	11987
9209001	9	61.8	2	1.1	2.4	4.5	0	0	0	0	2	0.45	9	9	9	11987
9209001	10	61.8	2	2.6	6	5.7	0	0	0	0	0	0	9	9	9	11987
9209004	1	63.1	2	6.7	6.1	4.2	2	0.02	2	0.03	2	0.27	9	9	9	11987
9209004	2	63.1	2	1.9	1.8	1.8	2	0.01	0	0	2	0.15	9	9	9	11987
9209004	3	63.1	2	4.5	9.8	9.3	2	0.17	2	0.16	2	0.18	9	9	9	11987
9209004	4	63.1	2	0.8	2.1	3.7	2	0.02	0	0	2	0.02	9	9	9	11987

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9209004	5	63.1	2	0.8	3	4.1	0	0	0	0	2	0.01	9	9	9	11987
9209004	6	63.1	2	0	1.8	4.3	0	0	2	0.02	2	0.01	9	9	9	11987
9209004	7	63.1	2	1.6	11.7	12	2	0.03	2	0.36	2	0.36	9	9	9	11373
9209004	8	63.1	2	4.6	6.1	7.6	2	0.15	2	0.02	2	0.01	9	9	9	11373
9209004	9	63.1	2	1.4	2.8	1.3	0	0	0	0	2	0.11	9	9	9	11373
9209004	10	63.1	2	1.6	3.7	5.3	2	0.02	0	0	0	0	9	9	9	11373
9209005	1	63.1	2	5.4	4.9	3.5	1	0.04	1	0.07	1	0.05	9	9	9	11373
9209005	2	63.1	2	4.3	4	5.3	0	0	1	0.26	1	0.26	9	9	9	11373
9209005	3	63.1	2	1	4.4	5.6	1	0.06	1	0.16	1	0.14	9	9	9	11373
9209005	4	63.1	2	0	1.3	3.4	0	0	0	0	1	0.05	9	9	9	11373
9209005	5	63.1	2	0.6	1.8	2.4	0	0	1	0.06	1	0.23	9	9	9	11373
9209005	6	63.1	2	1.8	2.6	4.1	0	0	1	0.17	1	0.32	9	9	9	11373
9209005	7	63.1	2	0.3	2.3	4.7	0	0	0	0	1	0.03	9	9	9	10023
9209005	8	63.1	2	1.7	3.9	5.5	1	0.06	1	0.06	1	0.14	9	9	9	10023
9209005	9	63.1	2	0	1.2	5.6	0	0	1	0.28	1	0.12	9	9	9	10023
9209005	10	63.1	2	1.6	3.6	4.7	1	0.06	1	0.19	1	0.08	9	9	9	10023
9209007	1	63.5	2	0.1	1	1.2	0	0	0	0	0	0	9	9	9	10023
9209007	2	63.5	2	1	3.1	4.8	9	0.01	0	0	0	0	9	9	9	10023
9209007	3	63.5	2	0.6	1.4	3.1	9	0.03	0	0	9	0.01	9	9	9	10023
9209007	4	63.5	2	0.2	0.8	1.2	0	0	9	0.05	9	0.03	9	9	9	10023
9209007	5	63.5	2	0.9	2.6	3.9	0	0	0	0	9	0.09	9	9	9	10023
9209007	6	63.5	2	1.6	1.9	3.5	9	0.12	9	0.12	9	0.05	9	9	9	10023
9209007	7	63.5	2	0.6	1	1.9	0	0	0	0	9	0.19	9	9	9	10023
9209007	8	63.5	2	1	1.8	2.9	9	0.01	9	0.08	9	0.05	9	9	9	10023

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9209007	9	63.5	2	1	2.7	1.4	0	0	0	0	9	0.09	9	9	9	10023
9209007	10	63.5	2	0.7	4.5	6	9	0.1	9	0.16	9	0.1	9	9	9	10023
9209009	1	64.65	2	2	3.3	4.4	0	0	9	0.02	9	0.22	9	9	9	10023
9209009	2	64.65	2	0.7	1.3	2.4	9	0.11	0	0	9	0.14	9	9	9	10023
9209009	3	64.65	2	1	1.5	1	0	0	9	0.1	9	0.1	9	9	9	10023
9209009	4	64.65	2	2.9	3.7	3.6	9	0.22	9	0.16	9	0.04	9	9	9	10023
9209009	9	64.65	2	2.6	3.8	4.9	9	0.01	9	0.27	9	0.5	9	9	9	10023
9209009	10	64.65	2	0.6	1.4	3.1	9	0.11	9	0.1	9	0.02	9	9	9	10023
9306002	1	62.7	2	0.5	3	5.1	0	0	2	0.04	2	0.07	0	0	0	9658
9306002	2	62.7	2	8.8	9.1	8.6	2	0.14	2	0.14	2	0.11	4	0	0	9658
9306002	3	62.7	2	12	12.2	11.2	1	0.15	1	0.22	1	0.12	4	4	4	9658
9306002	4	62.7	2	4.3	5.5	7.4	2	0.02	2	0.05	2	0.12	4	4	4	9658
9306002	5	62.7	2	1	5.7	7.8	2	0.04	2	0.02	0	0	4	4	4	9658
9306002	6	62.7	2	1.2	10.9	10.9	1	0.16	1	0.2	1	0.29	4	4	4	9658
9306002	7	62.7	2	1.6	2.4	3.5	0	0.06	0	0	0	0	4	4	0	9658
9306002	8	62.7	2	0.7	3.6	5.3	2	0.06	2	0.16	1	0.14	4	4	4	9658
9306003	1	63.5	2	0.8	1.3	3.2	0	0	0	0	2	0.02	1	1	1	9658
9306003	2	63.5	2	5.9	7.7	8.2	1	0.04	1	0.27	1	0.08	5	5	5	9781
9306003	3	63.5	2	0.3	5.1	7	0	0	1	0.01	1	0.09	5	5	5	9781
9306003	4	63.5	2	1.4	1.7	1.1	0	0	0	0	2	0.02	1	1	1	9781
9306003	5	63.5	2	0.5	1.2	1.9	0	0	2	0.04	2	0.04	0	0	0	9781
9306003	6	63.5	2	0.7	4.3	5.7	0	0	1	0.03	1	0.11	1	5	5	9781
9306003	7	63.5	2	0.5	1.7	2.8	0	0	2	0.04	2	0.01	0	0	0	9781
9306003	8	63.5	2	0.8	2.3	4.1	2	0.03	2	0.1	2	0.03	0	1	1	9781

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9306003	9	63.5	2	0.6	3.2	6.8	0	0	2	0.01	0	0	0	1	1	9781
9306003	10	63.5	2	0.5	4.5	6.4	0	0	1	0.11	1	0.27	5	5	5	11309
9306007	1	64.9	2	0.3	1.1	1.5	1	0.15	1	0.1	1	0.24	0	0	0	11309
9306007	2	64.9	2	0.1	2.4	2.7	0	0	1	0.04	1	0.26	4	1	1	11309
9306007	5	64.9	2	0.8	1.5	4.2	1	0.2	2	0.01	1	0.17	4	4	4	11309
9309003	1	63.51	2	0.3	1.4	2.9	0	0	2	0.01	1	0.02	7	7	4	11309
9309003	2	63.51	2	0.9	0.5	3.8	1	0.03	2	0.04	2	0.04	2	4	2	11309
9309003	3	63.51	2	11	11	11	1	0.38	1	0.36	1	0.68	4	0	0	11309
9309003	4	63.51	2	1.9	0.6	5.2	2	0.06	1	0.02	1	0.15	4	2	0	11309
9309003	5	63.51	2	1.9	7.4	8.8	1	0.29	1	0.31	1	0.28	2	2	0	11309
9309003	6	63.51	2	0.3	2	3.4	0	0	2	0.4	2	0.2	2	2	2	11309
9309003	7	63.51	2	1.5	2.8	4.3	1	0.01	2	0.8	2	0.9	4	2	2	11379
9309003	8	63.51	2	1.3	3.6	5.5	2	0.04	1	0.15	1	0.37	0	0	0	11379
9309003	9	63.51	2	4.3	1.8	5.5	2	0.02	1	0.05	1	0.1	4	2	2	11379
9309003	10	63.51	2	0.5	0	4.7	0	0	0	0	2	0.03	4	2	2	11379
9310003	1	63.2	2	1	1.1	1.2	2	0.05	2	0.06	1	0.01	0	0	2	11379
9310003	2	63.2	2	0.3	1.2	1.5	0	0	1	0.05	2	0.02	7	4	4	11379
9310003	3	63.2	2	0.4	2.3	6.3	0	0	1	0.07	1	0.14	4	2	2	11379
9310003	4	63.2	2	1.2	2.3	3.6	2	0.01	1	0.04	2	0.07	2	2	2	11379
9310003	5	63.2	2	0.7	2.2	3.9	1	0.01	2	0.03	2	0.07	2	2	0	11379
9310003	6	63.2	2	0.6	2.1	3.5	1	0.04	2	0.02	2	0.04	2	0	0	11379
9310003	7	63.2	2	0.9	2.4	4.2	0	0	2	0.04	2	0.09	7	4	2	9850
9310003	8	63.2	2	2.3	4.1	5.5	2	0.07	2	0.11	2	0.04	0	0	0	9850
9310003	9	63.2	2	1.3	0.9	1.1	0	0	0	0	2	0.02	7	7	7	9850

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9310003	10	63.2	2	2.1	1.8	2	1	0.04	1	0.01	0	0	7	4	7	9850
9310004	1	63.2	2	1	1.8	3.5	0	0	1	0.02	1	0.03	7	4	2	9850
9310004	2	63.2	2	0.9	1	2.1	1	0.01	1	0.07	1	0.05	2	2	2	9850
9310004	3	63.2	2	0.9	2.3	3.7	0	0	2	0.03	1	0.29	7	4	7	9850
9310004	4	63.2	2	0.2	3	5.1	0	0	1	0.05	1	0.06	7	4	4	9850
9310004	5	63.2	2	1.1	1.8	4.9	0	0	2	0.06	2	0.08	7	4	4	9850
9310004	6	63.2	2	1.1	6.2	0.7	1	0.05	1	0.09	1	0.12	4	4	4	9850
9310004	7	63.2	2	1.1	2.9	4.3	2	0.05	2	0.03	2	0.07	7	7	2	9955
9310004	8	63.2	2	1.8	3.3	5.2	2	0.05	2	0.1	1	0.05	0	0	0	9955
9310004	9	63.2	2	0.2	0.9	9	0	0	1	0.08	1	0.22	7	4	0	9955
9310004	10	63.2	2	2	2.4	1.1	1	0.05	2	0.03	2	0.05	7	7	7	9955
9310008	1	64.15	2	1	2.4	4	0	0	1	0.09	1	0.16	4	4	4	9955
9310008	2	64.15	2	0.5	3.2	4.4	0	0	1	0.09	1	0.18	7	4	4	9955
9310008	3	64.15	2	0.5	1.3	2.4	2	0.03	2	0.08	2	0.1	0	0	0	9955
9310008	4	64.15	2	0.5	0.8	4.2	0	0	0	0	1	0.05	7	7	7	9955
9310008	5	64.15	2	2.3	8	8	1	0.64	1	0.8	1	0.96	2	0	0	9955
9310008	6	64.15	2	1.2	4.4	5.5	0	0	2	0.06	2	0.11	7	4	4	9955
9310009	1	64.15	2	0.5	2.1	4.1	2	0.04	1	0.12	1	0.15	4	4	4	11511
9310009	2	64.15	2	0.8	1.9	2.8	1	0.05	1	0.1	1	0.1	2	2	2	11511
9310009	3	64.15	2	0.6	1.2	2	2	0.04	1	0.01	2	0.09	2	0	0	11511
9310009	4	64.15	2	0.3	1	3.6	0	0	0	0	1	0.03	7	7	7	11511
9310009	5	64.15	2	2.5	8	8	1	0.36	1	0.46	1	0.82	4	0	0	11511
9310009	6	64.15	2	0.5	4.2	5.2	0	0	2	0.04	2	0.13	7	4	4	11511
9208003	1	62.1	3	0.2	0.3	0.6	1	0.01	0	0	1	0.03	9	9	9	11511

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9208003	2	62.1	3	0.2	0.5	0.6	0	0	0	0	0	0	9	9	9	11511
9208003	3	62.1	3	0.1	0.2	0.2	1	0.01	1	0.06	1	0.1	9	9	9	11511
9208003	4	62.1	3	0.2	0.2	0.6	1	0.17	1	0.04	1	0.5	9	9	9	11511
9208003	5	62.1	3	0.1	0.3	0.8	0	0	0	0	1	0.13	9	9	9	11046
9208003	6	62.1	3	0.9	1.1	1.7	0	0	1	0.01	1	0.02	9	9	9	11046
9208003	7	62.1	3	0.5	0.8	1.3	0	0	1	0.05	1	0.2	9	9	9	11046
9208003	8	62.1	3	0.2	0.7	1	0	0	1	0.05	1	0.2	9	9	9	11046
9208003	9	62.1	3	0.2	0.3	0.3	0	0	0	0	1	0.01	9	9	9	11046
9208003	10	62.1	3	0.2	0.5	0.4	0	0	1	0.02	1	0.03	9	9	9	11046
9209002	2	62	3	1	2.5	3.8	1	0.05	1	0.14	1	0.09	9	9	9	11046
9209002	3	62	3	0.8	1.9	3.4	1	0.03	1	0.05	1	0.28	9	9	9	11046
9209002	4	62	3	0	0	1.7	0	0	0	0	1	0.24	9	9	9	11046
9209002	5	62	3	0.1	0	0	1	0.01	0	0	0	0	9	9	9	11046
9209002	6	62	3	0.2	0.4	1.3	1	0.11	1	0.25	1	0.39	9	9	9	10244
9209002	7	62	3	0.5	1.6	5.4	1	0.13	1	0.25	1	0.08	9	9	9	10244
9209002	8	62	3	0.7	2.2	4.1	2	0.16	2	0.13	2	0.19	9	9	9	10244
9209002	9	62	3	0.8	2.5	4.2	2	0.17	2	0.18	2	0.09	9	9	9	10244
9209002	10	62	3	0.4	1.6	2.4	2	0.12	2	0.09	2	0.15	9	9	9	10244
9209003	1	62.55	3	0.3	0.9	1.4	0	0	1	0.02	1	0.04	9	9	9	10244
9209003	2	62.55	3	0.9	0.1	3.3	0	0	0	0	1	0.06	9	9	9	10244
9209003	3	62.55	3	0.4	0.9	1.6	1	0.06	1	0.08	1	0.13	9	9	9	10244
9209003	4	62.55	3	0.4	0.9	1.9	1	0.05	1	0.01	1	0.21	9	9	9	11014
9209003	5	62.55	3	0	1	2.3	0	0	1	0.04	1	0.06	9	9	9	11014
9209003	6	62.55	3	0.1	0	3.3	1	0.32	0	0	1	0.08	9	9	9	11014

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9209003	7	62.55	3	0.8	0.9	1.5	0	0	1	0.12	1	0.23	9	9	9	11014
9209003	8	62.55	3	0.5	1.2	2	1	0.02	1	0.07	1	0.02	9	9	9	11014
9209003	9	62.55	3	1.5	2	1.3	1	0.02	0	0	0	0	9	9	9	11014
9209003	10	62.55	3	1.2	0.2	6.5	0	0	0	0	1	0.11	9	9	9	11014
9209008	1	63.5	3	0.4	0.8	1.4	9	0.02	0	0	9	0.03	9	9	9	11014
9209008	2	63.5	3	0.3	0.6	1.3	0	0	9	0.04	9	0.01	9	9	9	11014
9209008	3	63.5	3	0	2.1	0.8	0	0	0	0	0	0	9	9	9	11014
9209008	4	63.5	3	0.3	0.9	1.4	0	0	0	0	0	0	9	9	9	11798
9209008	5	63.5	3	0.3	0.7	1	0	0	9	0.3	0	0	9	9	9	11798
9209008	6	63.5	3	0	0	2.5	0	0	0	0	9	0.08	9	9	9	11798
9209008	7	63.5	3	1.9	1.4	3	9	0.02	0	0	9	0.11	9	9	9	11798
9209008	8	63.5	3	0.3	0.9	0	0	0	9	0.01	0	0	9	9	9	11798
9209008	9	63.5	3	0.4	0.5	1.7	0	0	0	0	9	0.05	9	9	9	11798
9209008	10	63.5	3	1	1.4	1.8	9	0.02	9	0.44	9	0.73	9	9	9	11798
9306004	1	63.6	3	1	1.3	1.4	1	0.65	0	0	0	0	4	4	4	11798
9306004	2	63.6	3	0.5	1	1.9	2	0.01	1	0.01	1	0.02	4	4	1	11798
9306004	3	63.6	3	1.7	1.5	1.6	0	0	1	0.09	1	0.08	7	4	4	11798
9306005	1	63.7	3	2.5	2.6	2.8	1	0.01	1	0.2	1	0.21	4	4	4	11299
9306005	2	63.7	3	0.6	1.8	2.8	2	0.01	1	0.1	1	0.19	4	4	1	11299
9306005	3	63.7	3	0.5	1.2	2.3	0	0	0	0	1	0.01	0	0	0	11299
9307002	1	63.3	3	2.3	2.8	3.5	2	0.16	2	0.2	2	0.53	4	2	2	11299
9307002	2	63.3	3	0.8	2.7	3	2	0.06	2	0.15	2	0.21	2	2	4	11299
9307002	3	63.3	3	0.9	1.1	1.2	0	0	0	0	1	0.04	2	4	4	11299
9307002	4	63.3	3	0.4	1	1.4	0	0	0	0	2	0.12	2	2	4	11299

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9307002	5	63.3	3	1.3	2.5	3.8	1	0.3	1	0.34	1	0.42	2	2	4	11299
9307002	6	63.3	3	1	2.2	1.8	1	0.03	0	0	2	0.03	4	4	2	11299
9307002	7	63.3	3	0.1	3.7	4.5	0	0	2	0.09	2	0.03	2	2	4	11299
9307003	1	63.3	3	1.2	2	2.6	2	0.08	2	0.22	2	0.02	2	4	2	14335
9307003	2	63.3	3	0.2	1.8	1.8	2	0.1	2	0.24	2	0.82	4	4	2	14335
9307003	3	63.3	3	0.1	0.5	1.7	0	0	2	0.1	0	0	2	4	2	14335
9307003	4	63.3	3	1.5	1.8	2.6	0	0	2	0.18	2	0.05	4	2	2	14335
9307003	5	63.3	3	2.2	4	5.9	2	0.33	2	0.44	2	0.72	4	4	2	14335
9307003	6	63.3	3	1.7	2.7	5	2	0.45	2	0.65	2	1.3	2	2	2	14335
9307003	7	63.3	3	0.9	5.2	6.9	0	0	1	0.71	1	1.15	4	4	2	14335
9307003	8	63.3	3	1	2.6	1.7	2	0.24	0	0	1	0.27	4	2	2	14335
9307003	9	63.3	3	0.5	1.8	3.5	2	0.5	2	0.37	2	0.17	4	4	2	14335
9307003	10	63.3	3	0.9	1.5	1.8	2	0.1	2	0.48	2	0.58	2	2	4	14335
9307005	1	62.6	3	0.9	2	3.2	2	0.1	1	0.3	1	0.45	4	2	2	13710
9307005	2	62.6	3	1	1.8	4.5	1	0.1	1	0.28	1	0.56	2	2	2	13710
9307005	3	62.6	3	1.7	2.3	1.7	1	0.07	1	0.5	1	49	2	2	2	13710
9307005	4	62.6	3	0.4	1.1	2	2	0.06	2	0.06	1	0.05	2	2	4	13710
9307005	5	62.6	3	0.5	0.9	1.5	1	0.11	1	0.08	1	0.22	2	2	2	13710
9307005	6	62.6	3	0.5	1	1.5	2	0.03	1	0.03	0	0	2	2	2	13710
9307005	7	62.6	3	0.6	2.2	4.1	0	0	1	0.04	2	0.02	2	2	2	13710
9307005	8	62.6	3	0.5	4.8	4.8	2	0.14	2	0.22	2	0.14	4	2	2	13710
9307005	9	62.6	3	1.3	2.9	4.5	1	0.09	1	0.11	2	0.16	2	2	2	13710
9307005	10	62.6	3	1	1.4	0.9	0	0	2	0.03	2	0.1	2	2	2	13710
9308008	1	64.25	3	0.8	3.1	4.3	2	0.13	2	0.23	2	0.06	7	2	2	13710

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9308008	2	64.25	3	1.1	3.9	4.8	2	0.15	2	0.19	2	0.16	6	6	2	13710
9308008	3	64.25	3	3.3	4.4	6	2	0.08	2	0.08	2	0.09	7	6	2	13710
9308008	4	64.25	3	2.2	3.4	4.7	1	0.09	1	0.05	1	0.03	7	2	2	13710
9308008	5	64.25	3	2.2	3.2	4.5	1	0.05	1	0.01	2	0.09	4	2	2	13710
9308008	6	64.25	3	1.3	1.8	4.5	2	0.14	2	0.15	2	0.18	2	2	2	13710
9308008	7	64.25	3	1.7	3.7	5.2	1	0.07	1	0.01	2	0.11	0	2	2	13710
9308008	8	64.25	3	1.8	1.5	5.8	2	0.06	2	0.02	2	0.15	4	2	0	12884
9309004	1	63.3	3	1.1	1.8	2.2	2	0.02	2	0.07	2	0.07	2	2	2	12884
9309004	2	63.3	3	0.3	1.8	1	2	0.05	2	0.05	2	0.17	2	2	2	12884
9309004	3	63.3	3	0.2	0.8	1.8	1	0.11	1	0.02	2	0.12	2	2	2	12884
9309004	4	63.3	3	0.8	1.9	0.5	2	0.08	2	0.03	2	0.05	2	2	2	12884
9309004	5	63.3	3	0.5	0.3	3.7	1	0.09	2	0.09	2	0.01	2	2	2	12884
9309004	6	63.3	3	1.1	2.5	3.7	2	0.01	1	0.17	1	0.03	4	2	2	12884
9309004	7	63.3	3	1.5	4.2	5.6	2	0.03	2	0.02	1	0.29	2	2	2	12884
9309004	8	63.3	3	1.8	2.5	3.8	2	0.07	2	0.02	1	0.03	2	2	2	12884
9309004	9	63.3	3	2.2	3.5	5.2	1	0.03	1	0.01	1	0.01	2	2	2	12884
9309004	10	63.3	3	0.7	1	2.5	2	0.05	2	0.07	2	0.27	2	2	2	14756
9307007	1	62.75	4	0.2	0.5	0.5	0	0	1	0.15	1	0.18	0	0	0	14756
9307007	2	62.75	4	0.4	0.7	0.5	1	0.01	1	0.02	0	0	0	0	0	14756
9307007	3	62.75	4	0.5	0.7	1.5	1	0.31	1	0.38	1	0.3	0	0	0	14756
9307007	4	62.75	4	0.5	1.1	2.8	1	0.04	1	0.52	1	0.68	0	0	0	14756
9307007	5	62.75	4	1	3	4.6	2	0.14	0	0	1	0.49	0	0	0	14756
9307007	6	62.75	4	1.3	3	5.1	0	0	1	0.1	1	0.1	0	0	0	14756
9307007	7	62.75	4	0.9	3.3	5	1	0.1	1	0.08	1	0.5	0	0	0	14756

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9307007	8	62.75	4	0.7	2.9	4.1	1	0.48	1	0.6	1	0.62	0	0	0	14756
9307007	9	62.75	4	0.8	2.3	3.8	1	0.49	1	1.05	1	1.32	0	0	0	14756
9308005	1	62.8	4	0.2	0.3	0.4	1	0.06	1	0.03	1	0.03	0	0	0	14634
9308005	2	62.8	4	0.3	1	2.5	1	0.06	2	0.14	2	0.04	0	0	0	14634
9308005	3	62.8	4	0.6	2.6	4.3	1	0.09	1	0.42	1	0.19	0	0	0	14634
9308005	4	62.8	4	0.8	1.8	3.4	1	0.43	1	0.45	1	0.44	0	0	0	14634
9308005	5	62.8	4	0.6	1.9	3.6	1	0.78	1	1.17	1	1.15	0	0	0	14634
9308005	6	62.8	4	0.7	2	2.4	1	0.61	1	1.38	1	1.47	0	0	0	14634
9308005	7	62.8	4	0.8	1.7	3.5	1	0.02	1	1.34	1	1.5	2	0	0	14634
9308005	8	62.8	4	0.8	2.4	3.1	1	0.25	1	1.03	1	1.46	0	0	0	14634
9308005	9	62.8	4	1.1	2.6	4.2	1	0.02	1	0.05	1	0.91	3	0	0	14634
9308005	10	62.8	4	1	2.4	4.2	2	0.23	1	0.05	1	0.32	6	0	0	18955
9205002	1	64.2	5	1	1.6	2	9	0.09	9	0.21	9	0.27	9	9	9	18955
9205002	4	64.2	5	0.4	0.5	0.9	9	0.06	9	0.11	9	0.2	9	9	9	18955
9205002	5	64.2	5	0.4	0.7	2.1	9	0.03	9	0.12	9	0.17	9	9	9	18955
9205002	8	64.2	5	0.4	0.5	0.6	9	0.01	9	0.17	9	0.17	9	9	9	18955
9205002	9	64.2	5	0.6	1.5	0.9	9	0.02	9	0.04	9	0.01	9	9	9	18955
9205002	10	64.2	5	0.5	0.8	1.4	9	0.01	9	0.1	9	0.14	9	9	9	18955
9206004	1	64.25	5	0.5	1.0	1.7	9	0.02	9	0.11	9	0.17	9	9	9	18955
9206004	2	64.25	5	0.7	1.3	1.9	9	0.01	9	0.06	9	0.19	9	9	9	18723
9206004	3	64.25	5	0.5	1.0	1.4	9	0.03	9	0.06	9	0.15	9	9	9	18723
9206004	4	64.25	5	0.5	0.8	1.1	9	0.15	9	0.13	9	0.23	9	9	9	18723
9206004	5	64.25	5	0.4	0.7	0.8	9	0.14	9	0.18	9	0.26	9	9	9	18723
9206004	6	64.25	5	0.4	0.7	1.0	9	0.12	9	0.22	9	0.21	9	9	9	18723

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9206004	7	64.25	5	0.4	0.7	0.9	9	0.13	9	0.2	9	0.25	9	9	9	18723
9206004	8	64.25	5	0.3	0.7	0.9	9	0.16	9	0.16	9	0.19	9	9	9	18723
9206004	9	64.25	5	0.4	0.6	0.9	9	0.08	9	0.16	9	0.2	9	9	9	18723
9206004	10	64.25	5	0.4	0.7	1.0	9	0.16	9	0.21	9	0.22	9	9	9	18723
9206005	1	64.35	5	0.4	0.6	0.9	9	0.08	9	0.16	9	0.13	9	9	9	18723
9206005	2	64.35	5	0.5	1.0	1.7	9	0.04	0	0	9	0.07	9	9	9	15711
9206005	3	64.35	5	0.5	1.2	1.6	9	0.05	9	0.17	9	0.16	9	9	9	15711
9206005	4	64.35	5	0.2	0.5	0.9	9	0.01	9	0.22	9	0.24	9	9	9	15711
9206005	5	64.35	5	2.0	0.4	0.5	9	0.1	9	0.28	9	0.22	9	9	9	15711
9206005	6	64.35	5	0.2	0.4	0.5	9	0.11	9	0.3	9	0.38	9	9	9	15711
9206005	7	64.35	5	0.1	0.3	0.5	9	0.07	9	0.12	9	0.22	9	9	9	15711
9206005	8	64.35	5	0.2	0.4	0.6	9	0.08	9	0.08	9	0.15	9	9	9	15711
9206005	9	64.35	5	0.1	0.4	0.7	9	0.01	9	0.06	9	0.15	9	9	9	15711
9206005	10	64.35	5	0.0	0.1	0.2	0	0	0	0	9	0.01	9	9	9	11652
9209006	1	63.1	5	3.3	3.3	4.8	9	1.3	9	0.2	9	0.23	9	9	9	11652
9209006	2	63.1	5	1.1	2.1	1.6	9	0.01	9	0.01	9	0.2	9	9	9	11652
9209006	3	63.1	5	0.8	2.4	3.9	9	0	9	0.14	9	0.17	9	9	9	11652
9209006	4	63.1	5	1.1	3.5	4.7	9	0.03	9	0.03	9	0.08	9	9	9	11652
9209006	5	63.1	5	0.5	1.3	4.2	0	0	9	0.16	9	0.21	9	9	9	11652
9209006	6	63.1	5	4.9	7.5	8	9	0.03	9	0.2	9	0.18	9	9	9	11652
9209006	7	63.1	5	0.7	7.3	8.4	9	0.02	9	0.09	9	0.36	9	9	9	11652
9209006	8	63.1	5	1.2	6	8.1	9	0.03	9	0.02	9	0.06	9	9	9	11652
9209006	9	63.1	5	1.5	3.4	8.8	9	0.03	0	0	9	0.01	9	9	9	11652
9209006	10	63.1	5	0.9	2.4	4.9	9	0.06	9	0.03	9	0.12	9	9	9	11652

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9306004	4	63.6	5	0.6	2.7	3.7	2	0.01	0	0	1	0.09	4	4	4	11652
9306004	5	63.6	5	1	1.9	2.6	0	0	2	0.01	2	0.01	0	0	0	11652
9306004	6	63.6	5	0.9	2	3.3	0	0	0	0	2	0.02	0	0	0	11652
9306004	7	63.6	5	0.5	1.2	1.8	0	0	0	0	2	0.02	0	0	0	11652
9306004	8	63.6	5	0.5	0.9	1.3	0	0	0	0	1	0.04	0	0	0	11652
9306005	8	63.7	5	0.7	1.2	1.2	0	0	0	0	0	0	2	2	2	11652
9306005	9	63.7	5	0.5	1	1.5	0	0	2	0.12	2	0.27	0	0	0	11652
9306005	10	63.7	5	0.6	1.4	2	2	0.06	2	0.29	2	0.28	0	0	0	11652
9306006	1	64.65	5	0.5	0.8	1	2	0.17	2	0.2	2	0.21	0	0	0	11652
9306006	2	64.65	5	0.5	0.7	1.2	0	0	0	0	0	0	2	2	2	9313
9306006	3	64.65	5	0.6	1.2	2.6	0	0	0	0	0	0	4	4	2	9313
9306006	4	64.65	5	0.5	0.9	1.4	0	0	2	0.01	2	0.03	2	2	2	9313
9306006	5	64.65	5	0.3	1	1.3	0	0	0	0	2	0.07	0	4	4	9313
9306006	6	64.65	5	0.7	1.8	2.3	0	0	0	0	2	0.16	4	4	4	9313
9306006	7	64.65	5	0.6	1.5	1.7	0	0	0	0	0	0	4	4	4	9313
9306006	8	64.65	5	0.9	1.5	2.3	0	0	0	0	2	0.01	0	0	0	9313
9306006	9	64.65	5	0.7	1.6	2.6	2	0.08	2	0.16	2	0.17	0	0	0	9313
9306006	10	64.65	5	0.5	1.4	2.1	0	0	2	0.17	2	0.34	0	0	0	9313
9307004	1	63.7	5	0.5	2.5	3.5	1	0.3	1	0.48	1	0.17	0	0	0	9313
9307004	2	63.7	5	0.5	0.7	1	0	0	2	0.3	2	0.47	0	0	0	9313
9307004	3	63.7	5	0.4	0.8	1.1	2	0.25	2	0.18	2	0.4	0	0	0	9313
9307004	4	63.7	5	0.3	0.6	1	2	0.03	2	0.13	2	0.08	0	0	0	9313
9307004	5	63.7	5	0.8	1.1	1.3	2	0.17	2	0.2	2	0.24	2	2	2	9313
9307004	6	63.7	5	0.8	1.1	1.5	2	0.05	2	0.2	2	0.2	2	2	2	9313

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9307004	7	63.7	5	0.5	0.8	1.1	2	1	2	1.26	2	1.65	0	0	0	9313
9307004	8	63.7	5	0.5	1	1.3	2	0.57	2	0.58	2	0.46	0	0	0	9313
9307004	9	63.7	5	0.7	1.2	2.1	2	0.31	2	0.33	2	0.26	0	0	0	9313
9307004	10	63.7	5	0.9	1.5	2.4	2	0.3	2	0.32	2	0.29	0	0	0	9313
9308001	1	61.9	5	0.4	1	1.6	1	0.12	2	0.02	1	0.04	0	0	0	9313
9308001	2	61.9	5	0.4	0.9	1.6	1	0.17	1	0.16	1	0.11	0	0	0	13937
9308001	3	61.9	5	0.3	0.8	1.3	1	0.15	1	0.21	1	0.13	0	0	0	13937
9308001	4	61.9	5	0.4	0.8	0.9	1	0.08	1	0.08	1	0.14	0	0	0	13937
9308001	5	61.9	5	0.4	0.8	0.9	1	0.07	1	0.01	1	0.04	0	0	0	13937
9308001	6	61.9	5	0.5	0.8	0.9	1	0.02	1	0.09	1	0.05	0	0	0	13937
9308001	7	61.9	5	0.6	1	1.2	1	0.05	1	0.04	2	0.03	0	0	0	13937
9308001	8	61.9	5	0.4	0.8	0.9	1	0.06	1	0.03	1	0.02	0	0	0	13937
9308003	1	61.9	5	0.3	0.7	0.7	2	0.02	2	0.12	2	0.18	0	0	0	13937
9308003	2	61.9	5	0.4	0.6	0.8	2	0.02	2	0.03	1	0.05	0	0	0	13937
9308003	3	61.9	5	0.3	0.6	0.9	0	0	1	0.01	1	0.06	0	0	0	13937
9308003	4	61.9	5	0.3	0.6	0.9	1	0.06	1	0.14	1	0.06	0	0	0	13937
9308003	5	61.9	5	0.2	0.6	0.8	0	0	1	0.09	1	0.17	0	0	0	13937
9308003	6	61.9	5	0.3	0.6	0.7	1	0.08	1	0.12	1	0.19	0	0	0	13937
9308003	7	61.9	5	0.2	0.5	0.7	0	0	1	0.13	1	0.14	0	0	0	13937
9308003	8	61.9	5	0.2	0.5	0.7	2	0.02	1	0.01	1	0.02	0	0	0	13937
9309002	1	61.8	5	0.7	1.8	3.3	2	0.13	2	0.09	2	0.06	0	0	0	13937
9309002	2	61.8	5	0.8	1.4	2.4	2	0.26	2	0.27	2	0.32	0	0	0	13937
9309002	3	61.8	5	0.7	1	1.8	2	0.08	2	0.05	2	0.17	0	0	0	13937
9309002	4	61.8	5	0.5	1.2	3.5	2	0.04	2	0.1	2	0.13	0	0	0	13937

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9309002	5	61.8	5	0.5	0.8	2.3	2	0.04	2	0.21	2	0.21	0	0	0	13937
9309002	6	61.8	5	0.3	0.9	1.5	1	0.05	1	0.04	2	0.03	0	0	0	13636
9309002	7	61.8	5	0.5	0.8	1.5	1	0.04	2	0.01	1	0.04	0	0	0	13636
9309002	8	61.8	5	0.3	0.8	1.3	1	0.04	1	0.07	1	0.06	0	0	0	13636
9309002	9	61.8	5	1.5	0.5	0.8	2	0.01	2	0.01	2	0.09	0	0	0	13636
9309002	10	61.8	5	0.7	0.8	0.3	2	0.12	1	0.08	1	0.1	0	0	0	13636
9309006	1	65.3	5	0.2	0.5	0.7	2	0.06	2	0.04	2	0.08	0	0	0	13636
9309006	2	65.3	5	0.4	0.8	0.8	2	0.01	2	0.11	1	0.15	0	0	0	13636
9309006	3	65.3	5	0.2	0.3	0.5	2	0.04	2	0.08	2	0.08	0	0	0	13636
9309006	4	65.3	5	0.2	0.3	0.5	2	0.09	2	0.13	2	0.12	0	0	0	9490
9309006	5	65.3	5	0.5	1.5	2.4	2	0.04	1	0.05	1	0.07	0	0	0	9490
9309006	6	65.3	5	0.5	1.9	3	2	0.06	2	0.06	2	0.07	0	0	0	9490
9309006	7	65.3	5	0.8	1.6	2.7	1	0.01	2	0.04	2	0.04	0	0	0	9490
9309006	8	65.3	5	0.6	1.9	3.2	2	0.02	2	0.04	0	0	0	0	0	9490
9309006	9	65.3	5	0.5	1.9	3.5	2	0.02	2	0.05	2	0.05	0	0	0	9490
9309006	10	65.3	5	0.5	1.1	3.3	2	0.08	2	0.12	2	0.1	0	0	0	9490
9310001	1	62	5	0.2	0.9	2	2	0.05	2	0.09	2	0.05	0	0	0	9490
9310001	2	62	5	0.2	1.6	3.5	2	0.08	2	0.07	1	0.1	0	0	0	9490
9310001	3	62	5	0.3	2	4.2	1	0.06	1	0.14	1	0.33	0	0	0	9490
9310001	4	62	5	0.4	1	1.7	1	0.1	1	0.13	1	0.29	0	0	0	9490
9310001	5	62	5	0.3	1.2	1.5	1	0.15	1	0.2	1	0.22	0	0	0	9490
9310001	6	62	5	0.1	0.5	0.9	1	0.08	1	0.16	1	0.19	0	0	0	9490
9310001	7	62	5	0.8	2	2.3	1	0.41	1	0.48	1	0.53	0	0	0	9490
9310001	8	62	5	0.5	1	1.5	1	0.05	1	0.01	1	0.11	0	0	0	9490

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9310001	9	62	5	0.4	1.4	1.6	2	0.06	2	0.11	2	0.05	0	0	0	9490
9310001	10	62	5	0.7	1.8	2.6	2	0.17	2	0.16	2	0.21	0	0	0	9490
9310002	1	62	5	0.2	1.2	3.2	2	0.03	2	0.07	1	0.07	0	0	0	9490
9310002	2	62	5	1	2.8	5	1	0.08	1	0.19	1	0.26	0	0	0	9490
9310002	3	62	5	0.4	1	2.7	1	0.18	1	0.27	1	0.27	0	0	0	9490
9310002	4	62	5	0.4	0.8	1.5	1	0.02	1	0.11	1	0.32	0	0	0	8625
9310002	5	62	5	0.2	0.9	1.3	0	0	1	0.14	1	0.28	0	0	0	8625
9310002	6	62	5	0.2	0.5	1	1	0.02	1	0.1	1	0.29	0	0	0	8625
9310002	7	62	5	1	2	2.3	1	0.4	1	0.48	1	0.66	0	0	0	8625
9310002	8	62	5	0.5	1	1.2	1	0.02	1	0.02	2	0.04	0	0	0	8625
9310002	9	62	5	0.6	1.3	1.7	2	0.09	1	0.04	2	0.06	0	0	0	8625
9310002	10	62	5	0.9	1.8	2.7	2	0.19	2	0.25	2	0.2	0	0	0	8625
9310005	1	64.6	5	0.6	1.1	1.9	2	0.08	2	0.06	2	0.09	0	0	0	8625
9310005	2	64.6	5	0.2	0.5	1	2	0.02	2	0.02	2	0.05	0	0	0	8625
9310005	3	64.6	5	0.4	0.9	1.3	2	0.06	2	0.1	2	0.1	0	0	0	8625
9310005	4	64.6	5	0.3	1.1	1.5	1	0.12	1	0.08	1	0.06	0	0	0	8625
9310005	5	64.6	5	0.1	0.8	1.8	0	0	2	0.14	2	0.2	2	2	2	8625
9310005	6	64.6	5	0.6	1.5	3.4	2	0.09	2	0.15	2	0.2	0	0	0	8625
9310005	7	64.6	5	0.5	1.1	2	2	0.18	2	0.26	2	0.46	0	0	0	8625
9310005	8	64.6	5	0.5	1	2.2	2	0.19	2	0.2	2	0.34	0	0	0	8625
9310005	9	64.6	5	0.4	1.2	3.9	2	0.11	2	0.27	2	0.35	0	0	0	8625
9310005	10	64.6	5	0.5	1	2.4	2	0.11	2	0.08	2	0.24	0	0	0	8625
9310006	1	64.6	5	0.4	0.9	1.5	1	0.04	1	0.02	1	0.04	0	0	0	8625
9310006	2	64.6	5	0.2	0.6	1	1	0.02	1	0.03	1	0.01	0	0	0	8625

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9310006	3	64.6	5	0.3	0.8	1.3	1	0.07	0	0	1	0.04	0	0	0	8625
9310006	4	64.6	5	0.4	0.9	1.6	1	0.05	1	0.06	2	0.08	0	0	0	8625
9310006	5	64.6	5	0.6	1	2.3	1	0.05	0	0	2	0.29	2	2	2	8625
9310006	6	64.6	5	0.5	1.5	3	2	0.17	2	0.2	2	0.25	0	0	0	8625
9310006	7	64.6	5	0.5	1.3	1.8	2	0.29	2	0.27	2	0.41	0	0	0	8625
9310006	8	64.6	5	0.4	1.2	2.4	2	0.23	2	0.33	2	0.27	0	0	0	8625
9310006	9	64.6	5	0.6	1.3	3	2	0.14	2	0.23	2	0.34	0	0	0	8625
9310006	10	64.6	5	0.4	1.2	2.5	2	0.05	2	0.25	2	0.24	0	0	0	8625
9306004	9	63.6	6	0.6	1.6	2.1	0	0	1	0.08	1	0.06	1	1	0	8625
9306004	10	63.6	6	0.3	1.7	2.8	0	0	0	0	1	0.05	5	5	0	13516
9306005	4	63.7	6	1.7	2.3	3.4	2	0.19	2	0.17	2	0.27	5	0	0	13516
9306005	5	63.7	6	0.3	1.5	2.4	0	0	2	0.04	2	0.06	0	0	0	13516
9306005	6	63.7	6	1.2	2.5	2.7	0	0	0	0	0	0	7	1	0	13516
9306005	7	63.7	6	1.7	2.2	2.7	0	0	0	0	0	0	7	1	0	13516
9306007	3	64.9	6	2.2	2.6	3.9	0	0	1	0.16	1	0.08	7	1	0	13516
9306007	4	64.9	6	2	2.2	3.4	2	0.04	1	0.04	1	0.08	1	0	0	13516
9306007	6	64.9	6	0.9	1.6	2	0	0	1	0.06	1	0.04	0	0	0	13516
9306007	7	64.9	6	1.2	2	2.5	0	0	1	0.34	1	0.43	4	4	0	13516
9306007	8	64.9	6	1.2	2.2	4.2	0	0	2	0.42	2	0.37	1	1	1	13516
9306007	9	64.9	6	1.3	2.4	3.1	2	0.14	2	0.41	2	0.43	5	5	5	13516
9306007	10	64.9	6	0.5	1.4	2.1	0	0	0	0	0	0	5	7	4	13516
9308002	1	62.2	6	0.85	1.7	4.6	1	0.05	2	0.09	2	0.24	6	6	6	13516
9308002	2	62.2	6	0.8	4.9	5.2	2	0.03	2	0.23	2	0.23	6	3	3	13516
9308002	3	62.2	6	0.9	2.4	3.7	1	0.05	2	0.01	2	0.21	6	6	0	13516

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9308002	4	62.2	6	0.9	3.2	5.3	2	0.33	2	0.55	2	0.63	7	3	0	13516
9308002	5	62.2	6	1.6	5	3.5	1	0.03	2	0.45	2	0.66	6	3	3	13516
9308002	6	62.2	6	3.1	6.2	6.7	2	0.21	2	0.44	2	0.58	7	3	3	13516
9308002	7	62.2	6	1.2	2.3	4.9	1	0.12	1	0.08	1	0.09	6	0	0	13516
9308002	8	62.2	6	1.8	4	5.6	2	0.02	2	0.12	2	0.23	6	3	0	13093
9308004	1	62.65	6	2.95	2.1	1.2	2	0.06	2	0.03	2	0.06	4	1	0	13093
9308004	2	62.65	6	1.6	3.25	3.1	1	0.05	1	0.05	1	0.03	7	3	0	13093
9308004	3	62.65	6	0.6	3.6	3.1	1	0.04	2	0.11	2	0.1	2	0	0	13093
9308004	4	62.65	6	1.8	3.2	3.2	2	0.11	2	0.14	2	0.22	6	6	0	13093
9308004	5	62.65	6	1.5	3.7	4.5	2	0.12	2	0.17	2	0.17	6	6	3	13093
9308004	6	62.65	6	1.5	3	5.4	2	0.18	2	0.26	2	0.27	6	6	0	13093
9308004	7	62.65	6	2.9	4	5.5	2	0.19	2	0.13	2	0.33	6	6	0	13093
9308004	8	62.65	6	2.7	4.5	6.3	2	0.16	2	0.29	2	0.43	7	2	2	13093
9308006	1	62.65	6	0.9	2.1	1.8	2	0.02	2	0.02	2	0.01	6	0	0	13093
9308006	2	62.65	6	0.75	2.1	2.2	1	0.05	1	0.02	1	0.05	7	3	0	13093
9308006	3	62.65	6	2	1.9	1.7	0	0	1	0.02	1	0.01	4	0	0	13093
9308006	4	62.65	6	1.2	1.7	1.8	2	0.02	2	0.02	2	0.06	6	3	0	13093
9308006	5	62.65	6	0.8	2.8	3.7	2	0.06	2	0.13	2	0.06	7	3	0	13093
9308006	6	62.65	6	1.3	3.2	4.5	1	0.04	1	0.07	1	0.13	6	2	0	13093
9308006	7	62.65	6	0.25	3.3	4.3	2	0.04	2	0.04	2	0.13	6	3	0	13093
9308006	8	62.65	6	1.6	5	6.5	2	0.05	2	0.15	2	0.02	7	2	0	13093
9308007	1	62.2	6	0.7	1.5	2.9	1	0.02	2	0.06	2	0.16	6	3	3	13093
9308007	2	62.2	6	3.2	3.4	3.4	1	0.06	1	0.05	1	0.1	6	0	0	13093
9308007	3	62.2	6	1.5	3.6	3.8	1	0.07	1	0.08	1	0.08	6	0	0	13093

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9308007	4	62.2	6	2.4	4	5.2	1	0.06	2	0.04	2	0.28	2	0	0	13093
9308007	5	62.2	6	1.9	2.9	4.7	2	0.63	2	0.45	2	0.52	6	6	6	10269
9308007	6	62.2	6	1.6	5	5.3	2	0.04	2	0.39	2	0.39	7	2	2	10269
9308007	7	62.2	6	0.9	2.2	4.6	1	0.06	1	0.03	1	0.04	6	0	2	10269
9308007	8	62.2	6	1.2	3.5	2.9	2	0.27	2	0.15	2	0.31	6	6	2	10269
9309005	1	65.5	6	1.1	2.4	3.6	1	0.01	2	0.05	1	0.01	0	0	0	10269
9309005	2	65.5	6	1.5	3.6	3.1	1	0.09	1	0.15	1	0.08	7	2	2	10269
9309005	3	65.5	6	0.5	1	1.4	2	0.09	1	0.05	1	0.04	7	2	2	10269
9309005	4	65.5	6	0.5	1.9	2.3	1	0.16	1	0.16	1	0.11	2	2	2	9877
9309005	5	65.5	6	1.5	1.4	1	1	0.19	1	0.1	1	0.14	2	2	2	9877
9309005	6	65.5	6	1	0	3.1	1	0.03	0	0	1	0.05	2	0	2	9877
9309005	7	65.5	6	0.4	0.9	1.4	1	0.14	1	0.12	1	0.05	0	0	0	9877
9310007	1	64.1	6	0.9	1.9	3.5	2	0.07	1	0.22	1	0.24	0	0	0	9877
9310007	2	64.1	6	0.8	1.8	2.4	1	0.16	2	0.05	1	0.3	0	0	0	9877
9310007	3	64.1	6	0.8	1.4	1.9	1	0.15	1	0.14	1	0.36	7	0	0	9877
9310007	4	64.1	6	0.6	1.1	1.9	2	0.12	2	0.05	1	0.21	7	0	0	9877
9310007	5	64.1	6	0.3	2	3.4	1	0.05	1	0.34	1	0.42	7	4	0	9877
9310007	6	64.1	6	0.8	1.5	3.7	2	0.02	1	0.15	1	0.46	4	0	0	9877
9310007	7	64.1	6	0.4	1.7	3.4	2	0.05	1	0.15	1	0.39	7	0	0	10807
9310007	8	64.1	6	0.4	1.6	3.1	2	0.08	1	0.03	1	0.13	4	0	0	10807
9310010	1	64.1	6	0.4	1.3	2.3	1	0.09	1	0.22	1	0.26	4	4	4	10807
9310010	2	64.1	6	0.5	1.3	1.9	2	0.1	2	0.04	1	0.29	7	4	0	10807
9310010	3	64.1	6	0.7	1.7	3.2	2	0.06	1	0.22	1	0.44	7	4	0	10807
9310010	4	64.1	6	0.8	2.3	3.4	1	0.12	1	0.32	1	0.38	4	2	0	10807

Table 16.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9310010	5	64.1	6	1	2.4	2.9	2	0.03	1	0.24	1	0.43	4	2	0	10807
9310010	6	64.1	6	1.3	2.4	3.8	2	0.11	1	0.28	1	0.53	4	4	0	10807
9310010	7	64.1	6	0.8	2.4	4	1	0.07	1	0.15	1	0.4	7	4	0	10807
9310010	8	64.1	6	0.4	2.1	3.4	1	0.01	1	0.1	1	0.2	4	4	0	10807

Table 17. Longitudinal transect data for Reach 2. Table 15 describes codes for this data set.

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9309007	1	67.5	1	0.4	0.9	1.2	1	0.04	1	0.12	1	0.14	0	0	2	10807
9309007	2	67.5	1	0.6	0.9	1.5	2	0.05	2	0.02	1	0.01	0	0	0	10807
9309007	3	67.5	1	0.4	0.7	1.3	1	0.04	2	0.01	2	0.04	4	2	2	10807
9309007	4	67.5	1	0.3	1.6	2.4	1	0.04	2	0.09	1	0.13	4	4	2	10807
9309007	5	67.5	1	2.9	5.2	6.7	1	0.15	1	0.2	1	0.25	0	0	0	10807
9309007	6	67.5	1	0.7	2.8	4.3	0	0	1	0.15	2	0.12	0	0	0	10807
9309007	7	67.5	1	1.3	2.1	3.1	2	0.04	1	0.03	1	0.12	0	0	0	10807
9309007	8	67.5	1	2.2	5.3	5.8	1	0.05	2	0.09	1	0.14	0	0	0	10807
9309007	9	67.5	1	1.5	2.2	2.8	1	0.18	1	0.21	1	0.19	0	0	0	10807
9309007	10	67.5	1	1.8	2.1	3.2	1	0.05	1	0.17	2	0.04	0	0	0	10807
9310013	1	66.7	1	0.4	4.5	5.3	2	0.19	2	0.2	2	0.21	7	4	4	11676
9310013	2	66.7	1	0.8	0.6	2.5	1	0.03	1	0.52	1	0.72	4	4	4	11676
9310013	3	66.7	1	0.7	0.4	0.3	1	0.91	1	1.05	1	0.17	4	4	4	11676
9310013	4	66.7	1	1	0.6	0.3	1	0.04	0	0	1	0.15	4	4	4	11676
9310013	5	66.7	1	0.5	0.3	2	1	0.12	1	0.42	1	0.36	4	4	4	11676
9310013	6	66.7	1	0.3	0.8	2.1	1	0.05	1	0.01	1	0.62	4	4	4	11676
9310013	7	66.7	1	0.3	0.5	1.9	2	0.04	1	0.26	1	0.4	4	4	4	11676
9310013	8	66.7	1	0.5	0.3	0	1	0.54	1	0.3	0	0	4	4	4	11676
9310013	9	66.7	1	0.2	0	0.5	1	0.17	0	0	1	0.12	4	4	4	11676
9310013	10	66.7	1	0.3	0.9	1	2	0.13	1	0.06	1	0.37	4	4	4	11676
9311002	1	68.3	1	2.8	5.2	8.2	0	0	2	0.41	2	0.25	4	2	2	11140
9311002	2	68.3	1	5.2	6	6.4	0	0	0	0	1	0.01	7	4	2	11140

Table 17.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9311002	3	68.3	1	1.1	1.3	6.4	1	0.11	1	0.57	1	0.61	2	2	0	11140
9311002	4	68.3	1	0.9	5	5.6	2	0.02	2	0.07	2	0.01	2	2	0	11140
9311002	5	68.3	1	1.4	3.5	4.7	0	0	2	0.17	2	0.32	7	7	2	11140
9311002	6	68.3	1	1.6	4	4.1	2	0.06	2	0.22	2	0.37	2	2	2	11140
9311002	7	68.3	1	0.8	1.9	2.7	2	0.01	2	0.03	1	0.05	7	2	2	11140
9311002	8	68.3	1	0.5	0.9	1.9	0	0	0	0	0	0	0	0	0	11140
9311002	9	68.3	1	0.4	1.8	1.7	0	0	1	0.02	1	0.03	4	2	0	11140
9311002	10	68.3	1	0.4	2.3	3.2	0	0	0	0	0	0	4	0	0	11140
9307011	1	65.75	2	4	4.5	5.1	2	0.11	1	0.15	1	0.18	4	4	4	8335
9307011	2	65.75	2	0.5	1.2	1.9	2	0.03	0	0	2	0.11	4	0	0	8335
9307011	3	65.75	2	1	1.8	2.1	2	0.03	1	0.02	1	0.05	4	2	2	8335
9307011	4	65.75	2	2	3	4.1	2	0.04	2	0.31	2	0.33	4	4	2	8335
9307011	5	65.75	2	0.3	0.8	2.3	2	0.03	1	0.01	2	0.01	0	4	4	8335
9307011	6	65.75	2	0.3	1	2.2	0	0	1	0.03	1	0.06	0	0	0	8335
9307011	7	65.75	2	0.8	1.8	2.8	0	0	1	0.3	1	0.33	2	2	2	8335
9307011	8	65.75	2	4.3	4.6	3.9	2	0.05	2	0.31	1	0.22	4	4	2	8335
9307011	9	65.75	2	0.5	1.6	3.5	2	0.15	2	0.07	2	0.02	0	0	4	8335
9307011	10	65.75	2	0.4	1.2	3.3	2	0.03	0	0	1	0.18	0	0	0	8335
9307014	1	67.8	2	0.8	1	1.2	1	0.03	1	0.02	1	0.22	2	2	0	8085
9307014	2	67.8	2	0	0.8	1.9	0	0	1	0.19	1	0.24	2	0	2	8085
9307014	3	67.8	2	0.5	1.1	1.5	1	0.06	1	0.13	1	0.17	4	0	0	8085
9307014	4	67.8	2	0.6	1.1	1.7	2	0.1	2	0.05	2	0.02	2	2	0	8085
9307014	5	67.8	2	0.6	1.5	2.3	0	0	1	0.12	1	0.31	4	2	2	8085
9307014	6	67.8	2	1.3	2.9	3.2	2	0.03	1	0.07	2	0.13	4	2	2	8085

Table 17.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9307014	7	67.8	2	1	1.5	1.7	1	0.03	2	0.02	2	0.03	4	0	0	8085
9307014	8	67.8	2	0.7	1.1	1.6	1	0.06	2	0.21	2	0.12	0	0	0	8085
9307014	9	67.8	2	0.8	1.6	2.4	1	0.07	2	0.03	2	0.22	2	0	0	8085
9307014	10	67.8	2	1.4	1.8	4.6	2	0.05	1	0.19	1	0.27	4	0	4	8085
9307015	1	67.75	2	0.4	0.4	1.7	2	0.02	2	0.05	2	0.37	2	4	4	8085
9307015	2	67.75	2	0	1.3	3	0	0	2	0.08	1	0.2	4	2	0	8085
9307015	3	67.75	2	0.7	1.4	1.6	2	0.02	2	0.13	2	0.05	2	0	0	8085
9307015	4	67.75	2	0.4	0.9	1.3	2	0.01	2	0.17	2	0.09	0	0	0	8085
9307015	5	67.75	2	1	1.6	1.8	2	0.03	2	0.15	2	0.16	2	2	0	8085
9307015	6	67.75	2	1.4	2	1.9	2	0.05	1	0.03	1	0.07	4	2	0	8085
9307015	7	67.75	2	0.5	1.6	2.1	2	0.02	1	0.2	1	0.2	2	0	0	8085
9307015	8	67.75	2	0.5	1	1.5	0	0	0	0	1	0.1	2	0	0	8085
9307015	9	67.75	2	0.3	1.1	1.7	2	0.1	0	0	1	0.1	0	0	0	8085
9307015	10	67.75	2	1.7	3.1	3.5	1	0.4	2	0.1	1	0.7	4	4	4	8085
9308010	1	67.8	2	0.3	1.5	1.9	2	0.03	2	0.1	2	0.09	2	2	0	7884
9308010	2	67.8	2	0.4	1	1.3	2	0.06	2	0.17	0	0.05	2	0	0	7884
9308010	3	67.8	2	0.8	1.9	2.3	1	0.02	2	0.01	2	0.01	2	0	0	7884
9308010	4	67.8	2	0.8	1.6	1.8	2	0.04	2	0.04	1	0.04	2	0	0	7884
9308010	5	67.8	2	0	1.8	2.2	0	0	1	0.01	1	0.09	4	2	0	7884
9308010	6	67.8	2	1	1.5	3.2	2	0.09	2	0.04	1	0.1	4	2	2	7884
9308010	7	67.8	2	0.2	1.8	2.8	0	0	1	0.08	2	0.2	2	2	2	7884
9308010	8	67.8	2	1.5	2	2.7	2	0.06	2	0.11	2	0.07	4	0	0	7884
9308010	9	67.8	2	2.4	2.6	3	2	0.18	2	0.08	2	0.14	4	0	0	7884
9308010	10	67.8	2	1	1.5	1.9	1	0.06	2	0.12	2	0.11	2	0	0	7884

Table 17.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9309010	1	66.95	2	0.6	1.4	3.7	2	0.03	2	0.08	2	0.03	0	0	0	7884
9309010	2	66.95	2	0.5	0.9	6.4	1	0.01	0	0	2	0.08	2	2	2	7884
9309010	3	66.95	2	0.5	1.9	3.1	2	0.06	2	0.04	1	0.34	4	2	2	7884
9309010	4	66.95	2	0.4	0.8	4.1	2	0.05	2	0.1	2	0.06	2	2	2	7884
9309010	5	66.95	2	0.4	1.3	2.8	2	0.02	1	0.08	1	0.1	4	2	2	7884
9309010	6	66.95	2	1	1.8	2.8	2	0.06	2	0.04	2	0.12	4	2	2	7884
9309010	7	66.95	2	2.2	3.1	4.9	2	0.03	2	0.06	2	0.06	4	2	2	7884
9309010	8	66.95	2	0.6	1.7	2.6	2	0.17	2	0.18	2	0.26	0	0	0	7884
9309010	9	66.95	2	1.2	2	1.6	2	0.02	2	0.26	2	0.26	4	4	4	7884
9309010	10	66.95	2	1.1	0.5	2.7	2	0.11	2	0.06	2	0.1	4	4	4	7884
9310014	1	66.8	2	1	1.9	2	2	0.05	2	0.12	2	0.06	4	4	4	16771
9310014	2	66.8	2	0.4	1	2	2	0.03	1	0.19	1	0.06	0	0	4	16771
9310014	3	66.8	2	0.9	1.8	3.3	1	0.04	1	0.63	1	0.7	0	0	0	16771
9310014	4	66.8	2	0.9	1.7	3	2	0.12	2	0.22	1	0.12	4	4	4	16771
9310014	5	66.8	2	1.8	1.5	4.2	1	0.52	1	0.96	1	1.6	2	1	1	16771
9310014	6	66.8	2	0.7	1.4	2.5	2	0.03	1	1.03	1	1.1	7	1	1	16771
9310014	7	66.8	2	1.4	3.3	4	1	0.02	2	0.11	2	0.18	7	4	1	16771
9310014	8	66.8	2	0.6	3	4.2	2	0.02	1	0.16	1	0.18	7	1	1	16771
9310014	9	66.8	2	1.2	2.4	2.6	1	0.06	1	0.39	1	0.48	7	4	1	16771
9310014	10	66.8	2	0.4	1.3	3.5	1	0.36	1	0.91	1	0.99	1	1	1	16771
9311003	1	66.85	2	0.4	0.9	2.2	2	0.04	1	0.01	2	0.28	4	4	4	16200
9311003	2	66.85	2	0.5	0.5	2.4	2	0.03	1	0.11	1	0.14	4	4	4	16200
9311003	3	66.85	2	0.7	1.4	2.9	2	0.02	2	0.18	2	0.3	4	4	4	16200
9311003	4	66.85	2	1.4	1.9	2.3	0	0	2	0.25	2	0.49	7	4	4	16200

Table 17.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9311003	5	66.85	2	0.3	1.5	3.9	0	0	2	0.22	2	0.24	4	4	4	16200
9311003	6	66.85	2	0.8	1.7	2.4	1	0.23	1	0.52	1	0.82	2	0	0	16200
9311003	7	66.85	2	0.6	1.9	2.3	2	0.02	2	0.08	2	0.03	2	4	4	16200
9311003	8	66.85	2	1	1.3	1.4	2	0.06	2	0.01	2	0.05	2	0	0	16200
9311003	9	66.85	2	0.9	2	4	2	0.02	2	0.01	2	0.25	7	4	4	16200
9311003	10	66.85	2	1.2	2.1	2.9	1	0.03	1	0.1	2	0.51	7	4	4	16200
9310015	1	67.2	3	0.6	0.8	2	1	0.22	1	0.2	1	0.13	2	2	2	15193
9310015	2	67.2	3	0.6	1.1	1.2	1	0.04	1	0.12	1	0.1	7	2	2	15193
9310015	3	67.2	3	0.7	0.8	0.8	2	0.04	0	0	1	0.15	4	4	4	15193
9310015	4	67.2	3	0.4	0.9	1.3	1	0.07	2	0.05	1	0.2	7	4	4	15193
9310015	5	67.2	3	0.7	0.9	1.1	1	0.11	2	0.01	1	0.03	7	4	4	15193
9310015	6	67.2	3	0.4	1.2	1	0	0	0	0	0	0	7	7	7	15193
9310015	7	67.2	3	0.6	1	0.1	2	0.06	2	0.01	2	0.01	0	0	0	15193
9310015	8	67.2	3	0.8	1.1	2.3	2	0.02	1	0.55	1	0.2	7	7	7	15193
9310015	9	67.2	3	0.7	1	2.2	2	0.01	1	0.14	1	0.15	2	4	4	15193
9310015	10	67.2	3	0.5	1.9	1.7	1	0.07	1	0.07	1	0.1	4	4	2	15193
9311004	1	66.9	3	0.3	1	1.5	1	0.03	1	0.03	0	0	2	0	0	14383
9311004	2	66.9	3	0.4	0.9	1.4	1	0.01	1	0.03	1	0.02	0	0	0	14383
9311004	3	66.9	3	0.7	1.6	3.2	2	0.01	0	0	2	0.06	0	0	0	14383
9311004	4	66.9	3	0.7	2.5	3.7	1	0.05	2	0.11	2	0.15	4	2	2	14383
9311004	5	66.9	3	1	2	4.9	2	0.12	2	0.07	1	0.04	4	2	0	14383
9311004	6	66.9	3	0.7	2	2.7	0	0	1	0.06	2	0.07	0	0	0	14383
9311004	7	66.9	3	0.4	1.4	2.2	0	0	1	0.01	2	0.02	0	0	0	14383
9311004	8	66.9	3	0.5	1.6	2.8	0	0	2	0.01	1	0.02	0	0	0	14383

Table 17.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9311004	9	66.9	3	0.8	2	3.9	1	0.05	1	0.01	2	0.09	0	0	0	14383
9307010	1	65.8	4	0.6	1.7	3	0	0	1	0.25	1	0.25	4	4	4	14383
9307010	2	65.8	4	1	1.9	2.6	1	0.11	1	0.13	1	0.31	4	4	4	14383
9307010	3	65.8	4	0.9	1.2	2.9	1	0.07	1	0.24	1	0.41	4	4	4	14383
9307010	4	65.8	4	0.9	2.6	2.6	0	0	1	0.04	1	0.25	4	4	4	14383
9307010	5	65.8	4	0.6	1.9	2.8	1	0.07	1	0.14	1	0.23	0	0	0	14383
9307010	6	65.8	4	0.8	2	3.3	1	0.09	1	0.17	1	0.33	4	4	4	14383
9307010	7	65.8	4	1.5	1.6	3.6	1	0.18	1	0.39	1	0.34	4	4	4	14383
9307010	8	65.8	4	0.3	1	2.5	0	0	2	0.03	1	0.23	0	0	0	14383
9307010	9	65.8	4	0.5	1.6	2.2	1	0.01	1	0.14	1	0.3	0	0	4	14383
9307010	10	65.8	4	1	1.9	2.8	1	0.3	1	0.51	1	0.6	0	0	4	14383
9307012	1	67.8	4	0.4	0.6	1	1	0.15	1	0.15	1	0.6	2	2	2	14383
9307012	2	67.8	4	0.3	0.6	1.2	1	0.01	1	0.09	1	0.18	0	0	0	13800
9307012	3	67.8	4	0.4	0.7	1.4	1	0.08	1	0.1	1	0.25	0	2	0	13800
9307012	4	67.8	4	0.5	0.7	1.3	1	0.02	1	0.1	1	0.32	0	2	2	13800
9307012	5	67.8	4	0.5	0.6	0.9	1	0.02	1	0.11	1	0.27	2	2	2	13800
9307012	6	67.8	4	0.5	1.2	1.3	1	0.14	1	0.24	1	0.3	0	2	0	13800
9307012	7	67.8	4	0.5	1	1.8	1	0.2	1	0.23	1	0.33	0	0	0	13800
9307012	8	67.8	4	0.3	0.7	1.7	1	0.1	1	0.2	1	0.4	0	0	0	13800
9307012	9	67.8	4	0.6	0.8	1	1	0.26	1	0.23	1	0.19	2	2	2	13800
9307012	10	67.8	4	0.5	0.9	1.3	1	0.27	1	0.34	1	0.26	0	0	2	13800
9307013	1	67.85	4	0.7	0.5	1	1	0.31	1	0.12	1	0.4	4	4	4	13800
9307013	2	67.85	4	0.2	0.9	1.1	1	0.1	1	0.14	1	0.45	0	2	2	11901
9307013	3	67.85	4	0.4	0.6	1	2	0.1	1	0.06	1	0.21	2	2	2	11901

Table 17.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9307013	4	67.85	4	0.5	0.6	1.6	1	0.33	1	0.1	1	0.4	2	4	2	11901
9307013	5	67.85	4	0.4	0.8	1.5	1	0.31	1	0.4	1	0.5	0	0	2	11901
9307013	6	67.85	4	0.5	1.5	2.6	1	0.12	1	0.28	1	0.42	0	0	2	11901
9307013	7	67.85	4	0.4	1.8	2.9	1	0.35	1	0.04	1	0.65	2	2	2	11901
9307013	8	67.85	4	0.8	2	2.6	1	0.14	2	0.06	1	0.5	2	2	2	11901
9307013	9	67.85	4	0.5	1.9	3.5	1	0.12	1	0.3	1	0.85	2	2	2	11901
9307013	10	67.85	4	1.7	3.7	4.7	2	0.14	1	0.18	1	0.34	2	2	2	11901
9308009	1	68	4	0.9	2.4	3.6	2	0.07	2	0.11	2	0.03	2	2	2	11901
9308009	2	68	4	0.7	1.7	2.9	2	0.07	2	0.24	2	0.28	2	2	2	11939
9308009	3	68	4	0.8	1.1	4.1	2	0.03	2	0.33	2	0.36	6	2	2	11939
9308009	4	68	4	0.7	1.8	3.8	2	0.19	2	0.58	2	0.75	6	2	2	11939
9308009	5	68	4	0.8	2.3	4.7	2	0.04	2	0.04	2	0.36	2	2	2	11939
9308009	6	68	4	0.8	2.7	4.9	1	0.09	1	0.1	2	0.09	7	4	2	11939
9308009	7	68	4	1	3.2	4.7	1	0.11	1	0.08	1	0.07	2	2	2	11939
9308009	8	68	4	0.8	2.6	3	0	0	2	0.01	1	0.05	6	0	0	11939
9308009	9	68	4	1	1.6	1.9	2	0.06	2	0.09	2	0.06	6	3	0	11939
9308009	10	68	4	1.3	2.4	3.8	2	0.12	2	0.05	2	0.02	2	0	0	11939
9309008	1	67.5	4	0.5	0.7	0.9	1	0.02	1	0.04	1	0.04	2	0	0	11939
9309008	2	67.5	4	0.3	0.5	0.8	1	0.02	2	0.01	1	0.04	2	2	2	12579
9309008	3	67.5	4	0.2	0.3	0.6	0	0	1	0.05	1	0.17	2	2	2	12579
9309008	4	67.5	4	0.2	0.3	0.1	1	0.16	1	0.01	1	0.01	0	2	0	12579
9309008	5	67.5	4	0.2	0.1	0.3	1	0.1	0	0	2	0.04	2	0	0	12579
9309008	6	67.5	4	0.5	1	1.1	1	0.25	1	0.12	2	0.05	2	2	0	12579
9309008	7	67.5	4	0	0.9	1.2	0	0	1	0.08	1	0.27	2	2	2	12579

Table 17.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9309008	8	67.5	4	0.2	0.4	0.6	0	0	1	0.12	1	0.05	0	2	2	12579
9309008	9	67.5	4	0.5	1.1	1.7	1	0.14	2	0.02	1	0.18	2	2	2	12579
9309008	10	67.5	4	0.2	1	1.7	2	0.02	1	0.07	1	0.18	0	0	2	12579
9310011	1	66.5	4	0.05	0.5	0.6	0	0	2	0.02	2	0.02	2	2	2	12579
9310011	2	66.5	4	0.05	0.4	0.4	0	0	1	0.03	1	0.08	0	2	2	17297
9310011	3	66.5	4	0.05	0.1	0.3	0	0	0	0	1	0.04	0	2	2	17297
9310011	4	66.5	4	0.1	0.05	0	0	0	0	0	0	0	2	2	0	17297
9310011	5	66.5	4	0.1	0.3	0.5	0	0	1	0.12	1	0.14	0	2	2	17297
9310011	6	66.5	4	0	0.2	0.5	0	0	2	0.02	1	0.06	0	2	2	17297
9310011	7	66.5	4	0.1	0.3	0.6	0	0	0	0	2	0.07	0	2	2	17297
9310011	8	66.5	4	0.1	0.2	0.5	0	0	2	0.04	1	0.01	0	0	0	17297
9310011	9	66.5	4	0.1	0.4	0.7	0	0	1	0.04	1	0.05	0	0	0	17297
9310011	10	66.5	4	0.1	0.7	1	1	0.03	1	0.04	1	0.1	0	0	0	17297
9310012	1	66.6	4	0.1	0.1	0.2	0	0	2	0.02	2	0.02	2	2	2	17297
9310012	2	66.6	4	0.5	0.5	1.4	1	0.03	1	0.2	1	0.27	2	2	2	16897
9310012	3	66.6	4	0.3	1	1.4	1	0.17	1	0.27	1	0.23	2	2	2	16897
9310012	4	66.6	4	0.2	0.7	2.1	0	0	2	0.02	1	0.08	2	2	2	16897
9310012	5	66.6	4	0.3	0.7	1.4	1	0.03	1	0.02	1	0.13	2	2	2	16897
9310012	6	66.6	4	0.1	0.7	0.3	1	0.06	1	0.08	1	0.25	2	2	2	16897
9310012	7	66.6	4	0.5	0.5	1.2	1	0.15	1	0.06	1	0.44	0	0	0	16897
9310012	8	66.6	4	0.8	0.5	0.7	0	0	1	0.16	1	0.04	2	2	2	16897
9310012	9	66.6	4	0.4	0.3	0.6	1	0.11	1	0.02	1	0.26	2	2	2	16897
9310012	10	66.6	4	0.4	0.3	0.9	1	0.12	1	0.24	1	0.28	0	0	0	16897
9307008	1	65.75	5	0.3	0.8	1.3	0	0	2	0.03	2	0.11	0	0	0	16897

Table 17.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9307008	2	65.75	5	0.4	1	1.5	2	0.04	2	0.2	2	0.2	0	0	0	
9307008	3	65.75	5	0.4	0.7	0.9	2	0.07	2	0.14	2	0.21	0	0	0	
9307008	4	65.75	5	0.4	0.6	0.8	2	0.02	2	0.15	2	0.2	0	0	0	
9307008	5	65.75	5	0.4	0.06	0.7	2	0.14	2	0.21	2	0.15	0	0	0	
9307008	6	65.75	5	0.3	0.6	0.8	2	0.04	2	0.14	2	0.17	0	0	0	
9307008	7	65.75	5	0.3	0.5	0.7	2	0.05	2	0.1	2	0.21	0	0	0	
9307008	8	65.75	5	0.3	0.4	0.6	0	0	2	0.1	2	0.19	0	0	0	
9307008	9	65.75	5	0.3	0.4	0.5	2	0.04	2	0.03	2	0.11	0	0	0	
9307008	10	65.75	5	0.3	0.4	0.7	2	0.02	2	0.04	2	0.01	0	0	0	
9307009	1	65.76	5	0.2	0.4	0.6	0	0	2	0.05	2	0.08	0	0	0	
9307009	2	65.76	5	0.3	0.6	0.7	0	0	2	0.04	2	0.13	0	0	0	
9307009	3	65.76	5	0.3	0.6	0.8	0	0	1	0.12	1	0.12	0	0	0	
9307009	4	65.76	5	0.4	0.5	0.9	1	0.08	1	0.12	1	0.21	0	0	0	
9307009	5	65.76	5	0.4	0.8	2.1	1	0.15	1	0.22	1	0.23	0	0	0	
9307009	6	65.76	5	0.3	0.8	1.9	1	0.15	1	0.22	1	0.34	0	0	0	
9307009	7	65.76	5	0.4	0.9	2	1	0.1	1	0.27	1	0.37	0	0	0	
9307009	8	65.76	5	0.4	1.2	2.3	1	0.12	1	0.23	1	0.32	0	0	0	
9307009	9	65.76	5	0.5	1.2	2.4	1	0.13	1	0.28	1	0.35	0	0	0	
9307009	10	65.76	5	0.5	1.4	2.3	1	0.06	1	0.31	1	0.31	0	0	0	
9307016	1	67.85	6	0.5	1.1	1.2	0	0	0	0	0	0	7	1	0	
9307016	2	67.85	6	0.7	1.1	1.3	0	0	0	0	0	0	7	5	1	
9307016	3	67.85	6	0.3	0.9	1.4	0	0	0	0	2	0.1	7	5	1	
9307016	4	67.85	6	1.4	1.8	1.8	2	0.1	2	0.2	2	0.2	5	0	0	
9307016	5	67.85	6	0.6	1.3	1.5	0	0	0	0	2	0.2	5	0	0	

Table 17.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9307016	6	67.85	6	1.2	1.8	2	0	0	2	0.2	2	0.2	7	5	5	
9307016	7	67.85	6	1	1.3	1.5	2	0.1	2	0.3	2	0.3	7	1	0	
9307016	8	67.85	6	0.9	1.4	1.6	0	0	2	0.1	2	0.1	4	1	0	
9307016	9	67.85	6	2.6	2.8	2.4	2	0.3	2	0.4	2	0.4	1	0	0	
9307016	10	67.85	6	2	2.3	2.3	2	0.1	2	0.1	2	0.1	5	0	0	
9307017	1	67.9	6	2	1.7	2.6	0	0	2	0.1	2	0.1	5	0	0	
9307017	2	67.9	6	2.1	2.7	2.9	2	0.1	2	0.1	2	0.1	5	0	0	
9307017	3	67.9	6	2.1	2.8	2.8	0	0	2	0.1	2	0.1	5	0	0	
9307017	4	67.9	6	2.6	2.8	2.4	0	0	0	0	0	0	7	0	0	
9307017	5	67.9	6	2	2.6	2.2	0	0	1	0.1	1	0.1	7	1	0	
9307017	6	67.9	6	1	2.5	1.8	0	0	1	0.1	1	0.1	7	3	0	
9307017	7	67.9	6	1.8	1.8	1.5	1	0.1	1	0.1	1	0.1	5	0	0	
9307017	8	67.9	6	0.3	1.7	1.9	0	0	1	0.1	1	0.1	1	1	0	
9307017	9	67.9	6	0.4	1.1	1.3	0	0	0	0	0	0	7	1	0	
9307017	10	67.9	6	0.5	1	1.3	1	0.1	1	0.1	1	0.1	0	0	0	
9308011	1	68.15	6	1.1	2.2	3.2	1	0.27	1	0.44	1	0.51	6	0	0	
9308011	2	68.15	6	0.8	1.8	2.9	2	0.02	1	0.23	1	0.44	2	2	0	
9308011	3	68.15	6	0.6	1.2	3.3	1	0.08	1	0.25	1	0.44	2	2	0	
9308011	4	68.15	6	0.9	1.5	2.8	1	0.02	1	0.13	1	0.24	6	2	2	
9308011	5	68.15	6	0.8	2	4	1	0.02	1	0.17	1	0.34	2	2	0	
9308011	6	68.15	6	1.2	2.6	3.6	1	0.15	1	0.44	1	0.76	6	2	0	13250
9308011	7	68.15	6	1.2	3	4.7	1	0.17	1	0.44	1	0.73	6	0	0	13250
9308011	8	68.15	6	1.1	2.7	4.2	1	0.03	1	0.25	1	0.73	6	2	0	13250
9308011	9	68.15	6	1.4	2.9	4.8	1	0.02	1	0.11	1	0.61	6	2	0	13250

Table 17.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9308011	10	68.15	6	1.3	3	3.7	1	0.02	1	0.53	1	0.72	6	0	0	13250
9309009	1	67.05	6	2.4	3	3.1	2	0.28	2	0.22	2	0.24	0	0	0	13250
9309009	2	67.05	6	2.8	2.7	1.8	1	0.23	2	0.15	2	0.11	2	4	4	13250
9309009	3	67.05	6	0.5	1.6	2.5	2	0.09	2	0.13	2	0.21	7	0	0	13250
9309009	4	67.05	6	2.6	2.2	0.09	2	0.25	2	0.2	2	0.1	0	4	7	13250
9309009	5	67.05	6	1	2.9	4.3	0	0	2	0.07	2	0.19	7	7	4	13250
9309009	6	67.05	6	0.5	2.7	4.7	2	0.01	2	0.08	2	0.14	7	4	2	10060
9309009	7	67.05	6	0.4	1.5	3	2	0.03	2	0.02	0	0	0	0	0	10060
9309009	8	67.05	6	0.5	1.7	3.7	1	0.02	2	0.02	2	0.06	7	7	7	10060
9309009	9	67.05	6	1.2	2.6	4	2	0.03	2	0.08	2	0.14	7	7	7	10060
9309009	10	67.05	6	0.6	3	5.4	1	0.03	2	0.01	1	0.01	7	7	0	10060
9311001	1	68.1	6	1.6	1.7	1.9	0	0	0	0	0	0	7	7	4	10060
9311001	2	68.1	6	0.5	0.6	1	0	0	0	0	0	0	7	4	0	10060
9311001	3	68.1	6	1.6	1.7	2	0	0	0	0	0	0	2	4	2	10060
9311001	4	68.1	6	1.2	2.1	2.9	0	0	0	0	0	0	7	7	6	10060
9311001	5	68.1	6	0.8	1.4	1.5	2	0.08	2	0.03	1	0.23	7	2	2	10060
9311001	6	68.1	6	0.8	1.9	2.3	2	0.02	2	0.02	1	0.22	5	5	5	11979
9311001	7	68.1	6	0.2	0.8	1.4	2	0.21	0	0	2	0.1	0	0	0	11979
9311001	8	68.1	6	0.5	1.5	2.5	1	0.03	1	0.14	1	0.12	0	0	0	11979
9311005	1	67.85	6	2.5	4	5.4	0	0	1	0.01	1	0.07	4	2	0	11979
9311005	2	67.85	6	2	4.1	6.3	0	0	1	0.26	1	0.27	7	7	7	11979
9311005	3	67.85	6	0.3	2.1	4	1	0.03	1	0.09	1	0.2	7	2	0	11979
9311005	4	67.85	6	1	2.5	4.2	2	0.02	1	0.01	1	0.14	7	7	4	11979
9311005	5	67.85	6	0.6	1.5	2.8	0	0	1	0.07	1	0.21	7	7	7	11979

Table 17.-Continued

ID	INT	RM	ST	D1	D2	D3	FD1	V1	FD2	V2	FD3	V3	C1	C2	C3	Q
9311005	6	67.85	6	0.4	1.2	2	0	0	1	0.01	1	0.06	7	7	7	11979
9311005	7	67.85	6	0.5	0.9	1.6	0	0	1	0.06	1	0.18	7	7	4	11979

Appendix E
Discharge records from Lee's Ferry U.S.G.S. gage station

Table 18. Mean daily discharge recorded at Lee's Ferry gage station for 22 years (Oct. 1 to Sept. 30) between 1922 and 1960 which represent the pre-dam era.

1922	1924	1926	1927	1928	1930	1931	1933	1935	1937	1940	1941	1944	1946	1947	1948	1951	1952	1954	1957	1958	1960
7120	13700	13000	6020	22400	22100	8920	5540	2770	4870	5310	20600	5600	5370	4860	7520	7250	7690	3180	2610	7180	4550
11800	13200	12200	5420	21500	20600	8620	5510	3240	4650	5500	23400	6180	5400	5260	7490	7280	10500	3180	2620	7010	5010
7830	13000	11200	5080	21100	19200	10100	5220	3120	4720	5310	16400	6540	5600	5050	7350	6910	5930	3200	2610	6800	5910
7470	12800	10500	6750	21100	18100	10100	5160	2830	4820	5360	15500	6180	5750	4840	6910	6700	5120	3220	2620	6700	8500
6780	12400	16500	6850	20400	16900	10600	5070	2720	4740	5340	14000	5870	6050	4920	6600	6410	5210	3220	2640	6610	12900
6950	12800	29700	8430	19500	16000	10100	4880	2680	4900	5390	19100	5630	6540	5810	6640	6050	5120	3200	2670	6440	12500
6950	12200	25500	9000	18400	15600	9580	4820	2640	5150	5340	19800	5580	6670	7490	6670	5810	5580	3240	2700	6220	11800
7120	12000	30600	8280	17500	15300	9270	4770	2590	5260	5230	14600	5490	6770	7840	6910	5960	5490	3240	2730	6100	11300
6780	12700	22500	8240	17000	15000	8770	4740	2610	5200	5230	16900	5460	6470	6980	6700	6020	5290	3200	2780	6060	10100
6780	12600	16700	8130	16800	14500	8510	4710	2570	5340	5230	14200	5210	6570	7320	6540	5870	5400	3220	2800	6100	9230
6780	12400	15900	8090	16800	14500	8330	4770	2450	5560	5360	12500	4990	6670	7920	6440	5720	6210	3220	2870	6190	8650
6780	12300	15700	7940	16300	14800	8330	4880	2340	5420	5610	11600	5070	6770	7150	6770	5720	7380	3360	2900	9080	8250
6950	12400	17100	7910	15500	15600	8700	4740	2300	5390	5960	11000	5180	14200	6840	15200	5720	8280	3620	2870	10500	7940
7120	12300	19700	8470	15000	16700	8550	4790	2220	5390	6140	10200	5050	13500	6810	35900	5520	7770	3940	2900	13400	7800
6780	12200	19200	8470	14500	16400	8440	4820	2250	5390	5870	9500	5260	14600	6700	34100	5400	7110	4130	2960	13200	7550
6780	12200	19300	8130	14000	15900	8620	4930	2170	5360	6050	8980	5400	12800	6600	37400	5260	6940	4170	2920	11300	7380
6450	12100	19700	7800	13600	15900	9070	5020	2090	5340	6110	8710	5400	11300	6640	26500	5070	6940	4420	2940	15000	7240
6450	11800	17100	7550	13200	15300	8960	5020	2270	5130	5730	8250	5520	9890	6670	19100	5020	6600	4460	2970	13200	7550
6130	11600	15600	7230	13000	16300	8810	5270	2200	5070	5560	7880	6370	10000	6640	14700	5180	6440	4490	2990	11800	7690
6290	11600	15000	7020	12600	15300	8850	5220	2170	5280	5450	7420	7350	9640	6540	12800	5050	6310	4460	3010	11300	7720
6450	11300	14400	6580	12300	14600	8960	5360	2280	5530	5310	7170	7660	8430	6500	12100	4890	6210	4270	3090	13700	7760
6130	10800	13800	6350	12100	14000	9190	5390	2400	5530	5150	6970	6640	7740	6470	11400	4890	6020	5460	3140	29900	7830
6130	10400	13300	6380	11800	13400	9310	5510	2280	6280	4960	6730	6570	7460	6700	11300	5100	5810	7810	3220	32700	7760
6130	10300	13200	6380	11600	12900	9270	5600	2300	6840	4860	6600	7040	7740	6770	11700	5180	5840	9240	3320	28400	7620
6130	10100	12800	6090	11400	12500	8960	6650	2350	7150	4780	6530	7380	7490	6980	13000	5050	5690	9800	3320	19600	7520
6780	10300	12800	5770	11200	12100	8620	6390	2400	7020	4660	6150	6940	7420	6910	13200	5070	5630	9360	3240	15000	7350
7120	11400	12500	5640	11100	11700	8510	6750	2340	6770	4540	6120	7150	7460	6570	12600	4940	5780	9600	3220	12900	7280
7650	11600	12500	5320	10800	11100	8290	6680	2520	6770	4470	6180	7110	7600	6370	12600	4820	6370	10400	3240	11800	7240
7650	10900	12300	5420	10800	11200	8040	6720	2560	6520	4440	7200	6740	7630	6600	12400	4760	7770	8580	3590	11300	7240

Table 18.-Continued

1922	1924	1926	1927	1928	1930	1931	1933	1935	1937	1940	1941	1944	1946	1947	1948	1951	1952	1954	1957	1958	1960
6780	10600	12000	5420	11100	10700	7970	6790	2440	6430	4320	7170	6810	7560	6910	12200	4790	9120	7630	3970	10900	7410
6450	10300	11800	5390	17100	10400	7900	6820	2490	6960	4440	7880	6940	7630	7320	11800	4790	12200	7150	4580	10700	8540
6780	10200	11600	5170	14300	10200	7900	6520	2540	9450	4950	8060	7040	7490	7040	11800	4640	11500	6810	4750	11100	9080
6780	10300	11500	5110	16300	10400	7790	6420	2490	9710	4980	6930	7180	7560	7150	11700	4640	11500	6470	5300	11100	8830
6780	10300	11600	5020	21200	10400	7720	6620	2400	9390	4900	6370	7560	7660	8850	11900	4760	10200	6600	4900	14700	10900
6780	10300	11800	5110	13900	10300	7500	6680	2390	9240	4980	6400	7810	7660	7950	12000	4990	8430	6740	4620	26900	13200
6950	10500	11700	5200	12900	10200	7260	6680	2450	8810	4900	6340	7740	7560	7770	11600	5020	7880	6670	4750	34800	12200
7120	10300	12100	5260	12600	9860	7230	6580	2450	8520	4900	6060	7950	7600	8660	11500	4970	7700	6410	5030	28400	11600
7300	10100	12200	5170	12500	9740	7160	6420	2400	8050	4870	5930	7770	7810	8540	11100	4970	7460	6540	5110	25100	10900
7300	9890	11900	5200	12400	10300	7160	6450	2370	7710	4980	6150	7280	7990	8240	10800	5050	7460	7150	5280	20900	10300
7120	9680	11800	5140	13400	10700	7260	6480	2450	7310	5060	6470	7250	7880	8470	10300	5120	7420	6570	5640	18400	9680
7120	9550	11400	5050	13800	10400	7260	6580	2610	6900	5220	6470	7350	7660	8850	10100	5150	7350	6740	5820	16300	9120
7120	12600	10900	5230	13000	10600	7160	6520	2750	6900	5470	6180	7380	7660	8970	9970	5260	7210	7280	5790	14400	8650
7120	19600	10700	5170	12300	10500	6990	6420	2700	7120	5610	6150	7700	7700	8580	9480	5520	7010	7180	5760	13400	8140
6950	18200	10400	5390	12000	10400	7060	6220	2720	7280	5720	6180	7600	7810	8970	9240	5490	6910	6870	5700	12500	7940
6950	16600	10400	5930	11600	10400	6790	6190	2860	7120	5960	6280	7280	7840	8280	9400	5430	7010	6670	5530	11800	7940
6780	14200	10200	5700	11600	10100	6650	6190	3020	7090	5700	6210	6870	7660	7880	9320	5460	7010	6500	5330	11600	7970
6450	12200	9890	5670	11500	10000	6680	6320	3060	6930	5550	6340	7180	7490	7990	9240	5660	7250	6340	5030	11600	7760
6450	11400	9700	5390	11500	9740	6520	6130	3080	6930	5410	6090	7380	7660	7490	9120	5870	7320	6340	5010	11800	7550
6780	11000	9740	5700	11600	9110	8580	5940	3040	6930	5270	5750	7350	8020	7460	9120	5960	6940	7350	5110	12000	7550
6780	10300	9660	5990	12300	8660	8960	5940	3100	6840	5250	5750	7350	7810	7660	9200	5990	6740	8430	5300	11800	7480
6950	9970	9540	5890	12000	8730	8080	6060	3240	6650	5250	8290	7320	7660	7420	9120	5960	6840	8170	5410	11300	7380
6950	9720	9470	5890	11600	8960	8220	6220	3520	6710	5330	10700	7180	7460	7150	9400	6280	6770	7380	5330	11100	7180
6950	9510	9350	5830	11400	9230	8110	6100	3430	7020	5360	9060	6980	7630	7180	9480	6500	6700	7660	5200	10900	7070
7120	9270	9160	5770	11100	9110	7720	6320	3540	7020	5330	7420	7110	7770	7010	9640	6500	6340	7810	4900	10500	7070
6950	9110	8980	5610	10800	8920	7580	6390	3480	6960	5060	7310	8540	7520	6500	9520	6470	6470	7700	4780	10300	6940
6620	8870	8540	5770	10700	8730	7230	6320	3650	6870	4950	6970	10600	7110	6570	9360	6940	7520	7660	4830	9990	6840
6620	8670	8260	6050	10600	7900	6520	6260	3650	6800	4850	6700	9640	6740	6640	9280	7320	6770	7280	4680	9570	6700
7120	8480	8220	6090	10500	7330	5720	6420	3690	6710	4720	6660	8850	6440	7040	9040	7350	6340	6840	4320	8900	6570
7470	8250	8190	6090	10300	7020	5130	6450	3760	6710	4740	6600	7810	6240	7660	8280	7490	6470	6340	4160	8680	6540
7470	8250	8400	6150	10000	6890	4630	6320	3760	6620	4820	6340	7600	6180	8660	7660	7840	6940	6150	3970	8750	6440

Table 18.-Continued

1922	1924	1926	1927	1928	1930	1931	1933	1935	1937	1940	1941	1944	1946	1947	1948	1951	1952	1954	1957	1958	1960
7650	8100	8650	6510	10300	6820	4520	6100	3600	6310	4900	6120	7460	6210	8620	7420	7770	6910	6020	4010	8900	6280
7650	8100	8610	6750	10000	6920	4740	6060	3560	6190	5000	6020	7280	6240	8130	7350	7460	6640	6440	4300	9040	6160
7470	8100	8300	6720	9770	7300	5160	6060	3710	6070	4950	5810	7210	6340	7770	7660	7380	6340	6840	4420	8610	6380
7470	8060	8300	6480	9680	7540	5360	6190	3780	5950	4870	5670	6980	6670	7630	9240	7350	5990	6740	4380	8250	6320
7300	7950	8360	6850	9730	7790	5600	6260	3760	5720	4950	5610	6570	7080	7560	10700	7040	5810	6700	4280	7900	6100
7120	7990	8540	6850	9370	8150	5720	6350	3580	5530	5030	5640	6370	7040	7560	9640	7110	6150	6700	4200	7580	5820
7120	8210	8470	6790	9240	8620	5480	6260	3520	5470	4870	5640	6240	6740	7520	9890	7180	7250	6700	4080	7210	5790
7120	8290	8650	6750	9460	8660	5040	6160	3350	5280	4850	5670	6410	6840	7700	9850	7080	6980	6670	4080	7380	5790
7470	8330	8720	7160	9500	8040	5100	6100	3080	5130	4770	5720	6470	6670	7920	9600	6840	7080	6600	4180	7580	5700
6950	8290	8400	10100	8990	7930	5240	5880	2850	4940	4720	5930	6570	6440	8060	10100	6770	7080	6670	4400	7760	5580
6450	7720	8120	11000	8190	7720	5220	5910	2680	4820	4600	5900	6500	6280	7840	10700	6770	7040	6440	4480	8110	5360
5830	7220	8190	11300	7680	7720	5160	5660	2590	4650	4640	5810	6500	5990	7950	10100	6700	6470	5960	4600	8430	5140
5830	6820	7850	10200	7180	7790	5270	5390	2610	4380	4740	6500	6810	5870	8210	9360	6570	5810	5660	4700	8680	4830
5550	6480	7620	8960	6260	7860	5270	5130	2810	4170	4740	7200	6840	5840	8240	8700	6310	4940	5260	4620	8900	4550
5280	6750	7580	7690	6140	7790	5300	4770	3220	3990	4770	7100	6980	5430	8430	7880	6340	4250	4820	4280	8930	4580
5020	6480	7350	7300	6880	7900	5330	4090	3600	3830	4770	7280	7110	4920	8100	7080	6570	3770	4220	3440	8720	4800
5020	5810	7190	6920	7540	8260	5390	3320	3650	3750	4820	6760	6870	4440	7600	6310	6740	3380	4420	3140	8720	5060
5150	5390	7190	6510	7700	8470	5270	2950	4050	3810	4850	6280	6570	4080	7010	5580	6670	2980	4460	3420	8570	5140
5420	5130	7000	5990	7200	8290	5200	2670	4340	4170	4770	5440	6280	3660	6840	5070	6440	2930	4490	3810	8680	5440
5980	4910	6810	5350	6600	8080	5100	2360	4200	4670	4700	4450	6050	3340	7350	4760	6340	3530	4490	4010	8900	5610
6130	4680	6590	4700	5400	7820	5000	2740	4150	4970	4640	3740	5840	3180	7520	4860	6570	4150	4490	4500	9160	5700
6450	4830	6290	4200	4800	7640	4900	2860	4270	5180	4520	4470	5750	3180	7380	5490	7040	4590	4490	4380	9380	5820
7300	5480	5730	4000	4200	7330	4500	3340	4320	5280	4470	4160	5840	3180	7250	5660	7460	4820	4890	4250	9380	5820
7470	5840	5530	4100	4100	6960	4200	3660	4200	5310	4380	4280	5840	3680	6670	5810	7560	5120	5550	4110	9300	5820
8020	6160	5440	4200	4310	6190	3600	3860	4080	5500	4450	4850	5810	4440	6080	5870	7180	5180	6120	4010	8900	5640
8580	6160	5640	4200	4850	5750	3300	3590	3940	5530	4400	5250	5870	4760	5810	6470	6770	5100	6020	3810	8680	5580
9810	5840	5670	4100	5530	5250	3400	3400	3960	5360	4160	6120	5990	4970	5600	6940	6670	4860	5720	3500	8430	5850
10500	5690	5810	3700	6230	4700	3200	3400	4050	5310	3770	7990	5930	4920	5580	6770	6670	4920	5260	3420	8140	6610
11800	5630	6110	3300	6350	4200	3100	3400	4130	5720	3680	6760	6080	5430	5630	6770	6370	5320	5070	3500	8000	7180
10700	7720	6620	2800	6350	4100	3120	3300	4250	6400	3860	6150	6500	7250	5900	6840	6020	5870	4790	3400	7900	6640
9180	9150	6720	2600	5960	4300	3240	3000	4150	5810	3900	6150	6600	7490	6280	6910	5750	6500	4640	3380	7720	6320

Table 18.-Continued

1922	1924	1926	1927	1928	1930	1931	1933	1935	1937	1940	1941	1944	1946	1947	1948	1951	1952	1954	1957	1958	1960
8780	9150	6690	2500	6570	4600	3220	2600	4170	5580	3480	6020	6440	7250	7010	6840	5550	7250	4540	3400	7480	6220
8580	7910	6590	2700	7310	4700	3220	3700	4150	5670	3100	6930	6150	6770	7250	6910	5430	11100	4460	3300	7310	6000
8390	7360	6620	2800	7540	4600	3280	3000	4100	5420	2950	7880	5660	6540	7040	6770	5350	10900	4440	3300	6940	5760
8200	6650	6690	2900	7410	4500	3500	2900	4150	5050	3050	8030	5260	6470	5930	6810	5370	11800	4150	3300	6870	5300
8580	5690	6810	3100	7040	4600	3700	3000	4100	4740	3180	7140	4840	6810	4740	6500	5490	11500	3990	3380	7010	4900
10000	4700	6870	3400	6600	5000	3700	3800	3940	4220	3300	6400	4660	7010	3900	6150	5430	9200	4150	3590	6670	4230
8980	3920	6780	3800	6570	5600	3800	3200	3870	3460	3590	6090	4540	6910	3490	6080	5230	7040	4250	4080	5940	3850
8980	3440	6750	4200	6980	5900	3900	3400	3580	3180	4570	5810	4370	6910	3380	5720	5320	5870	4220	4200	5610	3320
8390	3160	6780	4800	7340	6000	4100	3100	3500	3160	4930	5500	4200	6840	3240	5660	5210	5720	4150	4520	5530	3010
7300	3440	6470	5200	7650	6100	4300	3200	3540	2660	4980	5140	3940	7110	3200	6280	5020	5460	4170	4520	5500	2940
6620	4130	6350	5100	7790	6400	4200	3400	3520	2540	5110	4820	3970	7010	3640	6570	4760	5660	4420	4650	5850	3070
5280	4040	6170	5060	7860	6130	4200	4000	3870	2350	5270	4450	3700	6740	3990	7180	4520	4820	4740	4900	5940	3420
4430	4280	6170	5620	7790	5700	4200	4600	4700	1560	5250	4400	3510	6640	4250	7080	4270	4130	4790	5010	6060	3850
3900	4440	6020	5960	7750	5400	4100	4900	5420	2000	5440	4420	3300	6310	4490	7150	3790	4150	4720	5030	6130	5110
3700	4650	6020	6220	7750	5200	4200	4500	5190	3000	6600	4570	3100	5900	4920	7560	3600	4440	4760	5140	6280	5500
3700	4830	5840	6280	7820	5100	4400	4500	4940	2790	6120	5220	3180	5930	4970	7740	3640	4540	5100	5330	6840	5880
4110	5160	5640	6350	8150	5220	4500	4700	5190	2340	5550	5520	3000	5900	4690	7740	4250	5180	5230	5360	7040	6280
4110	5130	5550	6320	8460	5420	4600	4900	5890	2590	5440	6060	3100	5630	4460	7420	4690	5780	5260	5140	6870	6410
4320	5420	5550	6220	8780	5540	4500	4900	5450	3060	5160	5670	3530	5050	4340	6980	4860	5930	5210	5090	6670	6100
4540	5210	5390	6060	9460	5330	4500	4700	5160	3600	4600	5470	3900	4890	4340	6640	4860	8580	5260	5280	6640	5910
4540	5160	5280	6220	9160	5000	4500	4800	4830	3600	4090	5250	3880	5050	4080	6370	4660	15900	5230	5530	6740	5730
4900	4960	5400	6060	8540	4400	4400	4800	4650	3500	3680	5060	3970	5490	3740	6810	4690	11100	5370	5500	6770	5250
4430	4650	5350	6280	8000	3800	4300	4900	4250	3220	3050	4800	4060	5430	3790	6310	4920	9000	5630	5090	6940	5200
4220	4910	5300	6780	7650	3500	4400	5100	3700	2730	2450	4600	4320	5350	3900	6440	5260	8320	5660	4620	6640	5250
4000	5160	5100	7060	7440	2900	4600	5300	2950	2590	2320	4800	4660	5400	3830	6410	5630	8280	5810	4380	6440	5140
4110	5540	5050	6820	7340	2900	4500	5200	2610	2250	2790	5500	5430	5430	4040	6410	5840	7770	5900	4200	6190	5010
4430	5450	5000	6510	7080	2900	4600	5360	2540	2250	3070	5870	5840	5260	4390	6670	5810	7350	6120	4040	5940	4850
4900	5240	4950	6280	6950	4100	4660	5390	2490	2600	3120	6090	6080	5290	4620	7380	5810	7250	6440	4400	5940	4850
4770	4990	5050	6280	6750	4220	4630	5300	2750	2770	3460	6370	6120	5100	4890	7770	6020	7280	6670	4700	6160	5060
4430	5240	4980	6220	6690	4050	4740	5270	3350	2960	3970	5930	6150	4970	5180	6470	6310	7770	6700	5200	6350	5280
4430	5510	4980	6190	6820	4020	4900	5240	4420	3360	4230	5810	6150	5120	5430	4820	6370	8930	6740	5700	6940	5700

Table 18.-Continued

1922	1924	1926	1927	1928	1930	1931	1933	1935	1937	1940	1941	1944	1946	1947	1948	1951	1952	1954	1957	1958	1960
4660	5510	4980	5780	6850	4390	5040	5100	5050	4240	4210	5990	5840	5230	5630	3990	6540	9240	6840	4960	7410	5610
5150	5570	5090	5560	7080	5150	5130	5100	5100	4340	4500	6020	5460	5180	5810	4860	6810	8580	6770	4780	7550	5640
5150	5940	5060	5470	7340	6160	5300	5040	5000	4460	4770	6020	5430	5050	5550	5350	6700	7770	6410	4800	7580	5700
5020	6320	5330	5440	7510	6960	6520	4800	4950	4550	5060	5960	5600	4940	5460	5230	6120	7250	6410	4550	7450	5790
5150	6420	5550	5320	7650	7230	6580	4700	5150	4580	6210	5870	5750	5100	5520	5900	4820	6940	6120	4400	7350	5820
5280	6480	5870	5350	7900	6520	6720	4700	5160	4670	6470	5930	5960	5120	5520	7250	3550	6700	5900	4300	7350	6280
5020	6650	6200	5410	10400	6190	6620	4600	5160	4970	6700	5780	6080	5210	5630	7520	3060	6570	5810	4500	7450	6100
5280	6650	6290	5410	11200	6030	6520	4300	4890	6330	6470	5610	6340	5260	5780	7150	3320	6500	5600	4520	7860	5880
5020	6820	6320	5620	10000	6160	6790	4000	4780	9940	6060	5360	6210	5320	5840	7080	3970	6500	5400	4380	8140	5880
4900	6820	6410	5840	10600	6450	6850	3600	4750	8260	5810	5330	6280	5600	5960	6870	5070	6600	5210	4300	8540	5850
5020	6860	6440	6030	9820	6720	6650	2400	4890	8700	5550	5750	6240	5870	6440	6670	6120	6500	5430	4380	8750	5640
6450	7180	6290	6190	9110	6790	6450	2600	5080	7310	5250	5640	6280	5720	6640	6980	7080	6470	5630	4400	8570	5500
10900	7540	6350	6190	8540	6920	6720	4200	5000	7020	5160	5720	6570	5460	6640	7080	7420	6440	5840	4300	8250	5580
10000	8520	6380	5960	8190	7190	6720	3720	4860	7210	5060	5960	6870	5580	6500	7010	6940	6310	5900	4300	8390	5790
9600	8870	6500	5780	7610	7610	6750	3990	5000	7710	4980	6210	6810	5580	6500	6210	7010	6410	5960	4580	9160	5820
10200	9270	6780	5990	7580	8080	7020	3970	4890	7090	4850	6400	6370	5630	6470	5400	7380	6670	6120	5530	9160	6000
9810	9270	6780	6550	7650	8810	7130	4160	5020	10000	4900	6660	5960	5550	6370	5520	7460	7040	6310	6700	8500	5970
8390	9390	6780	9890	7480	9150	7610	4420	4920	9550	4900	7200	5840	5520	6470	5230	7380	6810	6600	7210	8140	5530
7650	11300	6910	11200	7440	8960	8040	4680	4970	10800	4850	7590	5780	5350	6740	5400	7380	6540	6670	6870	8000	5360
7650	11300	6870	9090	7210	8810	7750	4660	4920	10600	4770	7520	5720	5400	6940	5990	7420	6470	6570	6740	8080	5220
7830	11000	6750	10400	7110	8700	7260	4680	4780	9120	4740	7990	5600	5550	6810	7250	7210	6500	6810	6640	8900	5250
8780	10900	6840	9890	7010	8920	6650	4960	4600	9280	4720	8900	5600	5870	6740	8470	7040	6150	6600	7040	10000	5250
10200	10700	6660	8900	7080	9660	6220	4930	4370	8260	4740	10100	5660	6180	6840	9600	7110	6280	6150	7040	11100	5140
10200	10400	6470	7520	7080	10100	6060	4990	4270	7440	4600	11600	5550	6310	6940	11000	7660	6440	6240	6900	11800	5170
10700	10200	6440	6660	7340	11100	6130	5160	4300	7150	4400	12000	5550	6370	6870	14300	7950	6340	6640	7450	12500	5220
10700	10000	6320	6560	7340	14700	6100	5240	4750	6900	4380	11600	5670	6470	6810	14200	7920	6150	6670	7690	13700	5110
10500	10300	6380	6940	7310	16200	5910	5390	5270	6650	4500	11400	5840	7150	6910	13300	7380	5930	6310	8500	15000	5090
10000	11300	6260	7230	7140	13700	5810	5600	5360	6900	4670	11600	6080	7350	7350	11800	7180	6020	6050	8250	16300	5030
9810	11300	6260	8090	7080	13700	5840	6750	5190	7090	4670	11500	6280	7210	7770	10800	7320	6210	6210	8000	16600	4980
	11000			7040						4980		6020			11400		6120				4980
9600	10100	6170	9280	7390	12600	5750	7580	5190	7180	6660	11900	6080	7420	8510	11600	7380	5900	6050	7830	15200	5090

Table 18.-Continued

1922	1924	1926	1927	1928	1930	1931	1933	1935	1937	1940	1941	1944	1946	1947	1948	1951	1952	1954	1957	1958	1960
9390	9760	6140	10400	7200	11300	5720	7720	5110	7340	7740	11600	6210	7740	9080	12000	7380	5990	5960	7550	13900	5110
9390	10100	6110	9890	7420	10300	5720	8220	4920	7340	7740	11300	6080	7630	8540	12400	7490	6020	6050	7450	12900	5090
8580	10200	6020	9930	7740	9540	5780	8330	4750	7250	7200	10300	5900	7320	8170	11800	7520	6150	6310	7660	11600	5110
7650	10000	6110	10000	8620	9150	6000	8180	4420	7150	6800	11000	5690	7380	7920	10300	7210	6470	6310	8140	10900	5250
7300	9640	6320	11200	9060	9000	5880	8110	4650	7180	6280	11400	5840	7700	7600	9480	7040	6600	6240	8110	10300	5300
7120	9070	6720	10500	10600	8920	5880	7820	5160	7180	7030	10800	6240	8210	7080	9040	7150	6540	5990	8720	9870	5440
6780	8950	7350	11400	10900	8580	5970	7580	5330	7210	8400	10700	6340	8540	6500	8580	6870	6410	5720	9080	9380	5410
6780	8790	8050	10300	12000	8360	6060	7470	5360	7380	7920	10600	6810	8210	6310	8540	6570	6280	5490	9010	9040	6190
6620	8440	8650	10900	11600	8330	6260	7580	5480	7540	8330	9300	6870	7920	6470	8430	6440	6310	5290	8860	9010	9610
6290	8250	9130	10700	11300	8470	6450	7500	5360	7950	8100	8480	6410	7600	6540	8430	6240	6500	5350	8250	9230	12000
6130	8020	9240	10300	11100	8290	6480	7860	5220	8220	7660	8400	6120	7560	6540	8360	6020	6770	5490	7860	9160	12900
6130	8020	8790	11000	11000	7970	6260	7930	5200	8780	7590	8100	6080	7600	6700	7660	6500	7380	5630	8080	9420	13200
6130	7580	8940	11000	12300	7900	5880	8510	5020	9470	7240	7480	6540	7350	6910	7250	7080	7990	5780	9010	9380	12500
6290	7320	9470	10900	13200	7790	5880	8990	4830	10200	7140	7480	6840	7210	6840	7010	6980	8100	5660	9910	9080	11300
6780	7400	9660	10300	12700	7930	6060	9070	4830	11400	6630	9030	8540	7770	6740	7520	7040	7950	5900	9870	8930	11100
10000	7580	9350	9850	13100	7930	6260	8880	4830	11800	6340	10000	8770	7840	6600	7320	7350	7380	6410	9530	8790	11800
16800	7540	9740	9200	13100	8110	6990	9100	5500	12600	6210	9540	8390	8130	6670	7380	7490	7080	6440	8970	8570	12000
22600	7400	10100	9200	12700	8400	7300	9940	5740	14400	6120	9910	8930	8100	6870	8210	7040	6940	6080	8470	9270	11800
24500	7540	11000	8900	11700	9110	7230	9220	5770	19200	5840	10100	12500	8210	6840	8360	6700	7250	5870	8110	10300	11100
31200	7580	12800	8650	10700	9500	7330	8810	5770	17900	5810	10200	15100	8320	6700	8240	6700	7950	5870	7580	10900	10300
31200	7540	14600	8720	10100	9310	7440	8620	5860	17800	5990	10400	13000	8170	6770	8890	6770	7880	5750	7550	11800	10100
24500	7400	14700	8830	9820	9230	7580	8400	5950	17300	5960	10300	11600	8240	20900	9680	6770	8100	6050	7720	12000	12200
21200	7140	15200	8610	9920	9740	7860	8700	6080	16500	6020	11500	10700	8390	22500	10800	6770	7990	7560	7580	11800	13700
21900	7180	15800	8090	11100	9980	7930	8510	6230	16600	6120	12000	9850	8770	20900	10900	6440	7600	8060	7280	13900	14400
21200	7220	15100	7710	13200	10100	7970	7820	6390	16000	6240	12700	9680	9040	20300	10800	6150	7280	8170	7310	14700	15800
23700	7140	14100	7550	15800	10100	8360	7440	6110	14200	6470	14000	9080	9160	20600	11000	5960	7110	8320	7280	13900	19600
24500	7220	14400	8360	17500	10300	9150	7130	6140	13400	7340	15400	8660	8890	20100	11800	6080	7210	8430	7350	14400	24000
24500	7000	14700	9580	18700	10200	9380	6650	6200	12400	7700	15500	9280	8470	18200	20100	6240	7350	7600	7480	14700	25800
22200	8630	14200	10400	22300	10300	9380	6580	6230	11600	8360	13900	9520	8430	15700	22200	6470	8060	7210	7040	14700	26200
19400	9070	13700	11400	24600	10100	8850	6500	6490	11500	8440	13700	9000	8540	13800	21100	6700	9160	6980	6700	13900	26200
17200	9030	15600	13100	24100	9820	8330	7000	6680	10900	9220	13600	8540	8360	12800	19800	6840	11800	6810	6940	13700	26900

Table 18.-Continued

1922	1924	1926	1927	1928	1930	1931	1933	1935	1937	1940	1941	1944	1946	1947	1948	1951	1952	1954	1957	1958	1960
16000	8210	14100	14600	21200	9150	7720	7200	7000	10100	9580	13800	8060	8540	12200	19400	7700	13100	6770	7380	13900	27600
14500	8180	14000	15200	19300	8810	7360	7500	7610	9910	9420	14500	7950	9200	11900	19400	8850	14600	6570	7830	13900	27300
13500	8060	13000	15500	18200	8810	6790	7600	7610	12000	8980	16800	8060	9280	12400	18300	8930	15400	6640	8320	13900	25400
13000	8060	11800	16800	17800	8960	6480	7900	7860	13000	8790	16800	8510	9040	13700	17700	8280	17100	6540	8540	13900	22900
14000	8590	11300	18500	18300	8960	6100	8200	8820	12400	9220	16100	10600	9800	14300	17800	8100	21100	6340	8290	13400	20900
16500	9850	11300	20900	19000	9150	6160	8900	9510	11700	9500	15300	22200	11100	13700	18500	8280	22400	6150	8290	12900	19300
17800	11400	12300	23800	18100	10100	6550	9630	9470	11900	8820	15800	25000	12300	13300	18900	8060	24900	5870	9190	12700	18100
18800	13400	14600	25200	17100	11500	6960	10000	9740	12700	8290	17200	27600	13800	12900	20200	7490	24200	6120	9160	12900	18700
18100	21800	15300	26000	16400	16400	6920	9630	11300	12900	8140	17900	29300	13700	13000	20600	7250	28000	6600	8650	12900	20300
17800	33600	17600	26300	15500	26200	7060	9710	10600	14500	8290	17900	28500	13500	12300	20800	7280	32900	7150	8750	13200	23300
17800	38500	20000	25200	14300	34600	7400	9520	11700	16700	8630	18200	27000	14600	11300	22200	7600	37000	8240	8790	13900	26900
18100	40600	19700	22800	13200	40000	7540	9440	9580	17800	8480	20900	24200	15100	10300	22500	7660	34700	8850	8720	14700	31900
17500	41200	22500	22200	12900	39600	7610	9290	9240	19500	8060	20900	21500	13800	9560	25100	8060	34300	9680	8930	15200	36100
16800	40100	23200	21600	12600	38500	7750	8730	8780	21200	7880	20100	20800	13100	9040	24100	8700	31600	9520	9270	14700	37900
15700	40100	22800	19900	12300	40300	8150	8220	8460	23600	7990	18700	20500	12800	8810	21000	8930	30000	9320	10300	15000	38800
14800	43400	22800	18500	12100	41200	9190	7820	8930	28200	8290	17700	21500	13200	8770	20100	9040	31200	10600	12500	16600	36600
14000	44500	23900	17700	11600	39900	10100	7440	10400	37700	8630	16800	19400	13900	8810	22300	8770	35600	10600	14700	20900	34000
14300	39000	26900	16600	10900	39000	10500	7090	12100	44800	9220	16800	18200	14500	8700	27600	8540	42100	10000	17200	28000	31500
14000	35000	31600	15300	10300	35600	11200	6620	13100	41200	9750	16700	18200	14100	8390	35300	8510	47600	9880	19900	35600	30300
13500	31200	33200	14300	11300	32400	11300	6650	13600	41700	10500	16700	17700	13900	8660	38600	8100	49700	9880	23300	44000	27300
12500	28100	37200	13600	13200	29700	11000	6450	14000	43000	10300	16300	16100	15700	10200	39500	7700	50800	10200	22200	51200	25100
13500	27200	39500	14300	14900	29300	11500	6960	13400	40600	10300	15500	15200	19700	12000	44100	7810	54000	10600	21600	55400	24000
17500	29000	40200	15900	15800	33000	12500	7640	13100	39500	13400	16100	14500	23100	14400	52400	7920	56100	11100	22200	56400	24300
24900	32600	42600	17100	16800	37600	13000	8150	13100	42700	18500	17600	13800	27000	16900	53000	8850	57200	12400	24000	57500	24700
30700	35000	45100	19400	17000	42300	13200	8700	14400	39200	19200	19400	13400	28900	21300	48300	10400	57200	12200	24300	51200	26200
32900	37500	47800	24000	16900	44500	13600	10300	16400	33200	20000	17800	12900	31300	21000	43000	11500	60600	12200	21900	44000	26500
36200	36500	48200	28800	21800	45200	14000	9600	15200	31100	21100	22200	12700	34200	22400	38900	13100	63900	12400	19600	39200	26900
40000	33600	48300	33300	24500	44700	14800	9140	13700	32600	22000	29000	12500	36600	21300	35800	14600	68500	13100	18400	36600	26500
42000	30800	49000	35100	28600	44300	13600	8660	13300	36200	22600	37100	13200	36800	19000	33200	14900	75100	13100	18100	36100	25400
42500	29400	47600	38200	34900	43900	12300	10800	13400	34200	22700	40300	13900	37500	17800	34400	14900	78600	14100	19900	35200	23600
46600	26800	48800	42900	38900	41100	11400	11800	14200	29400	23500	40300	19700	38000	17900	41700	15400	70800	15700	19300	32300	21900

Table 18.-Continued

1922	1924	1926	1927	1928	1930	1931	1933	1935	1937	1940	1941	1944	1946	1947	1948	1951	1952	1954	1957	1958	1960
53200	25000	50900	49600	49800	38900	11200	14600	15900	26200	22200	44200	20700	37700	16900	47800	15700	68400	14600	18100	29900	19900
55400	24600	50900	55800	62200	36900	11500	16900	16400	25700	20800	49500	19800	36800	16900	48800	16200	69600	14400	17500	28800	18700
55400	25800	52600	58900	71500	38500	12000	17700	17000	28100	19300	51900	21300	35200	20100	48000	16200	77500	14400	20300	29600	17800
61000	30800	55300	61100	71400	41200	12800	17400	15200	33800	18200	65800	22100	33200	35200	46100	15400	89600	13900	26500	31100	16600
62700	38500	59600	63100	64200	40000	13600	16500	14000	39200	20200	78200	20200	32000	47400	45000	14600	99800	13600	32700	36600	15800
71700	42300	67300	63200	60500	36800	15000	16600	13200	43200	25000	71700	19400	31200	56800	44700	14400	108000	13100	39700	44500	15500
81200	44500	70000	60800	61100	34000	15700	16800	13100	43100	26300	73600	23300	31200	62200	45000	14100	112000	12400	46500	53300	14700
86800	45100	64100	62700	66300	32000	15500	17100	12700	46300	28900	77300	33600	30700	64800	47900	14100	109000	12000	52200	59700	14700
85100	45700	59000	61400	72400	29900	16400	17400	12600	52100	31500	80100	38500	30600	68900	49200	15700	108000	12000	55400	64100	14700
81200	46900	53600	55800	81200	28100	17800	17700	13700	60900	32500	83700	43300	30600	74600	45000	18000	105000	12200	61900	65200	14700
72800	48100	47500	50700	85700	26000	17200	17300	15300	66900	35300	87800	46100	33300	77300	41300	20100	97800	13900	59700	65200	15200
65500	49300	42200	46200	88200	24600	16000	16100	17500	70900	38400	94100	51000	35200	76900	38400	22700	93800	16500	61900	67400	17800
61000	49900	38600	42300	85900	23600	15300	14600	19600	69400	41400	105000	57600	33800	70800	34800	25300	92800	18900	59700	70700	22600
56500	52400	35300	42700	81500	21500	14800	13700	22900	71100	44200	118600	67700	31400	66900	32400	26400	92800	19800	55400	69600	29600
54300	56200	33300	47300	78500	20500	14300	12800	24900	73400	45200	117500	78500	29000	64500	35200	26000	95800	19800	51200	68500	36100
51500	58200	32000	55100	73200	20200	15100	12000	23700	77500	45700	110200	86500	26600	61000	43800	26000	97800	20400	47000	66300	39200
50400	60800	33300	64700	70600	22400	17900	11200	24100	81000	44900	102200	91600	24000	56500	51400	25600	95800	21100	46500	65200	40600
55400	61400	35800	74200	67900	25000	25100	10800	25000	82000	45300	97100	88300	22900	52300	59100	24900	87400	22400	44500	65200	38800
60800	65400	38300	84800	63500	25200	32100	13800	26000	81300	43200	95900	74200	21800	49700	68100	25300	80800	23100	40600	67400	37400
65600	65400	41800	89300	61200	24600	33500	25200	28200	75700	40100	89300	67100	21100	48600	79300	28000	75300	24900	41100	72900	36100
73800	66100	48800	89300	59100	24100	29500	33300	32000	71800	37900	80000	65800	21600	49000	87100	32100	70800	27200	45500	77100	34000
78900	64700	58600	87200	59000	28000	26000	43300	29300	69500	35400	76900	65200	21200	50500	90000	37000	68400	30000	45500	80200	31500
83800	64000	64900	84900	63900	34700	22500	46800	26400	68300	34300	81900	68000	20800	52500	91800	37900	65000	32900	44000	85500	29600
91100	61400	71700	78400	70700	35200	19600	43700	26800	64800	33100	79500	73000	22000	52600	89700	39300	60500	33800	43500	89700	28400
95200	58800	76000	72600	75700	32600	18700	38900	28600	61700	32200	82400	77100	21600	49300	85800	41200	56100	32900	42500	92800	29200
103000	56800	81000	69300	81500	34300	20600	39000	34800	57000	32500	83900	76300	20800	47300	79700	42100	55000	32100	39700	96800	29600
110000	58200	84000	67500	88600	38200	25300	39800	39100	51400	32500	86000	72800	20600	48100	74900	47100	57200	31600	37000	97800	28400
114000	58800	77500	64700	95000	43300	27100	46600	43500	47400	32900	84200	68200	20300	49000	71700	55000	59400	30800	37900	99800	27600
116000	58800	71700	62700	104000	51100	26800	53300	47500	48700	33900	78700	68000	20600	51200	69900	62800	62700	29200	42000	104000	28400
114000	54900	67000	60200	108000	58900	25600	59200	49200	55400	34700	74100	72700	20800	49700	70500	66200	68400	26000	49100	104000	30300
113000	51800	66300	56400	113000	69600	24700	66100	49300	65700	36200	70500	76000	22000	47200	73200	63900	71900	24500	55400	104000	31100

Table 18.-Continued

1922	1924	1926	1927	1928	1930	1931	1933	1935	1937	1940	1941	1944	1946	1947	1948	1951	1952	1954	1957	1958	1960
107000	47500	69700	53400	113000	71400	24400	70100	49800	60900	38500	68400	78800	22200	45800	77000	63900	76400	22400	60800	97800	31900
95700	44500	73600	52300	109000	65600	25700	75200	48200	56800	40500	66800	82000	21100	44600	77800	61700	80800	20100	65200	93800	33100
86200	42800	75000	51700	106000	57900	27400	79900	44900	54500	41100	66900	81700	20300	44800	78700	58300	83000	18900	72900	93800	35600
81200	44000	76000	49800	98800	53000	29400	77100	45300	54500	40600	67300	78300	19200	48300	84800	54000	94800	17700	83400	91800	39200
81200	48700	77500	47500	85600	47900	30100	76000	48000	53200	38500	67400	71200	18400	51700	82900	50200	102000	16800	95800	87600	43000
84500	54900	78000	46200	76300	45200	29500	79000	53300	49100	35300	69300	65200	22500	50100	78800	46600	104000	15700	107000	88600	45500
88500	61400	78500	46700	68800	46000	30300	78000	55500	44500	33700	75200	64500	33300	47700	77400	43100	108000	14900	113000	94800	45500
93500	64700	78000	48700	65800	52600	31500	73100	61900	40500	32100	82300	67800	40400	50800	74500	39800	115000	14400	118000	94800	45000
104000	62000	75500	54800	64400	55300	31800	67300	65900	37500	29300	80600	68600	42100	57800	70400	38800	121000	14100	121000	87600	44000
108000	57500	73400	59800	62900	57900	30600	65100	70500	35000	26600	74000	71300	43900	63200	67700	38800	122000	13600	124000	79200	44000
108000	54900	70600	63000	60600	58000	28500	70900	78100	32800	24300	66300	75800	46300	64900	65700	37900	121000	12400	123000	70700	44000
102000	55600	68100	64600	56600	54700	26200	75500	84400	32200	21900	60400	76800	49200	65200	66500	37000	121000	11500	114000	64100	42500
99700	59400	65800	66000	53800	60200	24300	76700	86300	31900	20800	55900	74800	47700	63000	62800	35200	119000	10200	106000	58600	42000
99100	66100	62900	67800	49500	62600	23400	75400	90000	33900	20100	54800	72500	46200	58300	59800	33800	111000	9930	106000	52200	40600
97400	71500	61400	67500	44600	60100	23200	72700	96800	33700	20100	54300	72800	43400	54700	55900	33400	107000	9680	108000	48600	39200
87900	72800	59900	69600	41600	58900	22800	72700	103800	32300	20200	54200	72200	41900	52100	51600	34300	105000	9850	108000	45500	39700
79500	70100	55800	69400	40500	54700	23300	72200	98000	30300	20400	56600	69300	42100	50500	48200	37400	98800	9640	102000	43000	38800
75600	65400	49500	67100	41900	52800	23300	71000	85800	30900	19100	60500	62700	44100	50500	44800	43600	86300	9480	93800	40200	37900
75600	59400	44400	69300	43500	49800	22600	69100	78500	32400	18600	68400	58300	44900	51500	41700	49700	77500	9240	90800	37900	39700
75000	53600	40700	70900	42600	48500	20300	68600	74400	33200	18300	74400	58900	40600	54000	38800	52900	73000	9400	91800	36100	40200
75000	48100	38600	69100	40200	48300	18800	65500	75000	33700	17300	74800	62600	36600	59800	36200	57200	70800	9680	95800	35200	39200
72200	44500	37200	65600	38400	43200	17600	63800	71900	33300	16600	73200	65400	33500	67600	33800	60600	65000	9890	97800	34000	38800
71700	41200	34700	61500	39100	41700	16000	59000	67800	32900	15800	70900	65300	31600	67300	31700	61700	60500	9970	90800	32700	36600
68900	39000	32400	57900	39500	42300	14600	54800	63800	32500	15300	72000	64100	30600	64100	29400	58300	56100	10600	85500	30700	34400
65500	37500	31400	56800	39900	38400	13600	48700	62000	32800	14700	71600	66200	28900	61500	27100	54000	52800	9680	87600	29600	30700
61600	35500	30700	58200	40400	32800	13100	44100	56600	29300	13900	67000	63200	25600	57800	25000	50200	50600	9760	90800	27600	27600
57100	34600	29200	73600	40800	30900	12800	39500	53500	29200	13200	63000	63600	23500	54200	24400	47600	48000	9560	93800	26200	25100
55400	32200	28500	91200	41800	27300	12500	36400	49800	30900	12300	57700	62500	21700	52500	26500	45100	47000	9720	94800	23600	23600
52100	30400	28000	119000	41500	24900	12700	32400	46000	29500	11400	52600	56400	20000	50900	29100	43100	44500	9360	97800	21900	22200
48800	28600	27000	106000	39900	23900	13000	29700	42800	27800	11600	45900	53600	18400	50400	27200	39300	43000	9560	99800	20300	20600
46100	26800	25700	78100	38300	22000	12800	27400	40700	26000	11000	43600	53900	17100	49300	26400	37000	42500	9850	99800	19300	19300

Table 18.-Continued

1922	1924	1926	1927	1928	1930	1931	1933	1935	1937	1940	1941	1944	1946	1947	1948	1951	1952	1954	1957	1958	1960
44000	25000	25300	65800	37200	19600	14200	24800	38300	24100	10100	40200	52300	16200	47700	26400	34700	41600	10600	97800	18400	17800
42500	23000	25600	59700	35700	17600	15500	22700	36200	22200	9340	37500	50800	15000	46100	25500	31600	39700	11800	95800	17500	16600
36600	21400	25400	55900	33900	17000	15800	20700	34300	20800	8980	35700	49400	14000	44100	23900	30000	36500	12200	91800	16300	15200
34800	20300	25700	59200	32300	15500	14000	21700	32100	19600	8330	34400	46900	13700	43000	22800	29200	34800	14900	89700	15000	13900
32900	19200	25800	53000	31200	14600	12500	25500	30900	17600	7740	34300	44000	13300	41800	21700	28000	34800	15400	85500	13900	13400
31200	18200	26700	44800	30100	14000	11100	32400	28600	17800	7480	32300	41200	12600	39100	20900	26000	36500	13900	79200	12700	12700
28200	17800	27600	42700	28700	13700	10200	27400	27200	17700	7280	30200	37900	12100	38300	19700	24200	37400	12700	76000	12000	11800
27000	18200	29100	40700	27000	13200	9150	27800	26000	18300	6830	29300	34700	11600	37100	18600	23100	34000	12000	74000	11300	11300
25000	20600	28600	40400	25100	13000	8220	26000	25000	23700	6240	28400	32100	11500	35800	17600	21700	31400	11100	70700	10500	11100
23100	20300	29900	41700	22900	16000	7130	22700	24100	26200	5900	27600	29900	11100	36100	16600	21100	28600	10600	66300	9910	10500
22400	19600	35800	38100	21900	18100	6520	20200	23900	28100	5700	27100	27400	11800	33600	15500	20400	26600	10000	60800	9230	9990
21300	18800	33800	34900	21000	14500	5970	19200	23200	31500	5360	25900	25100	11300	31800	14400	19200	24800	9360	56400	8720	9380
19300	16800	29800	30600	20700	15000	5360	18700	22200	31800	5110	24600	22700	11200	29900	13400	18000	23100	8580	53300	8320	8970
18400	15400	26700	27500	19800	14100	4960	16500	21600	31800	4850	23300	20800	10600	28000	12200	17700	21400	8020	51200	7940	9010
16800	14200	24000	25100	19200	15000	4600	15000	20000	32800	4570	22200	19100	10700	26700	11600	17100	19900	7770	49100	7410	8900
15400	13400	21900	22800	18800	17600	4390	13900	18200	30300	4350	22200	17700	10300	27200	11200	16000	18700	7810	48600	6940	8500
14600	12600	20400	21300	18600	19600	3950	14200	20400	26600	4600	20900	16500	11200	25700	10900	15700	17600	7180	50200	6540	8110
13800	11600	18700	20000	21100	19300	3660	13500	17700	23000	5000	21400	16800	10900	23500	11500	15700	16500	7080	50200	6220	7830
13100	11400	17500	18400	22400	19300	3420	11500	17100	19700	5810	21500	16900	10400	22500	10900	16500	16000	6770	52200	5910	7480
12800	11000	16000	17700	23000	19300	3050	10800	17400	17600	4670	21500	15100	11500	21900	9440	16200	15400	7040	49100	5610	7110
11900	10100	14700	17100	21500	20300	2950	9710	15900	15400	4140	19800	15800	11800	20500	9360	15400	14500	8130	44500	5730	6480
11200	9270	13600	17400	19800	19800	2990	8990	15600	13900	4110	20600	15500	10500	18900	9560	15400	13700	11100	41100	5760	6130
10800	8520	12900	18300	18400	18400	2990	8510	14700	12300	4380	18500	15000	9800	18300	9320	15100	13300	17400	40200	5820	5880
10400	8100	12100	19000	17700	17000	2790	8880	14100	11600	4420	17900	14400	9120	18000	9600	16500	12600	14100	40200	6350	5610
10400	8180	12000	18700	16900	15900	2670	9330	13300	11100	4060	17100	14700	8430	17400	9480	15700	12200	11300	44500	5820	5330
10100	8140	13400	20300	16000	14900	2780	7610	12300	11100	3740	15200	14200	7660	16600	9480	15100	12200	10900	55400	5390	5090
9930	8670	11800	20300	15100	16000	3200	6890	11200	12000	4700	14400	13900	7180	15800	9640	14400	13300	10200	61900	5060	4980
10100	6650	11300	18100	14100	15600	2960	6450	10700	13200	5700	14000	13700	7110	15200	9970	14900	16000	9680	51200	4880	4880
11900	7110	10000	17200	13600	15700	4710	5840	10700	11900	4640	13300	12500	6500	14800	9080	14100	16200	9080	44500	4900	4800
12100	7910	9470	16800	13500	15700	4290	5330	10400	11200	3700	12400	11600	6150	14000	8730	13600	16500	8470	41100	4850	4580
12400	8100	9350	16700	13900	16100	5910	6550	9740	10600	3300	11300	10800	5990	13600	9280	13600	15700	7660	37400	4800	4420

Table 18.-Continued

1922	1924	1926	1927	1928	1930	1931	1933	1935	1937	1940	1941	1944	1946	1947	1948	1951	1952	1954	1957	1958	1960
13400	7430	9390	15800	13800	18800	8180	6220	9620	9870	3000	10500	10200	6020	13200	10000	21100	15200	7010	33500	4720	4520
14900	7180	8850	15200	14600	21500	6000	7790	9970	9990	2700	9830	9520	6080	21400	14200	22400	15000	6410	31100	4650	4180
14100	6420	8470	18200	13600	26600	5300	7470	9700	9390	2500	9500	8890	6150	17100	12500	23400	15000	5960	31900	4580	4200
12400	6750	8890	19400	12500	22800	4260	6820	9740	9240	2400	8790	8320	6210	13200	13000	22700	14200	5490	34400	4500	4520
11900	6160	8060	25100	13100	19700	3900	9140	9540	8190	2290	9020	7740	5900	13300	15500	18300	13500	5070	45500	4380	4830
11700	5330	7800	20500	11800	18000	4580	9750	9310	7670	2220	9100	7350	5690	12300	13600	16800	13100	4720	37900	4250	5010
11000	4910	8890	18000	11200	30300	4790	9410	8930	7120	2080	9870	6980	5490	14400	13100	15700	12000	4270	38800	4080	4600
9930	4650	10500	17400	10900	39600	5330	8150	9120	6870	2020	15800	6770	5520	14800	12400	14600	11600	4060	31500	3990	4110
10600	4280	11000	18600	10300	45000	5220	7060	8820	7150	1950	24100	6700	7320	13700	10400	14100	11200	4130	27600	4130	3790
9120	4090	11100	19100	9860	41600	4770	6580	8060	7050	2040	19500	6340	7010	15100	9930	13600	11600	4490	24700	4580	3590
8930	3980	11600	18400	9860	36000	4710	6450	7920	6340	2070	17200	6050	10600	15200	8810	12900	12000	4820	22900	4520	3420
8740	3890	12200	16400	10100	33400	4900	6060	7860	5610	2150	15700	6150	9640	14400	8060	12000	12200	4010	21900	4010	3180
8180	4130	12200	15000	8980	30800	4290	5660	8560	5260	1920	15500	6240	13800	13500	7560	11100	15200	3790	20600	3810	3010
8180	4280	12200	14700	8390	27600	3860	5020	7510	4900	1830	15400	5900	11600	14000	7490	10200	16200	3940	19900	3830	2850
8550	4780	11000	13700	8210	28200	3570	4630	7720	4620	1790	15900	5990	8890	22600	7210	9400	13500	4370	19300	3700	2690
8550	4700	9800	13100	8320	32400	3360	4240	7230	4620	2040	15900	5580	8700	29000	6840	8770	13100	5750	19600	3610	2600
11500	4420	8770	12400	8460	32100	3070	3970	7340	4360	1780	17400	5660	8280	20600	6500	8360	13100	5870	18400	3500	2510
11000	4680	8580	11800	8680	28300	2760	3740	7920	4030	1700	16700	6470	8210	21700	6150	8130	12600	6370	18400	3480	2450
11700	4390	8060	11000	8180	23900	2620	3700	7100	4080	1840	15000	6120	8510	32200	5690	8020	11800	6020	17200	4300	2350
12400	4350	7440	9980	7680	20800	2660	4120	7230	4840	1830	13200	5260	7600	38400	5840	7840	11400	5350	22600	4720	2300
12400	4130	6890	9740	6920	18400	2620	3920	6490	4460	2080	13100	4890	8360	45000	5460	7320	11400	4840	22200	4700	2240
19300	3810	6510	9430	6850	17200	2590	3680	6770	4190	2670	12600	4720	8730	38100	5780	7320	11400	5230	19300	5330	2620
17800	3500	6050	8750	6750	15000	2640	3420	6650	4170	3420	11500	4740	8280	25900	6870	7770	12800	4860	15800	8360	2990
12600	3360	5700	9350	11000	13600	2480	3240	8600	4150	7280	10500	4740	8100	20800	6440	7420	13500	4390	15800	7310	2460
11000	3100	5510	13400	9940	12800	2510	3140	8930	4240	6530	9300	4540	8210	18700	5870	9080	13500	4150	16600	6130	2440
10400	2920	5320	14100	8210	12500	2590	3050	8820	3920	4870	8670	4390	8170	16000	5290	11500	13100	3920	15000	5170	2480
9320	2800	5140	13500	7230	11800	2740	2950	7890	4010	4400	8140	4540	7950	14600	5050	13400	13300	3720	17500	4780	2460
8930	2750	4930	13900	7400	10600	2670	2900	8170	7730	5030	7450	4690	7560	15000	5260	12200	13100	3640	26000	4620	2610
8550	2640	4780	14400	8540	10000	2530	2810	8900	9710	4900	6800	4620	7460	13800	5690	13900	13300	3490	42000	4550	2870
8740	2500	4410	14200	9160	9580	2360	2690	9350	12200	4600	6310	4440	7740	12900	5600	14400	13500	3360	40200	4320	3300
8740	2390	4150	13100	7780	9340	2220	2810	9270	13200	4620	6310	4620	7350	12300	5150	12200	13100	3220	30300	4300	4130

Table 18.-Continued

1922	1924	1926	1927	1928	1930	1931	1933	1935	1937	1940	1941	1944	1946	1947	1948	1951	1952	1954	1957	1958	1960
10800	2390	3920	11800	7300	9900	2210	2810	8560	13300	4500	6970	4540	6870	11900	4740	11100	12800	3140	26200	4060	3990
11700	2320	3700	10600	7750	9780	2420	2720	7770	12500	4230	7240	4520	6840	11300	4390	11100	12000	3060	22200	3940	2990
9930	2360	3520	10400	7190	9740	2740	2740	7170	10600	4060	6760	4270	6980	10200	4040	9930	10900	2950	19300	3850	2800
8930	2310	3390	11500	6650	10600	2530	2850	6550	9010	3830	6370	4250	6540	9520	3740	8730	9940	2950	17200	3830	2700
8930	2290	3330	14600	6350	13800	2340	2850	6110	8120	3860	6180	4220	6280	8540	3680	8060	9390	3020	15800	3680	2610
9120	2290	3210	14400	6060	13200	2180	3550	5890	7640	4140	5780	4170	5900	7840	3680	7380	8860	3220	14700	3650	2800
8550	3420	3150	29200	5780	13700	2070	4360	5950	7280	3570	5440	4150	5630	8170	3570	6910	8520	4420	13900	3570	2830
8180	3240	4880	43200	5710	11800	2050	10800	5530	6770	3340	5330	3970	5320	9000	3470	6570	7980	5780	12900	3480	2850
7820	2800	7940	43300	5530	10100	2070	10700	5500	6770	3030	5140	3830	5020	9560	3410	6600	7490	6410	12000	3970	3050
7300	9640	7200	88100	5230	9150	2150	8040	6170	6990	3790	5110	3700	4690	8100	3220	6500	7280	8890	11300	5610	3070
6960	9150	7200	103000	5000	8580	2140	7470	6140	6650	5090	6210	3620	4420	7950	3000	6150	7050	9200	10700	5220	3030
6640	7690	5170	110000	4780	8220	2120	7230	6520	5900	3830	8330	3570	4080	9000	2820	5750	7050	7660	9950	6220	2900
6480	6320	4550	78900	4650	7930	2080	7190	6970	5420	3320	9180	3510	3810	10300	2780	5430	7120	9530	9270	6190	2800
6320	4830	6120	55900	4780	7610	3350	7260	6200	5130	3920	11400	3490	3660	10100	2890	5070	6860	12400	8610	7410	2830
6170	4510	4930	45300	5000	7260	3550	7640	5530	4800	9450	10700	3450	3550	9720	3240	4940	6560	9800	8250	8040	3010
5720	4830	4330	33300	4950	7060	2620	6790	5130	4460	8930	9910	3340	3510	9560	3770	4760	6590	7950	8000	7940	2990
5580	4580	4670	30400	4890	6890	4070	6030	5250	4120	10200	11100	3240	3530	8970	4220	4660	6630	7040	7800	7280	3010
5580	4200	4900	31600	4860	6580	4550	8660	4860	4030	11600	10100	3340	3620	9280	3720	4660	7050	6150	7620	6840	3120
5300	3870	4300	26000	4970	6260	3920	11100	4440	3830	11000	10900	3380	3770	12500	3430	4590	8340	5930	7580	6440	3090
5300	3770	4040	23700	5000	6160	4580	11900	4130	4030	10400	12200	3430	4170	11000	3300	4560	10100	5600	7410	6030	3280
5170	3700	3870	21200	4750	6030	7330	7720	3890	3700	12400	17500	3430	5210	10500	3340	4560	12600	5460	7380	5790	3550
5040	3770	3820	20700	4650	6060	10200	6680	3900	4030	10400	26800	3360	5430	10000	3410	4540	9780	5930	7350	5700	3810
5040	3850	4310	22200	4650	6680	15100	7020	4000	3830	9340	20900	3320	5320	9600	3490	4590	8710	6240	7310	5760	3970
4920	3850	6250	28500	5030	6580	13000	7260	12200	3590	8520	16900	3300	5070	8970	3510	4490	8480	9290	7380	5390	4010
4920	3790	8620	27100	5530	6290	10600	6580	11400	3790	8100	16200	3280	4940	8320	3570	4390	8670	14600	7410	6280	4060
4790	3790	7800	25300	5620	8400	8550	6130	10900	4620	9510	14800	3850	4760	7950	4920	4690	8480	10900	7350	5880	4010

Table 19. Mean daily discharge recorded at Lee's Ferry gage station for 22 years (Oct. 1 to Sept. 30) between 1963 and 1993 which represent the post-dam era.

1963	1965	1966	1967	1968	1970	1973	1974	1975	1976	1978	1980	1981	1983	1984	1985	1987	1988	1989	1990	1992	1993
10300	5730	10300	11500	5710	9530	6680	7070	9630	14600	7420	9500	8160	8100	26600	23800	20000	12800	8000	5090	9430	9170
10900	5330	5700	7360	7030	8190	11500	8380	8230	14700	4150	12800	11100	6560	27500	23600	17100	9800	5560	10200	9250	8810
9270	5580	4390	9960	8370	7260	11800	9520	9130	16000	8540	11300	12200	7700	27200	23500	18600	11000	11100	9360	9050	8130
7580	5640	5080	10300	7830	4650	11400	8450	10400	11200	9430	9470	9520	9110	27000	24000	18400	6550	12100	7550	9310	7550
6410	5580	11700	9180	8040	3570	12200	8800	8160	12800	7680	11100	12600	8170	26900	23800	19600	11600	11700	9690	7330	8970
6510	5580	11400	9950	7820	5200	13400	5650	6290	17100	9480	8450	17300	11000	26600	23900	21200	9660	9110	6060	7550	9300
6640	4540	11800	10100	6110	9390	9500	4840	9070	15200	9600	5060	16400	13100	27000	23800	17700	10100	8380	4930	9300	8560
6410	3940	9770	10400	4000	11700	5320	6330	8930	15700	5920	11500	17900	12000	27400	23500	19900	8290	7670	4920	9160	9540
7040	4080	9690	8120	6130	12300	12700	8350	9190	11600	5210	12700	15300	10200	26900	20300	16600	7330	5320	4920	9330	9060
7830	4090	8810	10600	6390	11100	12300	9680	9640	14800	7790	14100	17900	8260	26700	23500	20400	8230	9540	9130	9300	7980
7620	4980	7910	10400	6800	12100	10100	10500	9470	10100	8650	15600	15800	14900	23800	23800	17900	5740	9600	10900	9200	7930
6970	4630	8860	9410	8270	7760	13500	7390	6800	4200	9230	13700	7410	13500	23400	23500	18500	10800	10500	13300	7610	8120
6970	4020	11200	8390	7770	11900	14500	4530	5340	9050	7740	9170	14200	14600	24200	23700	19500	11000	10400	13800	7670	9350
6870	4070	10300	8740	7140	12100	11900	2990	10500	12800	3660	3910	17900	14200	23600	23500	18700	13000	8910	8230	8960	9540
6570	4030	11000	6940	4210	11600	6500	9170	14100	13900	1560	5980	17500	15600	23400	23800	18500	11500	7090	4120	9130	9480
6570	4080	10200	2560	7350	12700	13500	11700	13900	10500	1260	5720	13400	16400	24000	23400	18900	10200	5460	13400	9000	9160
6670	3660	14000	5130	7950	12900	15000	11900	10500	11300	5530	7040	11100	12500	24000	23400	18400	6300	12200	15900	9950	7800
7070	3660	15700	6810	7320	11000	12000	10600	10000	6010	6690	7910	6530	16300	23900	20600	19000	4990	11100	15000	9070	7590
8860	3840	15500	7330	6310	7480	9660	11700	6270	3090	4930	7300	4180	12600	24400	6390	16600	10900	10900	10500	8040	8950
13400	3640	15400	9890	6810	10600	7700	9020	5680	8940	7040	2980	10400	14300	24400	5200	18900	10600	9190	11200	7750	9180
18100	3750	13600	11000	4590	13200	7350	4630	12200	8020	4770	4310	12400	17400	24000	5220	19400	8400	8900	6660	8780	9380
16600	4010	12200	8610	3510	12100	4430	6180	13500	8780	4620	10500	14700	13500	23800	13100	18700	8380	5930	6990	9270	9370
12200	4120	10800	4980	6920	10900	5620	10100	14900	10300	5000	15200	13300	11200	24700	25000	19200	6050	4160	10200	8910	9570
9720	4240	10500	8340	8140	9870	9620	10600	13500	11500	6940	14100	14400	8050	26900	24500	19000	5810	8590	11000	8940	8030
9270	4100	11600	11100	7130	9430	11800	11200	10700	9630	7380	9380	14800	12000	26600	24700	18700	5080	9310	10200	8630	7650
8830	4120	10500	10300	8000	7300	9060	10600	6910	8300	7860	9700	10400	12500	25900	25200	18400	6300	6890	10600	8630	8710
8680	4220	11800	10300	8260	9610	10200	7040	4190	6050	8560	6230	11600	18100	26900	25000	19400	5570	6730	9510	7790	8320
8250	4200	11400	10800	5960	11000	7410	3870	10300	7420	6540	7580	11300	18300	26900	25100	19300	6760	6280	5770	8550	8370
7800	4240	10800	11100	2900	11600	3490	7640	10700	7600	2300	16100	9040	17400	26800	25000	18200	7550	4250	3040	8630	8570

Table 19.-Continued

1963	1965	1966	1967	1968	1970	1973	1974	1975	1976	1978	1980	1981	1983	1984	1985	1987	1988	1989	1990	1992	1993
7940	3720	10600	8310	7560	15100	11900	8700	13200	4910	2320	18400	11200	18000	26400	25100	18700	5760	4480	6220	9170	9220
8110	3950	9840	10300	8770	14400	16200	9920	12400	4990	3340	14700	11800	13900	26800	24700	18100	5310	8400	7730	9370	8720
8080	3970	10100	11600	8980	12900	12600	8700	14400	2210	2160	17600	12800	15900	26500	25000	20300	3320	8590	11100	9700	8350
8000	3700	10400	9520	8120	7820	13600	9520	13500	1560	2820	18000	10200	17700	25700	25200	17300	8310	7490	13500	9520	10100
7940	5180	10900	10100	8950	12000	11200	9170	9520	2680	6230	14800	13400	16900	27000	25200	20000	8790	7180	12100	8470	10100
7760	5940	11400	8860	6230	12300	8670	7970	15800	2470	9120	13000	13200	18300	26400	25100	20100	9870	8430	6680	9980	9660
7690	5330	11000	8120	3050	12500	4480	12200	14900	2510	8430	15500	15300	20500	26800	25000	20100	9570	5200	4780	10100	9890
7760	3420	10500	4600	6420	13200	9130	13400	18900	3190	6060	17200	16900	16600	24400	25000	19600	9710	5290	9920	10000	9940
7940	6130	9310	8280	7200	13500	12300	10700	17600	2670	9260	17800	17200	14900	23500	24900	18500	10400	9700	11400	9950	9650
7720	5970	10600	9740	7530	12200	12300	6740	15900	2990	10300	14300	16300	17500	23500	24800	17700	9020	12500	11700	10100	8480
7580	6160	11500	12200	7750	7760	11800	6070	14200	4030	8580	17600	15000	18400	23400	24400	14800	13200	13900	10900	9180	9950
7450	6260	11200	11700	7710	12200	11200	4940	8530	10600	7360	15200	16400	19200	22800	24700	19500	14800	12200	8820	8310	10100
7350	6190	10800	11500	6760	12900	10100	3920	11700	14500	7290	5900	15800	20800	23400	24800	19000	14000	9940	6590	9680	10000
7110	6130	11300	11500	3040	12700	5110	5730	10900	16500	3710	12900	18700	19700	23400	24900	19100	13900	5870	5530	10100	10200
6640	6100	8800	7800	5260	13300	13200	5620	10100	15400	1920	13800	18100	15400	23900	24800	24100	13400	4920	13200	10200	10500
6440	6130	7440	9960	7830	13600	16700	7420	10400	10600	4830	14100	21100	13400	23000	25000	22500	12500	8970	12600	10100	9780
6410	6160	8920	9580	9780	12000	16500	8700	9590	4140	4980	13400	20600	16000	22100	25000	22600	11700	9890	11800	10300	8820
6480	6190	9910	10400	8370	7860	16400	6390	8230	2750	7290	11400	16500	14200	22700	24900	22200	13000	13700	11500	9530	10100
6670	6160	9510	11500	9360	12200	15700	3330	4410	8470	8540	8400	18100	15500	21900	25000	23500	14000	13800	12500	8350	10100
6770	6160	8840	11600	7430	13300	13500	2190	10700	11200	9310	6640	17100	18800	22600	24900	22300	14200	17200	7560	10100	10000
7450	6130	9010	11900	5420	16000	6290	6390	11700	14500	6620	11200	18500	16100	23500	24800	23000	11600	14100	7330	10300	10300
7760	6130	8970	7510	8730	15700	13100	7290	13000	10600	6990	18500	19500	11800	23900	24900	22700	13900	14800	10100	10100	10400
7860	6290	8490	10700	10100	14200	14300	7260	12500	9830	12900	14700	18300	11300	22200	24900	23500	12500	14300	10800	10100	9970
7520	6290	9600	10600	10300	11300	13900	3350	12100	6810	10600	9550	16200	14100	23500	24600	21000	14000	13200	9460	10100	8540
7310	6290	10500	10200	4910	8050	4870	3890	10700	4060	6340	7910	17900	12300	23500	24700	22000	17700	13000	4680	9400	10200
6840	6190	10700	7880	8900	12200	7740	3240	5100	6160	3150	14200	17700	16100	23500	24500	24700	19800	6110	7500	8610	10200
6510	6290	8690	10700	8290	14700	7900	3330	13400	10400	2160	12700	17200	13400	23500	24300	22100	14600	9970	7090	10000	10600
6740	6320	10000	12600	4700	12300	3620	11200	17900	12100	4670	13200	17100	15600	23400	24500	23100	8880	8470	5240	10100	9030
6640	6350	10200	8680	9400	7410	10900	15400	16000	4340	2630	11200	7930	17500	23400	24500	22700	12300	8710	11500	10100	10200
6480	5940	9180	9300	10600	11500	11900	7510	5280	7440	5260	12600	9930	16300	23500	24500	17300	11800	11800	13300	8720	10000
6480	5850	9590	7940	11300	11500	14200	3350	10000	5900	6410	14500	9520	18900	23400	24200	20000	9370	6500	12700	9960	8980

Table 19.-Continued

1963	1965	1966	1967	1968	1970	1973	1974	1975	1976	1978	1980	1981	1983	1984	1985	1987	1988	1989	1990	1992	1993
6440	5850	9750	7640	9350	7030	15200	3020	11100	3660	10700	16500	9380	18400	23500	24000	26800	11600	5900	11000	9420	10300
6320	5910	10000	7820	9370	13600	17600	3830	5800	7830	14000	15200	13300	18800	23500	24000	25300	13800	9630	10000	9410	11200
6220	5910	10500	6980	7280	15800	14600	2910	10100	5720	9650	15500	13700	17600	23200	24500	27200	16600	9560	6660	11300	11400
6160	6060	9450	9580	7060	16600	9230	7110	9100	7460	4880	14300	14100	13400	23200	22200	29300	16900	5850	4160	11500	11200
6060	6060	7750	5180	8880	17100	11900	7290	10400	9380	3510	13600	14200	15500	23600	22800	27000	16300	5310	6160	11500	11600
5970	6060	7150	9680	9590	16900	16400	9290	8980	13100	7560	9520	15200	16200	23400	23000	25100	12900	9130	7620	11500	11000
6000	6060	8150	10700	9560	15800	18000	9560	12200	5130	9380	12100	20300	19900	23600	22300	26800	11500	7730	8430	11500	10400
6100	6030	9060	8940	10100	10300	18600	8240	7560	1800	12400	12800	15700	20800	23400	22200	26900	13500	12200	10800	10800	11400
6100	6130	9080	7770	10500	15000	17200	6010	4690	4640	14700	9770	16200	19400	23900	24700	25800	15500	11200	11500	9730	11300
5970	6130	9090	7910	8980	15800	15900	3940	8750	5250	14500	7600	17500	18600	23600	25000	26600	12800	12300	9240	11200	11600
5820	6130	8960	8100	7050	16200	14800	7840	7680	7220	7870	17200	20800	18800	23600	24100	26200	13900	8360	7440	11500	11600
5760	6580	8030	5860	9590	15500	18000	5540	14300	8350	8290	18300	19300	13100	23800	25000	26800	13300	7110	14600	11500	11500
5760	7190	13200	8020	10600	15100	19500	4730	10400	10800	12400	16200	18200	10100	23800	25000	25900	11500	11000	14700	11500	11000
5670	6740	8970	8580	11100	11500	22900	7010	10400	8640	13500	16000	13200	16700	23800	25000	26300	15200	10600	14500	11600	10200
5700	5910	9660	7560	12700	7910	20000	7570	8870	6290	14600	14300	10100	17000	23000	24900	25400	14900	10300	14500	10800	11400
5730	5700	10100	8280	13400	12300	18900	6590	8100	12400	12200	7600	11600	20800	23100	25000	25400	16700	12400	14200	9580	11900
5550	6140	9800	8560	11400	13300	18000	3330	13100	11200	13200	6380	9190	20800	23800	25100	23400	17200	11300	11700	11300	11900
5410	6030	10100	8970	10700	14100	11000	8700	12700	16200	14600	8220	6770	22000	23800	23600	25000	15500	7630	7680	11400	11600
5280	6000	8120	5470	12400	14100	16700	7640	11700	16800	14400	10300	10500	14800	23800	24300	24200	15500	3520	12100	11600	11100
5250	5820	7730	9200	11200	14400	18000	4710	10400	16400	18400	9920	17400	13000	23200	23900	24600	10900	11300	12800	11600	10600
5030	5780	8540	10700	10700	12300	18500	4480	10600	15100	19000	10100	14600	17000	23500	23800	26300	7570	13500	12200	11700	9990
4780	5910	11000	10800	9610	8410	20300	4870	6630	13900	18200	10000	6830	15400	23600	24900	25000	10400	16200	14000	11100	11200
4800	5940	8720	9570	9920	13100	20300	4450	4070	11300	18300	5120	9310	15500	23600	25000	25300	11100	15700	14600	9900	11100
4900	5940	9290	10300	6630	14600	13200	2350	10000	8530	16700	6560	8630	16200	23500	25100	24500	11700	13900	8930	11300	10700
5060	4840	7700	8650	3740	12400	6440	1960	10300	3740	15300	8960	11200	15800	23400	25100	20400	11200	13400	6730	11600	10600
5470	2530	4470	4550	2920	5910	4480	1640	3760	1450	12600	2020	7220	8050	23400	25100	17500	9250	9100	5120	9700	10100
5610	3380	3770	4260	7140	8800	13600	3560	8970	2570	14600	10400	9510	7460	23400	24300	21900	11500	11300	8350	11400	10700
5300	4230	6590	9030	7290	11800	20000	5320	10300	4510	18900	11400	7440	10900	23400	25100	21700	10000	13000	10300	11600	10000
5000	9400	8970	9780	7920	8910	20300	3370	9320	2660	17800	12500	7880	13500	22800	24900	22000	9710	10800	12900	11100	10900
4320	13200	8770	12600	8160	12500	21200	4480	5060	6650	17100	4790	8170	16900	23600	25100	23100	10500	9340	12900	9790	10900
3600	12600	8530	12000	7610	15500	22800	3010	8670	6020	16400	2530	8500	18000	23200	25100	26800	12400	6390	12200	11400	11200

Table 19.-Continued

1963	1965	1966	1967	1968	1970	1973	1974	1975	1976	1978	1980	1981	1983	1984	1985	1987	1988	1989	1990	1992	1993
3000	10100	6500	11100	5280	15100	14300	6590	11500	11200	10200	2130	9300	10200	22100	25100	27900	11400	6910	7810	11700	10900
2250	8520	3160	8060	5100	9960	11000	6210	8570	4120	12700	2650	6380	13800	23100	24900	26100	12000	4450	7430	9920	10600
2400	8520	4410	7210	8690	14300	20900	18500	13600	11800	16400	8560	10500	18500	23500	25100	28200	14000	5760	11300	13100	12000
2600	8490	5600	12600	12400	16100	20800	25000	16700	8860	17100	9480	11300	14600	21800	25200	28900	12000	10200	15700	13400	11400
2990	7270	4530	13400	9820	10700	22200	23700	16700	8380	17800	10200	11900	14600	22800	25100	28000	16400	11000	15800	12000	12900
3180	7870	4480	11900	9350	14500	23700	18000	14300	8510	19700	10700	15600	15000	23800	25100	27600	15900	13300	12000	9970	12900
3500	8080	5640	11500	11500	15600	21800	14900	15200	10400	17900	6670	16500	16200	23900	25100	25100	13400	13400	14900	13000	13500
3940	8790	5960	9340	6690	16100	14000	18300	16200	13400	17100	12900	10100	14400	23100	25200	27600	10200	12300	8890	13400	13100
4280	9540	5270	6580	10200	15900	22500	18600	19500	15700	12600	14400	13400	10600	23800	25200	28300	10700	9670	12800	13300	13100
4520	9540	3590	10200	11500	16600	23500	17800	18400	13800	16800	16500	13100	10600	22900	25200	28800	9460	12700	11900	13500	11900
4700	9460	6180	9970	11300	13000	20900	21600	19700	4340	17600	7910	14100	12500	23300	25100	28300	11000	12900	12600	13500	11500
4600	9460	6440	9640	11500	7990	22200	20900	22800	3790	13200	10500	10600	9540	22100	25200	26400	11000	13500	11100	12800	13300
2800	8960	6980	10900	11900	13200	22200	18600	20200	9050	13200	3680	10900	14600	21700	25200	26700	12000	15500	12100	10600	13600
1600	8830	7240	10600	11000	12600	19400	12100	21500	10400	13200	1130	9030	18000	23600	25300	27200	13400	14800	9300	13200	13200
3000	9460	7850	11900	5390	12800	8880	15300	13400	14700	13900	2150	9550	16800	23500	25300	25400	14200	9690	6730	13400	12900
1800	9350	6270	8790	11600	13400	15300	13200	12600	14800	12500	5190	10200	13500	20400	25300	26300	13000	7320	10500	13500	13300
1900	8850	4540	11800	13200	14500	18600	12500	8660	10800	17300	6800	11600	11900	23800	25300	25300	10900	12300	14400	13400	12200
2100	8990	5820	11100	11600	13200	18700	12500	10600	10600	15300	8130	16200	13200	24200	23900	26100	10200	11000	12500	13500	11100
2200	9240	7170	10700	12800	10800	22000	13600	6040	13100	15300	12300	14900	16300	24100	24700	25000	17100	14700	15700	12800	13000
2300	9880	9890	11400	12100	12600	22500	8490	2480	17800	17600	14000	14300	17200	24200	25200	20500	17300	12300	14300	10800	13500
2400	9950	10800	11300	9850	12000	20900	4890	8230	14400	19600	10600	15400	17000	24200	25200	25100	15200	14400	12300	13600	14000
2400	7250	9700	10800	6630	11100	14400	15400	11600	15500	14700	14800	13600	19300	23800	24700	26500	16900	8240	6610	14000	13700
1300	7110	7260	6490	12600	7990	22400	15700	15300	16100	11200	10200	9900	22900	24000	25100	22400	17400	7240	13300	14100	13700
700	9950	4740	7920	13900	7560	21400	13700	10600	15200	17800	10300	11100	16700	24100	24600	25800	14000	9510	12500	14400	12200
700	9950	8010	9710	13000	4590	20200	15000	9290	13000	20200	8140	11600	18800	24200	25300	26700	14300	12400	11300	13700	11500
1400	9990	10600	10700	12800	2530	18500	11100	6360	5890	17000	5810	8270	19500	20800	25200	25200	17300	12000	8640	13000	13600
2100	9990	12300	10000	10800	7290	21100	6470	2970	12900	15800	8880	13000	16500	24200	25400	25700	14000	12500	8420	10800	13700
2600	9690	10500	9850	8090	9330	23500	2590	10400	11400	15200	7090	11700	15700	23200	25400	26000	17000	16600	9220	13000	13200
3200	9390	10600	8950	4030	10200	16300	7970	9160	10100	10200	14000	11900	11200	23900	25400	26700	14600	16800	6240	13000	13400
3650	9730	11800	6570	8700	10500	20900	8940	8620	9700	6660	17100	12000	10600	24300	25400	26200	11700	13600	9510	12700	13400
3880	9650	8520	8840	10900	10700	18300	7940	10000	12700	15200	18800	14900	7280	24400	25400	26000	9080	15100	11100	12400	12400

Table 19.-Continued

1963	1965	1966	1967	1968	1970	1973	1974	1975	1976	1978	1980	1981	1983	1984	1985	1987	1988	1989	1990	1992	1993
4180	9690	11600	11000	10300	8460	19400	7010	7640	7590	17000	15000	12300	13300	24400	25400	26300	8860	13700	8710	11800	11400
4520	9650	11600	10400	9960	4610	17900	4630	4530	4670	14800	13100	19300	17500	24400	26600	25400	13100	13100	9090	10800	12400
4850	7900	11000	12200	11500	9640	16000	3520	2010	12900	13200	10400	20600	21300	24300	29100	26200	16400	19300	11900	8990	12000
5060	8350	10700	11800	9680	10100	11300	1610	6250	13500	11800	6610	18600	22700	23900	29300	24400	15200	17500	8340	11600	12200
5410	9650	10600	11600	4910	9850	5290	4240	9990	17800	7470	8950	14800	22400	23400	27900	25700	15500	13500	6990	11800	11800
5470	9680	10300	9470	9740	10800	12400	2760	11300	20200	5180	12300	12300	20100	23900	25600	26000	13300	11400	9470	11700	12500
6250	9650	7350	10400	9180	9990	14800	2860	8330	19200	8870	12100	13300	19000	23800	26200	24700	11100	19900	9600	11800	11100
7010	9610	9110	11700	10100	8660	17300	3890	7800	10100	12200	8450	11700	20400	23400	26200	24600	8710	19500	9570	11800	9910
7240	8250	10400	11600	11800	3100	16700	5790	7100	5610	11400	11300	13400	19200	24600	26400	19900	16300	16400	11300	10900	11300
7550	9120	10900	11000	9750	7970	15200	2530	7170	12200	11000	14200	15000	17900	23800	26300	20500	15200	15400	11700	9150	11600
7520	9320	11600	11400	8440	10200	11900	1610	11200	15200	10000	13400	16800	17300	23700	26300	19600	13200	11500	6050	11400	11700
7480	10100	12600	11200	3990	12200	6890	5240	10700	15000	5270	12700	15300	16200	24100	26200	19600	13000	8350	4490	11700	11500
7550	14800	12300	9570	9450	13600	15300	4760	10000	11700	3730	10100	12400	13700	24200	26300	18600	9130	3810	7480	11900	11200
7620	14800	9910	8720	10300	9360	17200	3560	5900	9880	11200	11300	9750	9220	24200	26400	19300	14200	8990	8500	12000	11100
7620	14900	10700	9590	10900	9310	17800	4840	7670	8480	12900	12300	11300	14200	24200	26300	19100	8560	8950	14600	11900	10100
7580	14600	10600	10600	6920	3970	17100	5050	8850	4590	10900	12700	10900	14500	24300	26400	17300	15500	7510	15800	11000	11500
7380	9720	11400	9960	5580	8290	15800	5980	8270	8590	11800	10600	9950	16500	24400	26500	19000	17000	10100	13700	9110	11300
7310	9420	9250	10400	5210	8660	11300	2870	9160	12200	12800	7780	8170	16200	24400	26700	21200	16500	12900	9790	11600	11900
7110	7490	7610	8080	2520	7920	7160	6860	13800	11700	9640	12200	8590	14200	23700	26700	16700	16200	8560	8140	11800	11900
7040	5910	4900	8780	6290	7890	14100	7840	15900	12100	8490	8780	6570	8640	24000	26700	17900	15700	6650	9900	11700	11800
6940	8080	2630	9310	6820	8150	19700	8040	17400	18900	8530	10800	9360	8690	23400	26800	22800	14100	9090	13100	11700	11000
6740	8850	5110	8600	10100	6060	17200	8010	16800	12100	11100	13200	7720	12800	24200	26800	20700	12400	11200	13100	11700	9640
6410	8630	5230	9940	5550	3950	19900	9600	13700	13800	10700	13300	5230	12500	24300	26600	18200	14500	13300	11500	11000	11800
6440	7640	5160	8510	8560	4470	14000	7540	7440	10700	14300	11000	7290	13900	24300	26800	22200	15100	14300	11100	9030	11900
6440	7060	6020	8020	7060	8150	10500	3200	10500	16400	12600	9050	7260	14900	24400	26700	21200	16400	12300	9990	11300	11900
6440	8180	6710	7310	3460	6970	6680	9450	11900	16500	8920	11200	6790	16900	24400	26800	19200	16800	7890	7120	11700	12000
6380	6500	6810	6300	7680	6910	12000	8010	13100	17400	11400	8510	10500	8390	24400	26600	15900	14600	5050	12700	11700	12400
6350	5350	4520	7120	8790	7200	12400	8110	12500	15300	15900	9370	9550	8700	24400	26800	14200	9020	10000	16800	10900	11000
6250	6230	8570	5830	10400	6370	11300	8450	10900	13600	17100	7320	10400	15900	24400	26800	12600	6680	10300	17200	10700	11500
				9270					13800		7170			22500			11200			9810	
6130	7940	8860	9210	14700	6030	9740	11000	5820	13300	16300	7650	4130	14400	23600	26800	11500	14100	10200	15300	8820	9910

Table 19.-Continued

1963	1965	1966	1967	1968	1970	1973	1974	1975	1976	1978	1980	1981	1983	1984	1985	1987	1988	1989	1990	1992	1993
6000	9530	9750	10000	13700	6940	10500	4530	5480	11500	16500	4460	6580	12900	24600	25900	19300	10400	11500	12800	9910	9780
5940	19100	10900	10600	12700	5270	9780	2200	8410	13800	17700	6810	6250	13200	24100	26900	18900	10100	13100	9600	10200	9890
5970	17200	11200	10800	14900	4300	8320	9880	7860	17300	13300	9520	5250	12800	23800	26800	17500	13400	12900	8690	9930	9980
5970	6580	10100	10200	14100	4860	14200	9290	8670	15400	12600	9810	5380	10500	24400	26700	18300	11200	7840	14200	9730	9660
6000	5880	5700	13600	15500	4710	13000	8380	8310	11500	13300	7240	7780	9180	24400	26800	16400	6790	11300	16400	9660	9670
5970	5780	8500	12800	16200	4400	10500	6620	5550	6500	10400	6020	6580	14500	24000	25900	14900	10300	8460	12600	9430	8660
5850	6380	10400	12500	13500	4230	11100	7480	2960	12500	9770	7660	4850	13700	24000	23500	13900	13500	7270	10700	8940	9710
5790	6570	10000	15100	12800	7690	10600	5820	2900	13400	8920	3680	8510	12200	24000	20900	16300	11300	6430	10500	10200	9880
5700	6260	10500	13400	10500	9960	9820	7170	10800	12200	12300	11000	7250	10000	24400	19100	12300	10800	5440	5230	10300	9940
5530	5580	11400	12300	13100	9890	4580	9840	11100	12200	7230	12600	8000	8880	24100	19600	12300	14300	5280	4200	9780	9980
5440	6560	9840	10300	13100	9430	14500	6150	11200	14900	7630	8900	7910	7680	23500	19500	12200	12300	3150	8520	10200	10200
4470	6510	7350	13800	11600	8910	17200	5680	13200	10400	8540	8050	9020	6310	23200	19700	10700	12600	5390	10500	10000	9940
1300	7250	10300	13500	10100	6490	20000	4530	13600	7090	7060	8610	9130	12200	24200	20700	9670	12900	8190	12200	9460	9160
1260	7460	11600	14000	11500	5760	17600	5590	12200	10600	5310	9540	6440	11400	23700	20900	7880	12100	10100	11300	8740	10100
1220	15100	10900	12000	7710	7660	15900	6680	11400	10500	5400	9490	6160	7500	23400	19600	12500	11500	11000	10200	10200	11000
1260	27100	11600	11900	6470	9290	14400	3990	14600	9540	4950	12700	7600	8310	22700	16400	11800	15300	12300	8140	10500	10900
1210	19900	12300	10400	12400	10200	6680	3960	11600	9390	3380	11500	11100	9500	21800	18500	12600	11100	10100	3500	10300	10600
1080	7240	11200	11300	13300	10600	16400	4920	9980	12000	2940	14700	9680	7600	24000	16200	10800	5380	6780	10200	10200	10200
1050	6450	8460	12300	12500	9010	20700	4250	8800	6680	8970	14300	9750	5110	24600	18400	10700	5500	13200	11500	10200	9830
1060	6030	9360	11800	16100	8190	20500	4580	5390	2910	8140	12700	7610	9410	24700	15800	9150	13400	12500	9060	9470	8680
1060	6780	11400	9980	15200	7920	24900	4370	3450	11000	8520	8660	5650	11800	24600	16400	12400	11100	8760	11700	8700	9790
1050	7610	9600	9860	14800	9260	27200	2010	2330	12300	8600	9380	8470	11900	24700	16600	13300	11500	10100	16500	10100	9840
1050	7940	10600	9310	11500	9750	26600	1410	2680	12800	8300	13600	8690	12600	23000	15500	13800	12900	9950	6810	9900	9490
1060	7740	9790	8740	17600	8980	22500	7070	5570	12200	8030	16200	8880	11800	24600	19300	14100	9820	9600	4730	10100	9750
1050	7760	8040	7860	17400	8600	27400	8870	9220	11500	7220	15700	9430	10700	24400	19000	15600	7950	7170	7290	9770	9640
1050	6740	8400	9070	20600	10500	30300	10100	14200	8250	11600	11400	7800	7220	23000	17900	14100	7530	10200	9630	9610	9220
1040	6420	11100	8980	19600	8700	30500	12100	11200	4050	10400	7550	6840	11300	24600	16100	11900	12300	9640	12100	9110	8250
1050	7620	13000	11200	18500	7960	30300	11400	5750	10100	10700	6130	4230	12600	24600	17400	11800	12600	11800	14300	8280	9010
1030	7520	11100	11500	15600	8910	29900	3990	4110	12700	8580	5310	9790	11700	24700	18400	17600	11500	14200	14200	9050	9400
1040	7880	10200	9630	15100	10700	26500	2000	7580	12300	9440	14500	8490	14100	24000	16400	18600	12900	12300	10200	8350	9280
1030	10300	11400	11300	17100	12700	25700	6810	9180	12700	7260	15300	7550	9170	25000	16400	10500	11600	7410	5920	9750	9870

Table 19.-Continued

1963	1965	1966	1967	1968	1970	1973	1974	1975	1976	1978	1980	1981	1983	1984	1985	1987	1988	1989	1990	1992	1993
1030	12100	10100	12600	19900	14400	29500	8450	9600	9810	7270	15200	8590	7560	24400	18500	10300	8410	6980	9390	10100	10000
1030	13400	12700	15500	19700	15700	29800	9530	6840	6860	6910	11100	10800	5790	24400	18300	9560	10100	10300	9820	9990	9010
1030	13000	13800	16200	17000	16400	29800	8190	5070	6550	7450	12900	5870	8470	24600	20800	7960	12200	10100	10100	9830	7690
1040	15100	12100	17400	16100	15000	27900	8480	3560	10000	7900	9680	3240	11400	24700	20400	8130	11900	11100	10600	8300	9960
1020	17900	12700	16200	16800	16800	28900	4530	5180	10000	7700	9700	6420	12300	24600	21000	10500	10600	9820	8750	9940	10300
1020	14400	12700	15000	12300	16000	27200	5540	7520	7830	6760	14100	5410	10400	24600	19700	10700	9950	11700	6380	10100	10300
1030	8380	12900	13000	14200	15000	26300	8290	7970	7050	6660	18200	6170	10100	23900	21700	10200	11000	10400	5020	10100	10100
1020	7630	13800	9630	15600	16500	28900	8020	6520	6790	7470	13600	7210	10700	23000	22200	11800	8320	8050	9060	10300	9740
1020	19800	13600	11400	17800	15200	29300	6400	8160	6240	7490	15000	6820	16100	24600	19800	13100	8200	11700	11600	10500	8740
990	33500	14600	13700	14400	17000	29900	10100	9090	6360	6750	17400	6460	17900	24600	20400	13300	9810	10900	14800	10100	7720
990	20200	14200	12200	16600	14100	28000	8200	7730	9970	7060	11900	7020	21900	24200	20900	13700	10100	9770	15000	8180	10200
1010	8610	14600	13600	16600	14300	29400	8110	6230	11000	8420	20800	7590	22700	24600	18700	13300	10300	9310	11000	9990	10600
1020	9860	15800	13800	15900	15400	29600	6730	8990	13200	7780	17800	8320	21600	24500	21200	14500	10600	7800	7910	10200	10900
1020	11200	11100	11800	18200	16000	28800	6620	8970	14400	7220	16900	7710	18900	24200	20900	12900	11000	7200	7590	10100	10400
1010	15600	13600	11000	16400	17700	28900	6870	8310	13800	8610	18200	8150	17900	24200	22300	15200	8250	5770	12400	9980	11200
980	14200	11600	11600	17400	17100	28200	8210	7730	8470	9650	15200	8180	16100	24700	15300	13400	8040	9310	14000	9970	10500
990	13600	14300	16000	17200	14500	28700	10300	7430	6710	10200	15900	8990	17400	25300	14600	14500	11000	11300	10700	9130	9960
1010	13500	15100	18300	16200	11100	28600	12600	6880	10100	9370	9910	6060	18500	26800	23300	13100	11800	9760	11000	7840	10800
1010	15300	14800	17500	14600	14200	27500	8210	6090	12700	10300	6750	7390	17100	27400	23400	14400	11000	8230	10800	9890	11000
1010	12700	15200	15100	12600	13400	28500	6850	7540	11500	12500	11300	9610	18000	27300	23400	14700	9810	8440	8390	10400	11000
1020	12500	13700	11600	17500	15900	25600	9760	7330	11500	9040	13400	10600	19100	26100	22900	14600	7300	7970	5750	10300	10500
1010	34500	12400	10100	17700	18500	27600	13300	8750	14500	6930	17600	9840	17500	24200	21100	16700	7940	7700	8090	10400	10600
1020	37500	11700	11600	16500	20100	28400	10300	6460	14700	9210	17800	10500	15900	24100	19700	15900	5660	9460	9530	10200	9020
1020	37200	14300	12300	16600	17100	27000	7490	6430	15200	9550	18500	9700	18700	24600	22400	18300	7600	9900	10700	8440	7970
1030	40700	14700	13600	16600	15400	28900	8180	6480	17100	8010	14300	8070	19300	24600	21500	18000	7760	11100	10100	6910	10100
1020	38200	16600	13300	14300	17300	28300	8010	6300	14900	7780	11200	10500	19800	26100	22100	18200	7460	10500	10100	9110	10200
1020	40800	16400	13300	12600	18400	27000	7600	10100	13600	7150	16200	8970	19400	28100	23400	15600	9430	8870	10100	9150	9870
1030	40100	17500	10200	17100	16700	26200	8840	12400	14900	11100	14000	8150	20500	28100	19600	14400	9020	6520	9860	9090	10400
1020	34400	18100	8340	16500	17100	27400	8810	12500	14400	8680	15300	8400	19400	25500	21500	15300	7520	5240	10800	9420	10000
1020	25500	17300	13200	16200	16400	27700	8970	16700	15600	8660	14100	8800	15400	25200	20000	12000	7230	7110	9210	10200	8870
1030	25100	17600	13200	15800	13000	11100	9910	15800	14700	10400	11500	8790	17600	25200	19800	8770	8730	8740	10600	9380	7470

Table 19.-Continued

1963	1965	1966	1967	1968	1970	1973	1974	1975	1976	1978	1980	1981	1983	1984	1985	1987	1988	1989	1990	1992	1993
1020	20600	18000	11000	16000	11100	8990	10500	12000	15800	11900	11700	7920	18400	25200	19300	10000	8330	9130	8960	8380	10100
1010	44200	17500	12500	16200	14800	8080	9060	10400	14100	14500	8810	10700	19200	29000	26400	12400	8590	8370	9560	10400	10700
1010	34000	17200	14200	13700	14100	6620	7040	17300	15400	12700	10700	11800	18600	33700	26700	11700	7820	9780	8700	10500	10800
1010	39100	16100	12100	17100	14700	5990	9120	17800	15600	8030	12500	12600	17200	34800	26100	12500	7670	6320	9760	10500	10700
1010	40300	15400	10100	17400	14600	6860	8190	21200	16200	6860	11600	8990	13200	39000	26200	13800	7950	8130	15000	10400	11300
1010	44800	15000	13600	17600	14300	6290	10900	19700	18500	10800	11200	8340	12200	45300	26500	13600	7710	11200	12100	10500	9060
1010	35900	15700	15500	12400	12900	6980	14800	16900	12000	11200	10100	7250	17700	45100	26300	12300	9570	9780	11100	9500	7830
1000	28900	15600	15200	11800	11000	10100	16400	13500	12700	10600	8450	7880	19300	44600	26700	10300	9070	8630	12700	8720	10300
1000	32800	13800	16900	11600	14000	9540	16200	12600	18400	11200	7230	7960	20100	44700	26700	14100	12000	7530	11700	9980	11000
1000	22700	14600	16000	10200	15100	6890	11100	15600	17500	9810	9840	9780	19700	44400	26300	14600	10500	8090	10300	10400	10800
1010	21100	14000	15100	13000	15300	5760	16200	14800	17500	7550	10800	10200	22400	44700	26400	16600	11500	5120	6770	10600	11100
1020	26700	14000	13700	13100	15800	10000	17900	14600	17400	7120	15700	10900	20200	44600	26600	15200	8300	5340	11300	10400	10900
1030	23300	13600	17700	13600	16300	8950	18400	14900	19000	11000	12000	11200	17000	45000	25900	13300	10100	6750	12000	10300	9070
1000	28200	15000	18200	14500	15500	8670	16800	15100	15800	9320	12800	8760	21100	45000	24200	10200	11200	7910	12300	9590	7760
1000	30600	13000	18500	17100	13900	13200	15800	12900	17300	11400	16800	8340	23500	45000	36100	7310	9370	6800	13000	8500	10100
1020	23100	17100	18500	16200	17000	14400	13600	10800	19500	10500	16900	11200	24000	44900	45500	8320	9500	11300	11000	10100	10500
1030	25700	16500	18800	11900	16200	14900	9170	15500	21500	8300	19400	12400	24000	44900	45300	8590	8320	9840	5990	10200	10200
1040	28500	17100	18200	14600	17900	11600	11000	12100	20100	6840	12800	12300	25100	45000	44100	11300	8380	6750	4020	10000	10000
1010	37300	17800	15400	16700	17100	14000	12300	12100	20400	6430	11800	9300	19500	45000	44300	12000	8100	6520	8100	9890	9720
1010	40600	16800	16200	16700	17100	13800	16000	13200	17000	11300	11900	7680	17600	44800	45200	11800	9240	8890	10600	9920	9120
1020	47600	15100	15800	16200	15600	13700	15500	13900	15100	12800	16800	6230	21500	44800	43900	9280	11200	9800	13200	9110	9530
1010	56000	13400	12900	18200	14800	12100	14600	11400	19400	15100	16800	6580	23900	44900	45200	8180	10700	10700	14100	8280	10700
1000	55600	16100	13500	18100	17900	9500	11900	9650	19700	16200	11100	6740	24300	44900	43900	9210	11500	9990	11600	8090	8340
1010	55800	17800	13200	17700	16700	6530	8810	11600	19000	16400	15800	9780	25400	44200	44500	16500	12200	9930	8900	9480	10000
1000	56600	17700	11800	19000	14400	5790	12200	16900	18700	8750	19000	7620	25100	43600	44300	16500	11300	8380	5970	9530	9570
1000	55600	16500	10400	17900	15300	6380	17500	17600	19500	7050	19000	7600	23500	43900	46100	16000	6550	8760	8050	9230	9120
1010	54900	15600	11000	17800	12600	12300	17900	15100	16900	6600	19600	7320	22300	44500	46200	15700	5810	8470	9560	8890	8090
980	48000	15200	9460	13200	9270	15400	14300	14400	14200	13500	20500	6710	22100	44500	46800	16300	5610	12000	10500	7320	8050
990	42200	16800	11100	13800	8830	14500	13000	13700	12900	13600	19000	7080	23500	44600	45300	15800	6160	9950	10600	6310	8080
1000	30600	16000	10900	11300	10900	9940	9020	16300	18300	14600	12000	8790	22600	44100	46900	20200	8630	11000	5710	9650	9740
1010	30200	15600	11400	10600	15200	7870	8860	14900	20000	14100	18900	9880	27400	44600	47400	12300	8640	10700	4850	11400	10100

Table 19.-Continued

1963	1965	1966	1967	1968	1970	1973	1974	1975	1976	1978	1980	1981	1983	1984	1985	1987	1988	1989	1990	1992	1993
1550	37200	16200	10100	14800	13800	6130	11800	16800	18500	15600	19100	10100	32800	44200	47100	12700	8180	8660	4850	11700	9540
2470	35300	16500	11500	16100	15100	11000	13000	20200	14200	9160	18100	11200	36200	43500	46900	14800	6910	5340	4860	11600	9990
2500	36700	16500	12300	14600	15100	14900	11900	21400	10600	15700	21600	10700	39700	44100	43100	13000	5820	8300	13200	11500	7800
2470	45000	16500	14100	13700	12000	16500	10800	21500	8190	15500	21700	7460	43000	44500	37700	11600	8000	8990	12400	10700	7240
2450	49200	13800	13700	12800	9220	18900	11900	18100	16200	11300	20300	7180	47200	44100	33200.00	9640	8440	10100	14200	8830	9510
2450	43900	7750	14100	9540	11600	19600	9880	17000	17800	14000	20900	9000	47100	44300	30300	12800	9810	10600	15000	11000	9310
2440	42200	14200	12900	9060	12200	15000	10500	16200	17300	15500	24800	9190	48500	44100	30100	13300	9760	11800	9630	10800	9760
2450	42000	14200	10600	13000	13600	10500	14500	16100	17100	10600	26200	9980	48600	44700	30200	14200	9900	10900	9510	11500	10600
2470	46000	13600	10100	15600	12900	15600	14300	16400	12600	7870	26400	8650	48800	44500	30200	11900	6420	8260	13700	11600	10800
2480	54000	13900	11600	17400	14800	11200	16400	15900	9450	11500	25800	8470	48100	44500	31900	12200	6320	12300	14000	11500	9420
2540	58100	13500	11900	18400	12600	10600	19000	18300	6870	13300	28100	7210	48800	44300	37200	12800	9840	13200	15000	10200	8210
2550	51600	13600	10800	17900	9330	10200	19400	17100	12000	16900	29600	6210	51400	44500	42300	13900	9050	13900	14100	8420	9830
2550	45500	12000	11200	15500	11900	9780	17300	16100	12100	16700	23900	7170	52600.	42400	47000	16000	8370	15700	14800	11200	10700
2550	35700	13300	11500	14200	13200	5930	15000	18600	12100	12900	26900	8070	59700	39900	45800	17200	9340	16400	10000	11300	11200
2520	36700	15200	12300	16400	14200	6530	19300	17200	12300	9730	30700	9190	58800.	39900	45000	19600	9930	13600	9920	11100	11600
2500	39400	13600	8430	17600	15300	11400	19200	13300	12000	6740	29700	8880	60700	39100	46800	19100	6350	9390	17000	11300	11600
2500	47700	10600	10500	17700	15200	13400	19000	9950	8420	12600	25200	8290	61100	39100	46500	19200	7200	14700	17600	11400	10500
2500	47500	11800	11000	19100	14000	13900	18600	12400	7560	9490	21700	7300	60600	39900	46700	20900	10200	15600	16400	10500	10300
2500	47900	9930	10000	17000	12000	13900	17500	14300	13600	14400	6880	6710	60600	39300	46800	19900	9610	14700	16500	8560	10600
2480	48500	9890	11500	17500	16500	12400	18100	11100	14700	16500	13400	10400	63000	39900	46600	21000	11300	14800	17400	11500	10800
2500	48500	10400	12100	15000	15000	10800	15400	15200	9400	17500	24400	9790	69000	39900	45600	20700	11900	15900	17400	12100	11800
2500	48300	9750	13800	16600	13900	7770	18200	20100	6910	9460	32800	10400	67100	39900	46600	21100	11400	11700	14500	11900	11000
2480	43900	10200	10800	17000	15000	14200	18000	20300	11200	6530	25300	10500	67300	42900	43500	19100	8060	9000	12300	12000	10900
2480	26900	7020	11800	16900	15400	17200	19100	18700	8150	13200	31100	11300	67100	43300	36600	19900	6860	15000	20000	11700	10800
2480	13000	10200	12900	17000	14600	17900	18900	17500	7820	13000	34500	8490	67900	43700	35800	19200	9950	15200	17500	12300	10100
2480	11700	11400	12100	15800	11500	17600	17900	13600	15500	12000	34100	7040	86000	43900	32800	19400	9780	16000	15300	10800	11500
2480	13200	12000	12700	12100	13800	14900	13500	15400	16800	12900	34200	10400	92600	43900	29900	20300	9570	15500	6250	12700	12000
2470	15000	11000	13400	10800	13500	12900	14400	17800	13600	12900	33900	7740	86400	43700	29900	19900	10000	14500	4810	13400	12100
2450	14900	9910	12400	10000	12000	9020	18800	19900	13900	8510	34200	10000	85600	43700	29900	18100	9110	13300	4810	14600	14500
2470	14900	8270	11700	10400	16000	13800	21000	20000	12900	8250	31400	8870	84100	43900	30400	17700	7350	9170	14100	14800	14800

Table 19.-Continued

1963	1965	1966	1967	1968	1970	1973	1974	1975	1976	1978	1980	1981	1983	1984	1985	1987	1988	1989	1990	1992	1993
2480	15500	7600	11000	12000	17900	14300	21100	21000	8110	9970	29100	8960	83100	43700	30100	18400	7150	13900	14900	11800	13200
2470	15100	9350	10500	8580	14400	8710	18000	17200	7980	7940	27000	7990	83500	43700	30000	13800	6890	9490	14900	10700	10800
2470	15100	11400	12100	8660	12700	13400	19900	18700	9060	11100	27700	8140	81500	43700	30200	13100	10900	15600	14900	10800	11100
2470	14600	11600	13600	10500	16000	16400	19400	18900	14900	9100	28000	12300	73900	43900	30100	17500	12300	16300	14900	14500	14600
2470	11300	11800	11600	11200	12800	12800	16700	20200	15500	13000	28800	14200	69000	43900	29800	17900	15800	16200	14900	14700	14700
2480	10900	11500	10300	14000	12200	9540	19700	23100	14800	9290	27900	14100	58600	43900	29800	18100	14700	15700	14900	15100	14700
2500	9800	11200	9230	14600	12900	14000	20900	21800	16200	11800	25500	16900	51500	43700	29700	17700	8790	13600	14900	14900	15000
1920	7890	11500	10900	14400	10900	16200	21700	21200	13000	12900	26600	15300	51400	43600	29400	14600	7880	16900	14900	15000	14600
1030	8560	11400	11800	15600	10000	16500	20100	19800	14900	12600	25800	15000	52900	43900	29700	15500	12300	13700	14900	14700	12600
1010	9210	10600	10400	15600	7990	15700	18600	18800	14100	11800	26100	10200	54800	43300	29900	12500	11800	14000	14900	12800	14900
990	9460	12900	10300	14800	10800	13100	17400	12200	11600	12900	24600	13800	55200	43700	24300	16700	12000	12500	5590	14600	15200
990	10800	11000	11200	11900	12600	10900	17000	18800	11800	13600	24400	14000	55200	43600	24400	18800	12900	12700	4790	14200	15100
990	11100	11100	9360	14300	15000	7190	18600	19100	10500	10000	23800	10900	55500	43700	30200	19200	13100	9900	4780	14500	14900
990	11400	9830	9260	15300	15900	10400	22000	20800	12000	9860	26400	11400	55600	41700	29900	18300	8320	7880	14600	14400	14900
1000	10100	12100	10200	17600	16200	10600	22900	19400	10500	12500	25100	13500	53900	35800	28200	15600	9280	12300	15300	14700	14400
1000	10200	10800	11000	18800	14600	11200	23400	21100	8740	13600	24300	9570	50800	34900	29000	14300	10100	12900	15300	14000	12400
1000	11400	10000	11000	21200	13300	12200	22000	21400	14700	12600	23100	10900	48000	34200	28100	15300	11200	14300	15300	10500	15000
1000	10900	10100	10300	18400	10400	9420	17000	19100	13500	12800	23300	16100	42000	32200	27400	19500	12300	16800	15400	14300	15500
1000	9280	10600	10300	13400	10100	6830	16900	21800	15100	10700	23700	17000	40200	29700	27900	19400	12500	16800	15400	14500	15500
1000	10500	11500	8750	14700	10400	5900	18800	18100	13800	10200	23500	16400	40000	29700	26500	18500	12200	11800	15400	14600	15400
1010	10300	11700	8030	13600	11600	8220	19300	22800	16300	6400	24500	17500	40700	27700	26500	19200	9830	8840	15400	14700	15400
1010	10600	10300	8910	13600	11700	8110	22500	21600	10400	8950	24100	16900	42800	24600	25400	18500	10400	13200	15400	14300	14400
1010	13100	10900	8870	16300	10200	7910	20700	19000	8340	13700	22800	13400	41000	22800	26100	18000	14200	12900	15400	13100	13100
1000	13700	10000	11100	13600	8890	10900	22400	19300	12900	14000	22500	13200	42600	23800	27600	19200	14300	14900	15400	10100	15400
1000	13500	10600	7250	9230	10700	8230	18200	20600	12400	15700	24400	15300	40300	23800	28500	20400	14000	14200	5500	13700	16000
1000	13000	10800	11000	5480	11400	6610	17600	20700	14500	14300	25300	16600	40200	23900	29500	20800	17500	13000	4820	14100	16100
1000	12900	11100	9870	11300	10800	5710	23600	22400	13700	10500	24800	19100	41400	24000	27900	21000	16700	12200	4760	14500	16100
990	12400	10200	10400	13400	13300	6410	20700	18400	11900	11100	25500	19800	41500	24000	27900	21300	12900	10100	14800	14600	16100
990	14200	9830	10600	14600	13800	10600	21400	18300	8090	14100	24900	19000	41500	24000	28700	20800	10300	13600	17800	14100	15500
1000	13100	11600	10900	12200	13000	9760	20700	15300	7300	13400	24100	15300	39800	23900	28300	20500	13500	14500	16500	14600	14300
1000	11200	11900	12200	11200	9120	10300	16700	13800	8770	13400	24500	14700	36600	23800	28600	22300	15400	14100	15800	11600	16000

Table 19.-Continued

1963	1965	1966	1967	1968	1970	1973	1974	1975	1976	1978	1980	1981	1983	1984	1985	1987	1988	1989	1990	1992	1993
1010	10600	11600	12000	8100	12000	11900	15500	14000	9680	15100	22500	16700	36500	23600	26900	20700	14900	15400	16500	14700	16200
1010	11200	12400	12300	5600	11800	8670	12800	16400	9420	15700	22500	15700	36400	23000	26800	20100	13300	14300	13600	15000	16300
1000	12400	12400	7900	10100	11900	5420	16600	21400	8450	14100	22600	14800	36200	22700	28200	20600	14300	11900	12300	14600	16200
1000	14200	12800	8620	8460	12000	9160	19100	22000	8500	13800	22800	17300	36000	23900	28300	20400	10400	10900	16900	14700	16100
1000	11000	10600	10700	9740	14300	9600	19800	21800	9170	17500	22800	16700	35900	24200	26900	19900	10700	14300	17300	14600	15800
1000	9800	11800	12600	11100	12500	10100	18900	23200	7920	19400	19400	16400	34200	24300	26600	18100	12700	13600	17900	14000	14700
1000	10800	11900	12400	11800	8530	11200	17100	21400	12000	18000	25100	12500	35700	24200	26500	18200	13100	14300	18400	11200	16300
1000	11300	11600	12300	8470	11100	12000	15500	21300	12100	15900	22800	15500	33500	24200	26100	19700	14300	15700	18400	14500	16200
1000	12800	11500	11000	6380	12800	5540	13900	21400	10800	17500	23600	14200	29400	26200	26900	17900	13100	12800	14900	14700	16200
1000	11800	11400	10900	8560	11500	4640	17500	16800	9690	16200	24000	13300	26800	40500	26700	16600	13800	12100	10900	14900	16200
1010	11900	11100	9880	11200	11200	10200	15700	15300	9740	15400	23800	13400	26600	42400	28000	18000	10800	11700	16300	14700	16800
1010	12000	9440	11200	11400	12200	13100	18800	15600	6710	14400	24000	11800	26500	25400	27500	19500	9500	15600	16900	15100	16600
1010	12200	11400	11000	9840	8530	10300	21400	15600	6660	17200	23200	12200	26500	40500	26800	21500	13900	17200	14800	14600	15900
1020	12100	10600	12100	9000	6810	10400	23000	13900	10300	20300	21100	11900	26600	23000	27200	21400	14800	13800	17400	12200	17300
1020	13100	12800	10300	8360	10200	10600	21900	12700	12900	19900	20800	15100	26900	23500	26100	25200	13700	15200	17800	14700	15900
1030	16000	12000	11400	6320	12100	9420	21000	15900	12000	17700	21200	14300	26900	23500	25300	22800	13300	12800	13900	14900	15300
1010	16600	10800	10100	10000	12800	6320	23200	17500	15000	12500	20600	15000	26900	23400	27500	25600	14300	10800	10600	14700	14700
980	16200	10900	9420	12200	14200	10900	24200	16300	15600	16100	20900	15800	26800	23500	25100	26000	8850	7450	16200	14400	14300
980	17500	8840	11100	13000	14000	13500	19000	14000	14500	19800	16000	16000	26800	23500	24100	26000	6930	13700	18200	14100	13900
990	16800	11200	11700	14000	12300	13800	20200	13100	11800	19700	20700	14700	26500	23500	25200	22600	12800	15500	17500	13200	12900
990	17300	10200	11600	13200	8360	13000	23100	13900	15400	21200	20800	14100	26800	23600	24500	20000	12600	15500	18800	11000	14100
990	17300	10600	10800	12400	15300	9890	22400	12900	16300	22000	18900	14900	26800	23600	25200	22800	13000	15700	18800	12900	14300
990	18200	10600	12000	11100	18200	5130	20900	13900	15700	23100	19700	15900	25400	23600	24500	20100	14300	15000	13900	12100	14300
990	18500	10800	10900	15600	18900	3500	22800	14800	17300	18200	15200	15100	26800	23500	26300	22400	14100	15200	8950	12800	14300
1000	18200	10100	10100	16700	18100	7750	23700	16400	15800	14200	18800	17000	26900	23200	25000	23800	9930	12200	15300	12800	14100
1000	18400	9390	12100	17600	15200	4270	23600	16900	12100	19600	16200	13800	27100	23600	25200	19900	7690	18200	17200	12600	13700
1000	17300	10300	12900	15600	14500	8440	20600	20400	10200	17700	15400	12200	26800	23600	25800	19400	12300	18500	17400	13200	11300
1100	16500	10200	13300	15000	11600	9730	21600	13400	15600	17800	15400	12600	26700	23400	28800	16100	13000	15200	15800	11100	14000
1020	12700	11000	13400	11200	14600	7120	20200	13700	15600	20100	15200	16500	27000	23500	28700	18000	13400	13500	15900	12600	13500
1000	14500	9690	12300	10400	14700	7360	20700	16000	15700	20000	15300	14700	27100	23600	28600	18000	13100	14600	13700	12500	12800
1000	14500	8440	10200	9920	15000	5390	14900	18900	14400	16000	18400	12700	26900	23700	27500	18800	12800	13700	8060	12700	12300

Table 19.-Continued

1963	1965	1966	1967	1968	1970	1973	1974	1975	1976	1978	1980	1981	1983	1984	1985	1987	1988	1989	1990	1992	1993
1000	14700	8070	7830	11900	14100	5290	17900	17700	13800	16600	14700	12100	26800	22800	25300	18000	9660	10300	8300	12300	12000
1000	14500	6660	9030	12700	11200	7630	17600	19200	10300	18300	20800	10200	27000	23100	28100	15100	9310	7010	13100	12200	11100
1000	14500	7250	11800	13600	7590	8670	15800	18600	8010	21000	19900	6740	26900	22700	27900	13700	8400	14500	14200	10400	9720
990	14500	8510	12400	13600	6910	8440	10800	15900	7640	23500	16100	6430	25700	23200	24600	14000	11600	16700	16200	8970	9990
990	14600	8780	13100	11200	7530	8810	8890	14300	13400	23700	17900	6280	27200	23500	23900	18200	12200	15200	17800	9850	11900
1000	14600	8770	12900	10500	10700	5490	9100	19400	13900	23600	19300	11700	27300	24100	23200	17800	11500	13800	15700	12300	11900
1000	14500	10600	11500	12700	12100	4700	15100	19700	12100	17200	19100	12900	26800	24800	25100	16700	11600	9100	12000	12700	11900
1010	14700	11700	9990	13400	13600	6840	15500	19500	16900	18500	18700	14000	25600	24700	24600	15900	9620	4840	14700	13000	11800
1010	14500	10600	10800	15000	14700	5160	15400	18500	12600	19800	19200	15000	25200	24100	22700	17400	6670	13700	12200	13000	10800
1020	14200	11100	9320	14200	10400	5030	11800	16800	9120	17700	19900	12300	25600	24100	23100	15200	11400	13800	12100	11200	8640
1030	14700	7200	9330	12600	6910	7230	11400	10400	12300	16500	15100	10400	26300	24200	23800	18500	11000	13200	12900	9360	11400
1030	12200	7320	10800	11400	11700	8300	7380	6860	15500	17600	13800	13300	26600	24400	23600	20000	12100	13600	6090	12100	11700
1030	11600	8310	8740	7490	10400	5970	6620	11200	16700	14900	18000	11000	26400	24000	22000	19400	12200	14900	4800	11900	11700
1010	10900	10300	8680	10900	10600	3940	14000	15500	17700	11700	16500	15200	26000	24100	24300	20200	11300	16100	4800	12500	11600
1010	12100	9440	7060	11900	10400	6770	13100	15100	15600	9700	14000	15100	26500	24000	24700	19900	8940	12300	14100	12200	11600
1010	12400	9140	9580	10600	11600	6390	12500	16100	13000	11700	16600	15900	26500	24000	21800	18600	8010	15000	14400	12000	10400
1010	12600	13200	10800	9950	11800	7360	11400	14800	9590	11300	18000	9780	26400	24000	22900	18900	12600	15000	14400	10900	8660
1010	12000	13200	10900	9680	9610	8390	15900	19100	14000	13100	16700	7770	26700	23900	22700	16000	11900	15000	14300	9480	11300
1010	11800	13400	10300	7910	12200	8460	16500	16400	17100	14100	14300	12600	27300	23400	21400	20900	13000	14800	14400	11500	11500
1010	11500	13700	11200	5430	12700	8310	11500	20900	16700	13000	15900	14000	27400	23400	22300	12600	12800	14600	14400	12200	11900
1010	10600	13800	10400	7700	14100	5860	16400	19000	16300	13000	15600	11700	27000	23500	21600	12400	15400	12900	14400	12100	11700
1000	9740	13600	9130	9880	14000	8390	14600	19900	15900	13500	15200	11100	26500	23600	21500	14700	10100	11400	14400	12100	11700
1000	10200	10900	9730	10400	14000	9110	18000	21400	15200	16200	14100	9160	26900	24000	22000	14700	9200	16500	14400	11900	10100
1000	9800	12200	8660	9800	13800	8520	18000	15700	12200	16100	11600	7870	27700	24000	21300	13300	16300	17200	14400	10300	8420
1000	10300	12700	9780	11400	8770	10500	16800	12200	15300	15200	14600	6810	27300	24000	20600	12100	17200	16100	14400	9290	11100
1000	10400	10700	9690	8450	13000	10700	15800	8920	18300	17100	14200	9470	27300	23600	21200	14700	13200	14700	5100	11300	11400
1000	10700	12000	7490	6510	15700	7370	10100	14500	17600	16200	16800	9530	27400	24000	18900	11500	12100	11100	4820	11100	11200