

A HYDROLOGIC DETERMINATION OF INSTREAM FLOW
REQUIREMENT OF THE GANGES RIVER

by

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In Partial Fulfilment of the Requirements for the degree of
Master Of Engineering (Water Resources)



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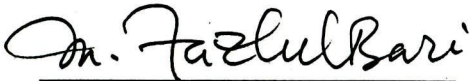
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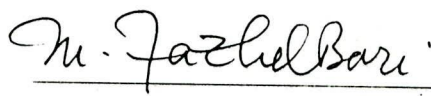

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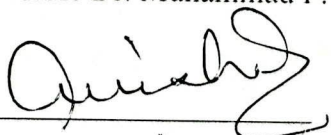
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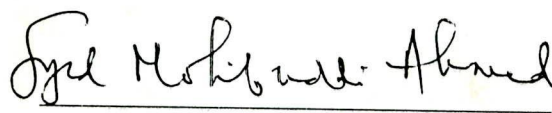
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ABSTRACT

This study concerns a hydrologic determination of instream flow requirements of the Ganges River. The instream flow requirements are defined as those flows which remain in the stream channel after diversions for off-stream uses such as urban and irrigation needs and, in some configurations, hydropower, are appropriately catered for (Maidment, 1992). These flows are essential within a stream to maintain its natural resources at desired or specified levels. Knowledge of the instream flow requirements assists in planning for new projects and in evaluating existing projects and it is needed for proper understanding of the issue relating to the natural environment of stream. The main objective of the study is the determination of instream flow requirement of the Ganges on hydrologic analysis. The basic data need for this study consists of mean daily discharge for the period from 1934-35 to 1993-94 of the Ganges at Hardinge Bridge station. Other information collected include fish catch, navigation draft and discharge requirement for keeping salinity below harmful level. The daily mean discharge data was used to compute statistical characteristics of streamflow and it is seen that the maximum flow varied between 35,900 m³/s in 1939 to 73,200 m³/s in 1961 and the minimum flow from 1,190 m³/s in 1953 to 2,360 m³/s in 1960 for the period 1934 - 35 to 1974 - 75 (pre-Farakka). On the other hand, for the period 1975 - 76 to 1993 - 94 (post-Farakka), the maximum flow ranged between 31,500 m³/s in 1989 to 75,800 m³/s in 1987 and the minimum flow from 261 m³/s in 1993 to 889 m³/s in 1977 with the exception of 1979 when 1,210 m³/s was available.

The methods used to determine the instream flow requirements of the Ganges, based on analysis of historic flows (Karim et al., 1995), were Flow-duration, Constant yield and Mean annual flow (MAF) method. The instream flow requirement for each months were estimated by using these methods.

The computed instream flow requirements based on analysis flow duration curve ranged from about 1,580 m³/s in dry season to 40,000 m³/s in the wet season. The corresponding values for the constant yield method ranged from 1,990 m³/s to 40,200 m³/s and those for the MAF method varied from 1,154 to 23,080 m³/s. A comparison of these values with the minimum discharges revealed that in the pre-Farakka period, the minimum

observed discharge met the flow requirement for instream protection whereas that for the post-Farakka period falls much below the required flow. The bankfull discharge is found to agree with the higher value of the instream flow requirement during wet season.

The study shows that the minimum instream requirement is about $1,154 \text{ m}^3/\text{s}$ whereas the minimum flow of the Ganges ranged between 261 and $889 \text{ m}^3/\text{s}$ with the exception of one year when minimum flow was $1,210 \text{ m}^3/\text{s}$. Since the recorded minimum flow is found to be less than the recommended flow for instream protection, the Ganges has suffered substantial morphological and environmental degradation as expected. On other hand, the minimum flow during pre-Farakka was $1,190 \text{ m}^3/\text{s}$ which is found to be very close to the calculated minimum instream requirement. Based on the results obtained the instream flow requirement in the dry months should range between 1,150 and $2,000 \text{ m}^3/\text{s}$ in order to restore and sustain the natural environment of the Ganges. The methods applied for this analysis are easy to apply and can provide preliminary estimates of instream flow before undertaking any detailed, expensive and time-consuming analysis and study.

Combing the computed instream flow requirement estimates ($1,150 - 2,000 \text{ m}^3/\text{s}$) with the diversion requirements to meet agricultural needs ($1,000 \text{ m}^3/\text{s}$) and domestic water supply ($150 - 200 \text{ m}^3/\text{s}$) as estimated by FA4 (1993), total water demand is found to be in the range of 2,300 to $3,200 \text{ m}^3/\text{s}$.

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CHAPTER 1

INTRODUCTION



1.1 Importance of the study

Throughout history, water resources development and exploitation has played a key role in the social and economic development of nations. Over the last century, aided by the development of new and increasingly powerful technologies and expertise, the rate of water resources exploitation increased markedly with larger and more complex projects being designed and constructed. However, such developments, particularly the construction of diversion works and reservoirs to impound river flows, have had a significant impact on the natural flow regimes of the affected rivers. These changes in flow regimes have in turn caused significant changes to the ecological and environmental conditions in the river.

In recent years concern for the environment has grown, with environmental objectives receiving higher priority in all aspects of economic activity. Reflecting this increased concern for the environment, environmental impacts of water resources developments have come under closer scrutiny. In fact, in many countries, explicit consideration of environmental impacts has now become mandatory in the planning and design of water resource projects. One of the fundamental difficulties faced by water resources planners and engineers is that use of water for economic purposes modifies the environment. The question then becomes one of evaluating trade-off between economic benefits and environmental costs. However, the measurement or quantification of environmental costs is a very difficult task. Furthermore, defining these costs in terms commensurate with economic benefits, which are almost always measured in monetary units, is not only very difficult but also may be quite inappropriate because it has the potential to disguise or distort the essence of environmental costs.

This issue is particularly problematic when the environmental costs of changes to the natural flow regime of a river caused by construction and operation of diversion works or reservoirs. A common approach to addressing this problem has been to specify flow conditions (requirements) which must be met by the operation of

diversion structure or reservoir. These flow specifications are generally different from the natural conditions - use of the water controlled by a diversion work or reservoir for economic purposes such as irrigation or generation of electricity guarantees the flow rate will change in the temporal pattern - and are normally specified in terms of the minimum (or some cases maximum) flows which will maintain the ecological balance within the river. A major difficulty with this approach lies in how these flows, which are known as instream flow requirements, are determined or defined.

The instream flow requirements are defined as those flows which are essential within a stream to maintain its natural resources at desired or specified levels. Knowledge of the instream flow requirements assists in planning for new projects and in evaluating the operation of existing reservoirs so that water use policies which minimize damage to the environment, can be developed.

Protection of streamflow is based upon water requirements of the communities that share the streams. Chiang and Johnson (1976) stated that the benefits derived from maintenance of streamflow include, in addition to downstream industrial and domestic uses, the following : navigation, boating, swimming, fishing, wildlife support, sightseeing (esthetics), picnicking, fish production, ground-water recharge, avoidance of salt-water intrusion, and dilution of natural and accidental waste discharge.

Development of water resources is an increasingly important factor in social and economic development of Bangladesh. Scarcity of water due to reduced flow in rivers, such as the Ganges, often hampers agricultural production, navigation, fisheries as well as leads to ecological imbalance. The purpose of this research is to conduct a hydrological investigation about instream flow requirement of the Ganges; to assess long-term discharge data for the Ganges River at Hardinge Bridge is available and will be analyzed for instream flow requirements.

1.2 Scope of the Study

The Ganges is an international river with its drainage basin extended into Nepal, India and Bangladesh. It rises in the Gangotri glacier in the Himalayas near Tibet- India border and drains an area of almost one million square kilometers. After draining the middle

ranges of the Himalayas it emerges on to the plains at Hardwar and flows in a generally easterly direction through India. About 40 km up of Farakka it bifurcates, with the main flow (the Padma) continuing to flow eastwards into Bangladesh. The river enters Bangladesh about 17 km below Farakka. The other branch known as the Bhagirathi flows southwards into the Hoogly basin.

The Ganges flow is subjected to seasonal fluctuations as its monsoon flow (June - October) is sufficient to meet the needs of both India and Bangladesh, but its dry season flow (November - March) is insufficient. The rainfall in the Ganges basin varies from about 1520 mm near delta to about 760 mm in the western part of the Gangetic plain. This seemingly high precipitation occurs mainly in the monsoon season. The abundant wet season flow (more than 80% of the annual flow) drains into Bay of Bengal. Most part of the basin requires irrigation for multiple crop production. Large dry season flows are needed in the region in Bangladesh for irrigation, to allow navigation, and control the seasonal precipitation of the saline front in the Sunderbans and the agricultural lands of the southwest region .

The Ganges is the only major source of surface water in the Ganges dependent southwest area of the country. All other rivers of the region receive water directly or indirectly from the Ganges. The fate of about 40 million people in the northern and western region of Bangladesh is directly related to the Ganges flow. In order to sustain the natural environment of the streams, it is essential to determine the instream flow requirement of Ganges . It is needed to plan measures to overcome or at least minimise the adverse effects that have arisen due to abnormal decrease in dry season flow in the recent years.

There are many methods for determining instream flow requirement reported in literature. The relatively more accepted methodologies for determining instream flow requirements can be broadly divided into three categories - namely, those based on (1) historic flows, (2) hydraulic rating, and (3) habitat rating. The methods based on historic flows use hydrologic approaches includes such techniques as Flow-Duration Curve Method, Constant Yield Method, Mean Annual Flow Method are only applied in this study. The methods based on historic flows have common advantage of being relatively simple, requiring only hydrological data, and therefore being relatively inexpensive. Long-term discharge data for the Ganges river at Hardinge Bridge are available and is analysed in this

study for determining instream flow requirement of the Ganges river. Out of available methods only hydrologic approach is applied. It is simple, estimates obtained are seasonable and seem to compare with other estimates.

1.3 Objectives

The main objective of this study is the determination of instream flow requirement of the Ganges based on hydrologic analysis.

The specific objectives are as follows:

- (i) to study of daily, monthly and annual statistics of discharge and water level time series of Ganges river at Hardinge Bridge;
- (ii) to construct flow-duration curve for each month and to provide cumulative probabilities of exceedance for various historical flow records which will provide flow for instream protection for normal months and during high flow months;
- (iii) to determine the mean annual and median monthly flows from historic flow statistics for estimating instream flow requirement of the Ganges at Hardinge Bridge.

1.4 Methodology

The Ganges River within the territorial limits of Bangladesh has been chosen for this study. Basic data required for this study consists of mean daily discharges. Main source of these data is the Bangladesh Water Development Board (BWDB), which maintains a network of hydrometric observation and measurements stations throughout Bangladesh. Necessary data for this study were collected for the Ganges at Hardinge Bridge from Surface Water Hydrology Directorate II, BWDB, Dhaka. After collection, data were checked for continuity and consistency. Any inconsistency found was removed and missing records were filled by appropriate methods.

The relatively more accepted methodologies for determining instream flow requirements based on analysis of historic flows (Karim et al., 1995) can be broadly divided into three categories: (i) Flow Duration Curve Method, (ii) Constant Yield Method, (iii) Mean Annual Flow Method.

The historic flow methods are based on the premise that stream flow data can be correlated with ecological data to determine the instream requirements and can be easily incorporated in planning models to determine how best to meet these requirements. Each of the above methods are briefly described below :

Flow-Duration Curve Method -- This method utilizes historic flow records to construct flow-duration curves for each month and to provide cumulative probabilities of exceedance for various flows. As cited by Loar and Sale (1981), this method was proposed by the Northern Great Plains Resource Program whereby, based on at least 20 years of daily flow records, a flow recommendation is made for each month. This method includes the provision to eliminate abnormal events, after which the recommended flow for instream protection is set at the 90th percentile for normal months and 50th percentile during high flow months. The flow duration curve method does of course retain the basic simplicity of using hydrological records only, but it is more accurate than other techniques in this category only because of a better representation of flow variability. However, as reported by Richardson (1986), a complete representation of a given watershed could still be lacking.

Constant Yield Method -- This method uses a combination of the median flow and constant yield statistics to represent watershed hydrology. This procedure deals with unregulated streams with a drainage area greater than 130 square kilometer and historic flow records of greater than 25 years, the median monthly flows serves as the datum for evaluation of instream flow needs. In this case, instream flow requirement is 100% of the median monthly flow. For stream not meeting this criteria, a constant yield factor, namely run-off per watershed area is then applied to specific sites to estimate actual conditions. The recommended instream flow thus computed is called the Aquatic Base Flow (ABF). Loar and Sale (1981) have cited the use of this method by Robinson (1969) for the Connecticut River and by Chiang and Johnson (1976) for streams in Pennsylvania.

Mean Annual Flow Method -- This method was presented by Tennant (1976) and correlates habitat quality with various percentages of Mean Annual Flow (MAF). Its

recommendations are based on extensive field studies on both cold and warm water fish. The habitat quality is described separately dry and wet periods by what is called "Base Flow Regimens" and ranges from 10 percent MAF for severely degraded conditions, barely sufficient for short term survival, to 200 percent MAF for flushing flows. Tenant (1976) notes that the studies conducted over a period of ten years using the MAF method have shown that aquatic habitat conditions are similar on most streams carrying the same portion of average flows. The MAF method is of course simple and easy to use and does not require data other than hydrological. However, while the usefulness of this approach lies in part in ease of applicability, its accuracy as a general tool for aquatic resource management is not so perfect.

CHAPTER 2

REVIEW OF LITERATURE AND RELATED STUDIES

2.1 Literature Review

The instream flow requirements are defined as those flows which are essential within a stream to maintain its natural resources at desired or specified levels. Knowledge of the instream flow requirements assists in planning for new projects and in evaluating the operation of existing reservoirs so that water use policies which minimize damage to the environment, can be developed. It should be noted that the term "instream" is somewhat of a misnomer in the sense that flows in the river are also required for maintenance of wetlands, estuaries, and flood plains, etc., which are not really within the stream but which are critical elements in maintaining the ecosystem.

Ideally, the methodology to determine the instream flow requirements should be able to consider the individual and joint effects of the various parameters. However, consideration of those effects, even at the individual parameter level, is very complex issue; fully validated and accepted comprehensive methodologies will likely not become available for some time. Furthermore, even such a methodology has been developed, the problem of spatial variation is likely to require the site specific methods.

Initially, perhaps because the legal need to recognise and consider environment formally and explicitly in planning and management of water resources project arose earlier in the United States than others, the technique for determining instream flow needs are almost exclusively developed in the USA. Many techniques, ranging from those designed for localised site or specific applications to those with more general utility, have been used, with some of them being applied and discussed more widely than others. The relatively more accepted methodologies (Karim et. al., 1995) for instream flow requirements can be broadly divided into three categories - namely, those based on (1) historic flow, (2) hydraulic rating, (3) habitat rating. Some of the techniques which are developed in the USA and have been used at one or more geographical locations in and outside the USA are as follows:

Historical Flow Methods

- Flow Duration Curve

- Constant Yield Method

- Mean Annual Flow Method

Hydraulic Rating Methods

- Habitat - Discharge Method

- Simplified Staff-Gage Analysis

- R-2 Cross Method

- Wsp Hydraulic Simulation

Habitat Rating Methods

- Usable Width (UW) Method

- Weighed Usable Width (WUW) Method

- Preferred Area Methods

- Instream Flow Incremental Methodology (IFIM)

In addition to the techniques listed above, two other techniques have been proposed in Australia - namely, the Holistic Approach and the Expert Panel Method (op. cit).

Historic Flow Methods

The methods based on existing stream flow data are the easiest to use in that stream flow records are readily available, or at least more easily available in comparison with other data. Furthermore, these flow data can be correlated with ecological data to determine the instream requirements and can be easily incorporated in planning models to determine how best to meet these requirements.

Flow Duration Curve method utilizes historic records to construct flow-duration curves for each month and to provide cumulative probabilities of exceedance for various flows. As cited by Loar and Sale (1981), this method was proposed by the Northern Great Plains Resource Program whereby, based on at least 20 years of daily flow records, a flow recommendation is made for each month. This method includes the provision to eliminate abnormal events, after which the recommended flow for instream protection is set at the 90th percentile for normal months and 50th percentile during high flow months. The flow duration

curve method does of course retain the basic simplicity of using hydrological records only, but it is more accurate than other techniques in this category only because of a better representation of flow variability. However, as reported by Richardson (1986), a complete representation of a given watershed could still be lacking.

Constant Yield method uses a combination of the median flow and constant yield statistics to represent watershed hydrology. This procedure deals with unregulated streams with a drainage area greater than 130 square kilometer and historic flow records of greater than 25 years, the median monthly flows serves as the datum for evaluation of instream flow needs. In this case, the instream flow requirement is 100% of the median monthly flow. For stream not meeting this criteria, constant yield factor, namely run-off per watershed area is then applied to specific sites to estimate actual conditions. The recommended instream flow thus computed is called the Aquatic Base Flow (ABF). Loar and Sale (1981) have cited the use of this method by Robinson (1969) for the Connecticut River and by Chiang and Johnson (1976) for streams in Pennsylvania.

One of the most used methods in Historic Flow Methods category is the *Mean Annual Flow* (MAF) method. The MAF method was presented by Tennant (1976) and correlates habitat quality with various percentages of mean annual flow. These recommendations are based on extensive field studies carried out in Montana, Nebraska, and Wyoming for both cold and warm water fish. Tennant (1976) notes that the studies conducted over a period of ten years using the MAF method have shown that aquatic habitat conditions are similar on most streams carrying the same portion of average flows. Analysis in 21 different states have substantiated these correlation. Richardson (1986) used the MAF Method, Flow Duration Curve Analysis (wetted perimeter), and the Incremental Method on the Tweed River for determining instream flow requirements of fresh water fishes in a north coast river system in New South Wales. This technique can be useful tool for short term purposes prior to detailed studies for existing reservoir operations. Tierney (1986) has cited one such example by Fraser (1978) recommending a modification of the MAF method for use in New Zealand where the river environment is different.

Hydraulic Rating Methods

This category includes methods involving correlation of various hydraulic parameters to habitat conditions and contains the greatest number of variations of any category. The parameters to be considered in this category include wetted perimeter, water surface width, velocity, depth, cross-sectional area, and the type of substrate. Data for these parameters are collected for different flow conditions along transects across a stream. The transects are selected to be representative of specific types of habitat. The data are then used to define the habitat and form the basis for flow recommendations.

Loar and sale (1981) have delineated a range of approaches in this category as developed by the U.S. Forest Service for various regions. The first of these is based on a *habitat-discharge* relationship. According to this approach, attributes such as surface width of stream, wetted perimeter, average velocity, maximum depth, or cross-sectional area are used in developing the relationships. The relationships are presented in the form of graphs, with discharge being represented on the horizontal axis and the habitat parameter on the vertical axis. Two different approaches based on a single attribute measurement were subsequently used to derive instream flow recommendations from the habitat response curves. In the first approach, the minimum discharge can be set at the flow which produces a fixed percentage reduction in a particular habitat attribute relative to that associated with a reference flow; e.g., 20 percent reduction in the wetted perimeter might be the maximum allowable degradation (Bartschi, 1976). This approach is known as the habitat retention criterion. The second approach, the inflection point criterion, relies on determination of the inflection point in the habitat-discharge response curve, the inflection point being defined as that point where a major change in slope, as it relates to the way the habitat responds to the flow, occurs. Such a point might occur where a steep reduction in the wetted perimeter occurs. The discharge corresponding to that point could then be defined as the minimum discharge.

The *simplified Staff-Gage Analysis* approach was developed as a relatively simple method for quantifying the relationship between habitat condition and stream flow. This approach is based on a stage-discharge curve, with the transect location being based on ecological criteria for identifying critical habitat for a target species or life stage. A staff gage

is established at the location relevant to the critical habitat and the stage read for various known flows. The instream flow requirement is then determined by applying a specific habitat criterion, such as minimum depth threshold, at the gage location.

A *R-2 Cross* method was developed by the Region 2 office of the U.S. Forest Service for prediction hydraulic conditions which could be expected at unobserved discharges. The calculations are based on the Manning equation for open channel flow and are used to describe conditions at a single transect. Field data in the vicinity of a transect are used to calculate the coefficient of roughness (n) and, assuming that values of n and slope (s) independent of flow, an iterative program is applied to find values of average velocity, wetted perimeter, cross-sectional area, maximum depth, or hydraulic radius at discharge other than those contained in the calibration data set. These data are then used to derive a habitat-discharge curve. The recommendations for instream flow requirements from this method are based on habitat-discharge curves and use either a habitat retention criterion or inflection point criterion.

The *WSP Hydraulic Simulation* method is based on the hydraulic simulation model Water Surface Profile (WSP), originally developed to predict water surface elevations. This model used three basic equations - namely, continuity of discharge between transects, Manning's equation and the Bernoulli energy equation, to link transect data to predict depths and velocities longitudinally through a stream reach. This method can also include prediction of mean water column velocities for multiple subsection of each transect. The generation of instream flow recommendations in this approach involves the same type of habitat-discharge curve as in the habitat-discharge curve method explained earlier. White (1976) noted that the channel characteristics simulated by this program, combined with additional data describing the stream bed material, distance between transects, and elevation of transects, can then be correlated to fish characteristics of passage, spawning, and rearing requirements to recommend the flows necessary to sustain the aquatic environment. The recommended flow for a given time period is then the highest for the critical biological activity on any time period, for that time period.

Habitat Rating Methods

As explained earlier, while the terms hydraulic rating and habitat rating can both be used to describe certain techniques for determining instream requirements, the latter is generally reserved for techniques targeting specific species. The Instream Flow Incremental Methodology (IFIM) is the most established and used technique in this category.

The *Usable Width* (UW) method oriented towards use of single transects across critical locations in the stream channels where limiting habitat occurs. The specific habitat criteria used in the technique comprise velocities and depths associated with the fish. A binary criterion is employed to distinguish between usable and unusable; i.e., the portion of transect with less than minimum depth or exceeding maximum velocity criterion are unusable. This approach can be used for assessing flow requirements for fish passage, spawning, incubation, and rearing. However applications of the method have been limited to salmonoid species.

In the *Weighted Usable Width* (WUW) method, on the other hand, the stream transect is divided into sections, each with a width, average depth, and average velocity. The width of each section of the transect is multiplied by velocity and depth weighting factor. Instream flow recommendations based on usable width methods are made by using UW vs. Discharge curve. In an application of the method reported by Thompson (1972) and noted by Loar and Sale (1981), the minimum acceptable flow for salmonoid migration was set at that flow which meets the minimum depth and maximum velocity criteria on at least 25 percent of the total transect width and on a continuous portion equalling at least 10 percent of the total width. In the application reported by Thompson (1972), the discharge that provides suitable flow conditions over 80 percent of the gravel available at the optimum flow was specified as the minimum requirement for spawning.

The use of *Preferred Area* to quantify physical habitat is an important technique for determining instream flow requirements. In this method, biological criteria for spawning consists of upper and lower bounds on preferred depths and velocities. Depth and velocity are measured across four transects at a potential spawning site, and isopleth maps of the streambed are constructed to show the distribution of hydraulic parameters at a fixed discharge. Areas satisfying both velocity depth criteria are designated as "spawnable"

portions. This procedure is repeated for at least five different stream flow conditions to develop a response curve of spawning area vs. Discharge curve. The preferred spawning flow is defined as the flow with the maximum spawning area. Instream flow requirements are set at flow which maintains 75 percent of the maximum spawning area.

Incremental Methodology developed by the Cooperative Instream Flow Service Group (IFG) of the U.S. Fish and Wildlife Service, consists of a package of computer programs title PHABSIM (for Physical Habitat Simulation system). As noted by Loar and Sale (1981), the approach combines the multiple-transect data from representative and/or critical river reaches and hydraulic simulation models to predict physical habitat parameters such as mean velocity, depth, and substrate. PHABSIM can provide the relationship between stream flow and Weighted Usable Area (WUA) in a tabular or graphic form. According to Loar and Sale (1981), two alternatives have been used to obtain instream flow recommendations from the data provided by PHABSIM. In the first approach, the discharge level lying between the monthly median flow and the 90th percentile monthly flow that results in the least reduction in WUA relative to the optimum is set as the instream requirement for each life stage of a target species. The discharge level in which the largest relative change for any species is the lowest is usually used for the minimum flow recommendation for each month. In the second approach, a daily flow record is obtained for the representative stream reach from historical, pre-project data, or from modification of those data by hypothetical storage and release specifications at a proposed reservoir. The daily flow record is then converted to a record of daily WUA values by using habitat-discharge response curves generated by the incremental methodology. This process is repeated for various life stages of target species for those seasons in which they are present. Habitat duration - i.e., the percentage of days in which the WUA equals or exceeds various level - is then calculated on periodic (weekly, monthly, or annual) basis. The instream flow requirement is then determined on the basis of this information. The instream flow requirement can also be on the basis of the discharge level which provides a fixed percentile habitat quality: e.g. a minimum monthly flow corresponding to the 80th percentile WUA value based on historical records may be specified.

The Case in Australia

The hydrological conditions and aquatic environment in Australia differ a great deal from the rest of the world, with the exception of South Africa, and certainly from those of North America where most of the developments in relation to analysis and determination of environmental flow requirements have occurred. Arthington et al. (1992a) proposed the use of the *Holistic Approach* for assessing the environmental requirements of stream. This approach based upon the principle that, as far as possible, the original functional aquatic system of rivers should be maintained. Accordingly, the water requirements of the complete ecosystem, including source area, river channel, riparian zone, floodplain, ground water, wetlands, and estuary need to be assessed. Accordingly, in order to maintain the functional integrity of the ecosystem, essential features of the natural regime, such as seasonal patterns of flow, low flows and periods of no flow, flood flows of different magnitudes, duration and recurrence intervals, and flushing flows have to be incorporated in modified flow regime.

Most recent, development in Australia, cited by Arthington and Pusey (1993) from Swales et al. (S. Wwales, H. Cross, and J.H. Harris, The Use of An "Expert Panel" Approach in Assessing Environmental Flows in Regulated Rivers in South East Australia, under review for Regulated Rivers), is the Expert Panel approach. In this approach, a panel of experts, drawn from a range of disciplines, is used to assess the impacts of different flow regimes and to make recommendations for environmental/instream purposes.

A review literature shows that so far the topic of instream flow requirement has not been addressed per se in Bangladesh. Studies relating to the Ganges river mostly concern sediment transport, morphological characteristics and low flows. Bari (1979) investigated the sediment discharge characteristics and found that transport rates predicted by colyby relations showed closer agreement with the measured values. On the other hand Engelund-Hansen formula underestimates transport rates but results are more consistent. It also been shown that sediment transport and water discharge can be related with power law relation. Ahmed (1982) analyzed the annual minimum daily discharge of the Ganges at Hardinge Bridge by Gumble, Pearson type-3, log Pearson type-3, and lognormal distributions. He concluded that LP3 distribution fitted one-day low flow data series best. Hossain (1989) studied the geomorphic characteristics of the Padma up to Brahmaputra confluence. It was shown that

average peak flow increased by about 12% and average lowest discharge decreased by 60% after 1973. The study also revealed a trend of rise in mean bed level in the upper reach and fall in the lower reaches. Other studies related to river course shifting, erosion, hydraulic geometry include Dad (1977), Rahman (1978), and Das (1992), Ullah (1987) developed a computer model to study the river channel changes in the alluvial condition and he studied the case of Brahmaputra-Jamuna. Gossami (1985) studied the Brahmaputra river within India and applying the suspended sediment budget, he showed that there was an aggradation of the 607 km Assam reach of Brahmaputra between Ranaghat and Jogighopa by about 16 cm during 1971-79 period. He also found that the mean monthly flow of Brahmaputra at Panda indicated a modest increase in flow but a large increase in sediment discharge, particularly since 1977. Hossain (1991) conducted study on erosion and deposition in the major rivers of Bangladesh and found that deposition rate is more than erosion. As a result the mean bed gradient of the Brahmaputra increased by 19% and that of the Ganges increased by 35%. Khan (1995) investigated statistical characteristics of discharge and sediment transport in the Ganges and Jamuna rivers.

2.2 Related Studies on the Ganges

In this section first a description of the Ganges is presented together with a summary of main features of this river. This is followed by a review of related studies on the Ganges relating to water availability and demands for agriculture, salinity control, fishery, navigation.

2.2.1 The Ganges River

The Ganges River originates from the Gangotri glacier in the Himalayas at an elevation of approximately 7000 m near the border between India and China. The total length of the Ganges is about 2,550 km from its origin upto its confluence with Meghna. Three main tributaries of the Ganges River are the Karnali, the Gandaki and Kosi rivers which rise in China and flow through Nepal and joined the Ganges in India. The main distributaries are the Bhagirathi in India and Boral, Gorai, Bhairab and Mathabhanga river in Bangladesh. The Mohananda River is one of its main tributary in the lower reach. The river drains the southern

Himalayas and the Gangetic plain in India. Annual average precipitation in the southern slopes of the Himalayas is generally in excess of 1,200 mm and often exceeds 2,000 mm in the west and 3,000 mm in the east. A major part of this area lies in Nepal, all of which drains to the Ganges. Average annual rainfall in the plain region of the Ganges basin ranges from about 800 mm to 1,200 mm in India. The Ganges River has a predominantly meandering form which generally erodes outer bends and deposits at inner bends. The meander belt of the river varies between 5 and 15 kilometres. The river width at the Hardinge Bridge is about 1.6 km. The intake to Ganges Kobadak irrigation project is about 1.25 km downstream of the Hardinge Bridge and the Gorai off-take is about 15 km downstream at Talbaria .

The Ganges river bed is characterised by large sand deposits which are locally known as chars .The majority of these chars are point bar deposits attached to the inner bend of the meander belt. Major chars and branches are apparent in the Ganges reach downstream of the Gorai off-take. The annual suspended sediment transport in the Ganges River is around 550 million tons. The flow of Ganges was largely unregulated i.e., in natural condition prior to construction of Farakka barrage in 1975. Through this barrage part of the dry season flow of the Ganges is diverted into Hooghly river.

Bankfull Discharge and Summary Statistics -- FAP24 (1996) estimated Bankfull discharge by comparing the bank level over a certain reach with the water profile at different discharges. They also estimated this parameter using different bankfull discharge predictors. The results are summarized below.

Method	Predictor	Bankfull Discharge (m ³ /s)
FAP24, 1996		40,000 - 45,000
Chang, 1979	Graphical relation: Q_m and Q_h	20,000
Williams, 1978a	$Q_h = 4A^{1.21} i^{0.28}$	42,000
Wolman and Leopold, 1957	1 to 2 year return period	31,000- 53,000
Inglis, 1968	50% of Q_{max}	38,000

(Source: FAP24, 1996)

FAP24 (1996) concluded that the bankfull discharge may be taken as 43,000 m³/s with a range of 40,000 to 45,000 m³/s. The summary statistics including bankfull discharge of the Ganges at Hardinge Bridge are presented in Table 2.1.

Table 2.1 Summary Statistics and Bankfull Discharge of the Ganges River at Hardinge Bridge

	Ganges River at Hardinge Bridge Based on flow record from 1934 to 1993	
	1934-1974	1975-1993
Annual maximum discharge (m ³ /s)	72,200	75,800
Annual average maximum discharge (m ³ /s)	48990	54326
Annual minimum discharge (m ³ /s)	1190	261
Annual average minimum discharge (m ³ /s)	1761	684
Annual mean discharge (m ³ /s)	11,539	10,659
Highest observed water level (m, PWD)	14.87	
Lowest observed water level (m, PWD)	4.22	
Annual average range in water level (m, PWD)	8.4	
Water surface slope (cm/km)	4.0 -5.5	
Bed sediment size:		
D ₃₅ (mm)	0.12	
D ₉₀ (mm)	0.22	
Bankfull discharge (m ³ /s)	40,000 to 45,000	

2.2.2 Water Availability and Demands

The natural flow of the Ganges has been considerably modified by abstraction in India, in particular at the Farakka barrage. According to the Indian estimates, the mean annual flow for the period between 1948 and 1973 was some 398,000 mcm while the extreme minimum and maximum monthly flows ranged from 1220 m³/s in April 1955 to 65,000 m³/s in August 1971. The typical annual flow pattern shows a peak in August or September with

flows then reducing steadily through to the following April. The month of May sometimes only shows a slight increase on the April flows but by June they have increased significantly.

After the Farakka Barrage became operational in 1975, the overall flow in the river Ganges started to reduced. The variation of average, maximum and minimum discharge of Ganges for pre-Farakka (1934-74) and post-Farakka (1975-93) periods are presented in Figure B.1 and B.2 respectively.

In the National Water Plan (Harza, 1991), Phase II, covering period 1991-2020, water demand and availability has been analysed on the basis of short term, midterm and long term development scheme. Short and midterm development, covering 1990-2010 period, envisage utilisation of available regional surface water and full ground water development for irrigation by Low lift pump (LLP) and Flood control drainage irrigation (FCDI) scheme on minor and border rivers. Mid-term schemes consists of utilisation of main river water by Primary pumps (PP) and improved offtakes to supply LLPs. Table 2.2 shows a summary of irrigation development proposed under National Water Plan, phase II from all sources in South West (SW) and South Central (SC) region.

Table 2.2 Existing and Future Irrigated Area ('000 ha)

Regions	Total Irrigable Area(a)	Existing Irrigated Area(1989/9e)			Incremental Irrigated Area (1991-2010)			Total Area	
		LLP & Trad.	Major Schemes	Ground Water	Surface Water (c)			Surface Water	Ground Water
					LLP (b)	PP	FP/OF		
SW	1276 (d)	97	85	230	0	3	29	163	393
		(8)	(7)	(18)	(0)	(0)	(2)	(13)	(31)
SC	722	89	27	26	41	115	24	140	166
		(12)	(4)	(4)	(6)	(16)	(3)	(19)	(23)

Figure in parenthesis are the percentage of regional irrigable area.

(a) Based on Soil survey data processing system data and excluding active flood plain.

(b) Area Irrigated by LLP only.

(c) Does not include potential development of the main rivers with barrage.

(d) Excluding Sundarban.

(Source: National Water Plan, Vol. II, 1991).

The total irrigable land in SW and SC region is 1.998 million hectare (mha). Out of this total irrigable land, 0.510 mha could be irrigated by surface water and 0.559 mha could be irrigated by ground water within the year 2010.

The supply and demand for water from the Ganges by constructing a barrage on it during long term scheme, as estimated in Volume II of National Water Plan, is presented in Table 2.3. Assessment of availability of water is based on 80% dependable flow of Ganges at Hardinge Bridge.

Table 2.3 Ganges River at full development dry season supply and demand for water.

<u>Water demand</u>	<u>Area</u> (<u>'000 ha</u>)	<u>water supply</u> <u>February</u>	<u>and demand</u> <u>March</u>	<u>(m³/s)</u> <u>April</u>
Irrigation demand				
-SW and SC region	687	632	637	500
-NW region	64	44	51	51
-GK project	85	4	28	43
Salinity control at Khulna*		53	97	266
Total water demand		733	813	860
<u>Water supply</u>				
Steamflow available**		1080	800	870
Balance at full development		347	-13	10

*Required to maintain a mean monthly salinity at Khulna of 1000 micro-mhos

**80 percent dependable flow at Hardinge Bridge

(Source: National Water Plan, Volume II, 1991).

With the construction of Ganges barrage, 0.687 mha could be irrigated in SW and SC region. In addition, 0.149 mha could be irrigated in the NW and GK project area by this proposed Ganges barrage.

2.2.3 Salinity Intrusion

The Gorai river is an offtake of the Ganges. The South West Region receives fresh water through Gorai, Kumar - Sitalakha, Arial Khan and distributories of the Megna river. The western part of this region is the most effected area of salinity intrusion. The Gorai represents the only major dry season source of fresh water in the western part of the South West Region, and is therefore of great importance. Any type of interventions in the Ganges, Brahmaputra or Meghna river basins which decrease the fresh water flow into the estuary

increase the penetration of salinity inland and impair water quality. This has been a major effect, due to large scale withdrawal of water from the Ganges at Farakka. In the recent years, during the dry season the mouth of the offtake of the Gorai river is closed, completely, cutting off the fresh water flow.

FAP4 (1993) study noted that unless preventive measures are taken in the near future, Gorai could be completely abandoned, and become an inland river carrying only local runoff. The effect of fresh water flows in the Gorai on the salinity distribution in the region has been investigated by FAP4. They identified the Ganges as the most suitable source of surface water for augmenting the water supply to the south west region and part of south central region. Dry season flow augmentation needs as estimated in FAP4 study are presented in Table 2.4 below.

Table 2.4 Identification of needs for Augmentation of Dry Season Flows

Sector	Requirement	Desirable Flow Rate in Dry Season (m ³ /s) (Not cumulative)
Agriculture	Irrigation	1000
Domestic Water Supply	Khulna (2 m ³ /s)	150 - 200 (for salinity control) 2 m ³ /s for direct supply
Industry	Industrial users at Khulna	150 - 200 for salinity control
Forestry	Commercial Production of Sundri in Sundarbans	> 250
Transportation	Mongla Port	1000

(Source : FAP4, 1993)

The effect of dry season flow in the Gorai was investigated (SWMC, 1997) in a one-dimensional salinity model, assuming different dry season flow rates for the Gorai. The impact of the increased Gorai inflow clearly shows the reduction in maximum dry season salinity during March-April produced by the increased Gorai flow. According to SWMC study, with a Gorai discharge of 150 m³/s salinity level at Khulna is reduced from 10 ppt to 3 ppt. For 200 m³/s and 250 m³/s the impact is higher, reducing the salinity level to 1-2 ppt. The Pussur-Sibsa river system, which of all rivers in the region receives the largest flow contribution from the Gorai, shows the highest impact of increased Gorai flow. The reduction

in salinity concentration varies from 2-8 ppt near Mongla and along the Pussur-Sibsa system for 150 m³/s, 200 m³/s, 250 m³/s, to less than 2 ppt in the western and eastern regions of the Sundarbans. There is only minor impact in the Baleswar river and the South central region.

The National Water Plan (Harza, 1991) studied the freshwater requirement for maintaining salinity at an acceptable level in areas south of the Ganges and west of Lower Megna. The permissible upper limit of salinity was taken as 2,000 micro-mhos/cm. Analyses of salinity conditions in the south-west show that salinity is a problem in the Khulna area and is getting notably worse. In summary, areas dependent on the Ganges are suffering and need more water, areas influenced by the Padma and Lower Meghna have excess flows that could be diverted for other development purposes. Water demand for salinity control at Khulna are presented in Table 2.5. The demands are only for the critical months of February, March and April.

Table 2.5 Water demand for salinity control at Khulna

Month	Mean monthly discharge at Gorai Rly. Bridge <u>a/</u> (m ³ /s)	Existing salinity level at Khulna <u>b/</u> (micro-mhos)	Category of water use (micro-mhos)	Future salinity level to be maintained at Khulna (micro-mhos)	Regular flow in Gorai at Rly. Bridge	
					present condition <u>c/</u> (m ³ /s)	with regulator <u>d/</u> (m ³ /s)
February	127	880	Newsprint mill	400	384	192
			Cooling water	1,000	106	53
			Agriculture	2,000	41	21
March	88	1,750	Newsprint mill	400	700	350
			Cooling water	1,000	193	97
			Agriculture	2,000	71	35
April	88	3,600	Newsprint mill	400	1,920	960
			Cooling water	1,000	532	266
			Agriculture	2,000	200	100

a/ Existing condition (Post-Farakka, 1975-82)

b/ Mean monthly salinity equalled or exceeded on the average 15 days a month.

c/ Present condition means the present flow distribution between Nabaganga and Madhumati at Halifax cut

d/ With regulator on Madhumati below Halifax cut to control flow into Nabaganga.

(Source : National Water Plan, Volume II, 1991)

2.2.4 Summary of Water Demands

It can be seen from Table 2.3 that NWP phase II, predominantly an agricultural development plan covering a 20-year period from 1991 - 2010, provides estimates of water demands from the Ganges for agriculture and salinity control. On the other hand, FAP4 (Vol. 12, 1993) estimates cover all sectors (Table 2.4). Combining NWP estimated demands for agriculture and salinity control with FAP4 estimates for other uses, the total demand ranges from 1133 - 1183 m³/s, 1213 - 1263 m³/s, 1260 - 1310 m³/s for February, March, April, respectively. The total of FAP4 estimates for all uses is seen to be 1550 - 1650 m³/s for each month of dry season. The water demands for critical months of February, March, April in the dry period as estimated by NWP and FAP4 are summarised in Table 2.6.

Table 2.6 Estimated Water Demand for Ganges Based on Available Information.

Use	Estimated water demands (m ³ /s) in dry season					
	February		March		April	
	NWP	FAP4	NWP	FAP4	NWP	FAP4
Agriculture (irrigation)	680	1000	716	1000	594	1000
Salinity control	53	150 - 200	97	150 - 200	266	150 - 200
(industrial users) at Khulna						
Forestry (minimum requirement)		250		250		250
Domestic water supply		150 -200		150 -200		150 -200
Total water demand		1550 -1650		1550 -1650		1550 -1650

2.2.5 Navigation

Navigation depths in the Ganges are not guaranteed by the Bangladesh Inland Water Transport Authority (BIWTA) and considerable difficulties have been encountered at times of low flow since the commissioning of the Farakka Barrage. BIWTA has classified their waterways route on the basis of Least Available Depth (LAD) for different mechanized cargo vessels. The inland waterways system has four types of routes named as Class-I, Class-II, Class-III, and Class-IV. BIWTA maintained a regular inland waterway from Aricha to Gudagari at Rajshahi district before 1985. Due to reduced flow and siltation in the Ganges, a

year-round route could not be operated since 1985. Now this route falls under Class-IV type, which is basically a seasonal route. For Class-IV route, the LAD requirement is 1.5 m with a horizontal clearance at 30 m (BIWTMAS, 1989).

In Final Report of Feasibility Study of Floating Pump Station in GK project (BRTC, 1996), stated that the hydrographic survey maps of BIWTA were analysed and found that the deepest water level of Ganges at GK project area was about 9.15 m before 1975 and became about 3.05 m in the year of 1985. In this report also stated that it is not feasible to maintain a LAD of 1.5 m in the dry season with a total length of about 2400 km. Before 1993, withdrawal of water by GK pumping station did not hamper ferry services at 1.5 km upstream of the project area that are operated and maintained by RHD. The withdrawal of water by floating pump will have almost insignificant reduction of water depth at Hardinge Bridge. So there will be no impact on ferry services at Hardinge Bridge. Thus it can be concluded that there will be no impact on existing navigation pattern due to withdrawal of water by floating pump. They need about 1.5m to 1.8m draft for their ferry operation. Presently, depth of water at Hardinge Bridge is about 4.3 m in dry season. The bed level of the Ganges and the lowest annual water level & depth also recorded on the final report of Feasibility Study of Floating Pump of GK Project which are presented in Table 2.7 and 2.8 respectively.

Table 2.7 Bed level Changes of the Ganges,
Cross- section G-13 for 1991-1995.

Year	Bed Level (PWD) at Lowest Annual Water Levels*
1991	+ 1.0 m (11-04-91)
1992	NA
1993	+5.0 m (07-12-92)
1994	+1.0 m (03-01-94)
1995	-2.5 m (30-03-95)

(*Source: Bangladesh Water Development Board)

According to the Southwest Area Water Resources Management Project study (FAP4, 1993), the estimated water requirement of the Ganges to maintain navigability/transportation at Mongla port is about 1000 m³/s (Table 2.4). Similar suggestion has been made in the

Table 2.8 Lowest Annual Water Levels and Depths
(G-13) for 1990-1995.

Year	Date	Observed Water Level meter (PWD)	Depths (m)
1990	15 February	4.990	5.99
1991	01 April	5.060	4.06
1992	28 March	4.765	9.77
1993	06 March	4.220	NA
1994	20 April	4.900	3.90
1995	14 April	4.600	4.60

SWMC's final report on Gorai restoration project (1997). But no estimate of water requirement in the Ganges for navigation in the SW and SC region has been made in the National Water Plan (1991) Study.

To get an idea about water level requirement for meeting navigation depths corresponding to Class IV, III, II, I routes, available cross-section data for the Ganges at Hardinge Bridge (G-13) during the period 1992-97 were analysed (Table A.18). Required water level was computed by adding LAD with the highest bed level encountered across the navigation channel having necessary width as shown in Figure 2.1.

As seen in Table A.18(c), the water levels required to maintain recommended LAD and horizontal clearance varies from (-) 0.835 m to (+) 3.445m (PWD) when highest bed level is in the range from (-) 2.335 m to (+) 1.945 m. The lowest water level during the period 1990 to 1995 was recorded (Table 2.7) to be 4.22 m, whereas water level required to maintain required LAD and horizontal clearance for class IV route is 3.445 m. From this analysis, it appears that necessary depth is available to maintain class IV route.

However, actual bed levels are subject to local conditions, shoaling and deposition which are quite unpredictable. Although the above calculations/ results seem to satisfy the navigational depth requirements, discussion with BIWTA officials revealed that navigation routes could not be maintained. As such BIWTA declared the route from Aricha to Godagari via Hardinge Bridge as a class-IV route, i.e., seasonal route only.

RIVER: GANGES, CS: G13, DATED: 4/12/96

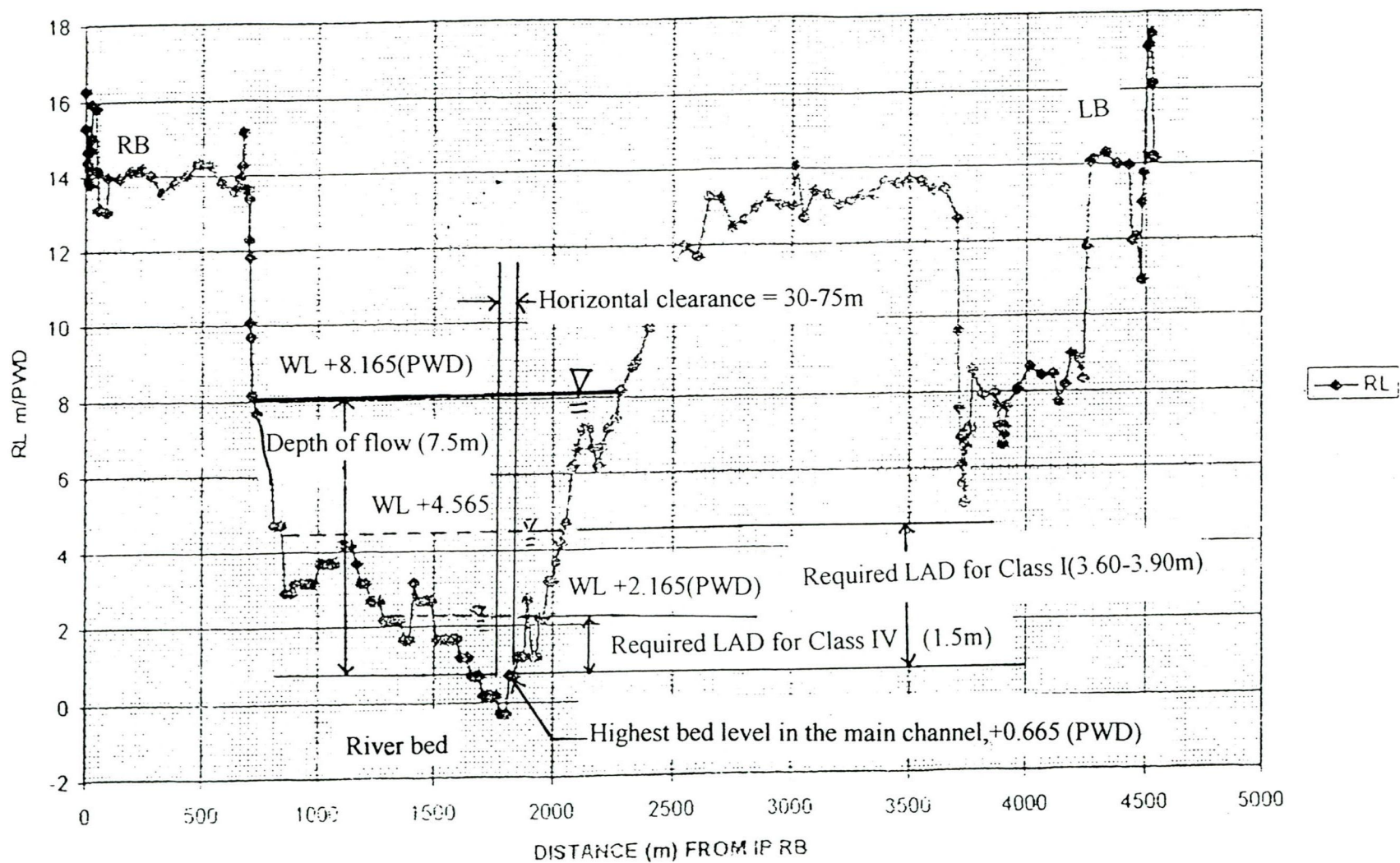


Fig.2.1: Computation of Navigation Depth based on Analysis of Cross-section G-13 of Ganges at Harding Bridge, 4 December 1996. 25

2.2.6 Fishery

Bangladesh has a long tradition of fish production and consumption. About 75% of the animal protein in the diet usually comes from fish. Average per capita fish consumption has declined from 12 kg in 1963 to 8 kg in 1991. Fish production has decreased because of over fishing and loss of fisheries brought about by population increases and degradation of water bodies caused by an overall reduction in country's surface water flow. Department of fisheries publishes fish catch statistics of Bangladesh each year. The fish catch statistics in the upper Padma for the period from 1985 to 1995 is given in Table A.1.

It is well-known that fish catch has reduced due to flood embankments and other control structures. According to Jhingran (1986), provision of fish passes in the water control structure is less recognised in the tropical countries and many fish ways built have failed to be effective. The fisheries of Hilsa, an anadromous fish of high economic value, has been adversely affected in many rivers on the account of the construction of regulators, weirs and barrages. Hilsa is known to migrate upriver in the Ganga to a distance of about 1,300 - 1,600 km from the sea and contribute about 300 ton (30-60% of the total catch of India) annually at Allahabad has almost completely disappeared from the river above Farraka barrage in the lower Ganga. Since fish passages are expensive to built and operate, it requires close co-ordination between engineers, fishery biologists and environmental scientists to design and construct effective pathways.

Chacko and Dixithulu (1951) noted that low water levels and siltation are believed to have kept the fish out of the river, thereby forcing them to move along the coast. Fallon and Potkin (1989) stated that in the past, the majority of hilsa fishing was done in the rivers, during inward migration, spawning and outward migration. In recent years, the stocks of hilsa in the rivers have been on the decline and the main locations of hilsa fishry have shifted to lower reaches of the major rivers and to estuarine waters. The changes has been attributed to sediment blocking and overfishing and premature capture of juvenile fish is also cited as a contributing factor.

Ghos (1987), remarked that Farraka barrage is a reality and it affects the migration of hilsa. Dr.V.C. Jhingran remarked that although the endemic strain of hilsa is breeding upstream in rivers blocked by dams, in the absence of the dominant migratory strains, the

fishery is declining. Hilsa enters the Bangladesh part of the river of Ganga system in large numbers and bumper catches obtained are clandestinely coming to West Bengal. He wondered whether Farakka barrage is preventing the migration of hilsa into Hooghly.

Shafi (1987), noted that until the commissioning the Farakka Barrage in 1974 in West Bengal (India), hilsa fishing in Bangladesh was restricted to the upper reaches of the main rivers. Presently, hilsa is primarily in estuarine and coastal marine water. The production of hilsa above the Farakka Barrage on the Ganges River has decreased from about 400 t to nil. In Bangladesh there has been steady decline of the hilsa catch from the rivers and their tributaries. The Farakka Barrage has destroyed the habitats of hilsa and major carps in the River Padma.

Water Development Board (WDB), which maintains a network of hydrographic observation and measurement stations throughout Bangladesh. Water levels are read from a fixed and mobile water level gauge series are computed from these readings. Discharge measurements are taken once or twice a week from the measured discharge and water level. A discharge gauge is developed and daily discharge time series is obtained utilizing the rating curve and measured daily water level time series. Separate data for the period from 1934 - 35 to 1971 - 72 for the Ganges at Hardinge Bridge were obtained from the West Bengal Hydrology Directorate, Calcutta.

Department of Fisheries compiles and maintains various fish statistics such as the fish production of fish which is different year from different water bodies - inland fisheries, (1) natural and artificial fishery, (2) fish catch, (3) fish production, (4) fish production on the river, (5) fish production in pond, (6) fish production in private and public fish farms and hatcheries, and (7) fish production in other fish ponds. A reliable fish catch statistics for the period 1934 - 35 to 1971 - 72 are collected from Fisheries Department.

Discharge measurement of Ganga for maintaining salinity concentration within acceptable limits are referred from the Ganga report on Ganga restoration project (GWRP, 1967). According to this study, with a discharge of 150 m³/s in Ganga, salinity level at Khajuria is reduced from 13 ppt to 3 ppt. For 250 m³/s and 250 m³/s salinity level reduces to 1.0 ppt. National Water Plan (NWP, 1961) notes that the required flow in Ganga River at the delivery point in February, March, April are 50 m³/s, 50 m³/s, 200 m³/s respectively for salinity

CHAPTER 3

DATA COLLECTION, ANALYSIS AND RESULTS

3.1 Study area and data collection

The Ganges River within the territorial limits of Bangladesh has been chosen for this study. Basic data required for this study consist of mean daily discharge and water level. Other information collected include fish catch, navigation draft, water for agriculture, domestic water supply and discharge requirement for keeping salinity below harmful level.

Main source of mean daily discharge and mean daily water level data is the Bangladesh Water Development Board (BWDB), which maintains a network of hydrometric observation and measurement stations throughout Bangladesh. Water levels are read five times a day and mean daily water level time series are computed from these readings. Discharge measurements are usually taken once in a week. From the measured discharge and water level, H-Q relationship i.e., rating curve is developed and daily discharge time series is obtained utilizing this rating curve and measured daily water level time series. Streamflow data for the period from 1934 - 35 to 1993 - 94 for the Ganges at Hardinge Bridge were collected from Surface Water Hydrology Directorate II, BWDB, Dhaka.

Department of Fisheries compiles and maintains various fish statistics such as (a) fish production/ fish catch in different year from different water bodies - inland fisheries, (b) industrial and artisanal fisheries - marine fisheries, (c) statistics of natural spawning on major river, (d) statistics of artificial spawning in private and government farms and hatcheries and (e) statistics of exported fish and fish products from Bangladesh. Available fish catch statistics for the upper Padma for the period from 1985 - 86 to 1994 - 95 are collected from Fisheries Department.

Discharge requirement of Gorai for maintaining salinity concentration within acceptable limits are collected from the final report on Gorai restoration project (SWMC, 1997). According to this study, with a discharge of $150 \text{ m}^3/\text{s}$ in Gorai, salinity level at Khulna is reduced from 10 ppt. to 3 ppt. For $200 \text{ m}^3/\text{s}$ and $250 \text{ m}^3/\text{s}$ salinity level reduces to 1-2 ppt. National Water Plan (Harza, 1991) noted that the required flow in Gorai River at the railway bridge in February, March, April are $53 \text{ m}^3/\text{s}$, $97 \text{ m}^3/\text{s}$, $266 \text{ m}^3/\text{s}$, respectively for salinity

control at Kulna (if permissible salinity at Kulna for power plant cooling is adopted at 1,000 micro-mhos level). The desirable flow rate in Gorai was estimated to be 150-200 m³/s by FAP4 (Vol.12, 1993) for salinity control.

Navigation related information and standard were collected from the master plan of Bangladesh Inland Water Transport Authority (BIWTA). Required cross-section data were collected from BWDB. All other information about water demands in various sectors (e.g. Agriculture, Forestry, Transportation, Domestic and Industrial water supply) were extracted from different study reports which were mentioned in Section 2.2.

Daily mean discharge time series for the period from 1934 - 35 to 1993 - 94 of the Ganges river at Hardinge Bridge were used to compute statistical characteristics of steamflow in Table A.2 and A.3. Annual maximum, minimum and mean flows were calculated separately for the period 1934 - 35 to 1974 - 75 and 1975 - 76 to 1993 - 94.

Table A.2 shows maximum flow varied between 35,900 m³/s in 1939 to 73,200 m³/s in 1961 and the minimum flow from 1,190 m³/s in 1953 to 2,360 m³/s in 1960 for the period 1934 - 35 to 1974 - 75 (pre-Farakka) .

From Table A.3 it is seen that for the period 1975 - 76 to 1993 - 94 (post-Farakka), the maximum flow ranged between 31,500 m³/s in 1989 to 75,800 m³/s in 1987 and the minimum flow from 261 m³/s in 1993 to 889 m³/s in 1977 with the exception of 1979 when 1,210 m³/s was available.

3.2 Computation of Instream Flow Requirement

Instream flow requirements were computed on the basis of available historical flow records of Ganges at Hardinge Bridge. The results obtained by methods selected for this study are presented below:

Flow-Duration Curve Method -- A flow-duration curve of a stream is a plot of discharge, Q against the percent of time, P_p the flow is equalled or exceeded. It shows the percentage of time during which a specified flow is equalled or exceeded. It combines into one curve a number of flow characteristics.

Flow-duration curves for each month for the pre-Farakka period (1934-35 to 1974-75) were constructed from daily mean discharge of the Ganges. Flow-duration curve for the month of April to March are presented in Tables A.5 to A.16 and plotted in Figures B.4 to B.15. According to Loar and Sale (1981), the recommended flow for instream protection is set at 90th percentile for normal months and 50th percentile during high flow months. As such the 50th and 90th percentile flows of the Ganges at Hardinge Bridge were calculated from the computed flow- duration curves and given in Table 3.1.

Table 3.1 Discharge (50th and 90th Percentile) in m^3/s from Flow Duration Curve.

Percentile	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
50th	2050	2150	3600	17000	40000	36500	16000	6700	4000	2980	2570	2300
90th	1580	1700	2500	8000	25000	23600	8800	4500	3000	2400	2080	1850

Considering June to October as high flow months and other months as normal flow, the instream flow requirement of the Ganges for each month were found to be as follows and presented in Table 3.2.

Table 3.2 Instream Flow Requirement of Ganges in m^3/s Based on Flow Duration Curve

Month	Instream flow requirement		Remarks
	percentile	m^3/s	
June	50th	3600	High flow months
July		17000	
August		40000	
September		36500	
October		16000	
November	90th	4500	Other months
December		3000	
January		2400	
February		2080	
March		1850	
April		1580	
May		1700	

Constant Yield Method -- This method uses a combination of the median flow and constant yield statistics to represent watershed hydrology. This procedure deals with unregulated streams with a drainage area greater than 130 square kilometer and historic flow records of greater than 25 years. The median monthly flows serve as the datum for evaluation of instream flow needs. In this case, instream flow requirement is 100% of the median monthly flow. For streams not meeting this criteria, a constant yield factor, namely run-off per watershed area is then applied to specific sites to estimate actual conditions.

Median monthly flows for the Ganges at Hardinge Bridge for each month over the 40-year period extending from 1934 - 35 to 1974 - 75 were calculated in two ways and results are presented in Table 3.3. The values shown the first row were obtained as follows:

In the first method median flows were calculated, as shown in Table A.17, for each month of each year separately. Thus 40 median values were obtained for a given month and then the median of these values were taken as the median for the given month over the entire period of record. In the second method median value was obtained, as shown at the bottom of Table C.1, by ranking the daily flows for a given month for the entire period of record. For calculation of instream flows, median values given in first row of Table 3.3 are used.

Table 3.3 Computed Instream Flow Requirement of Ganges at Hardinge Bridge (m^3/s) Based on Constant Yield Method

April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1990	2010	3400	16100	40200	33975	14750	6195	3725	2850	2515	2220
2000	2050	3410	16100	38300	35400	15200	6370	3910	2890	2510	2260

Because the flow of the Ganges was unregulated before 1975 (the time of commissioning of Farakka Barrage) and the drainage area of the river exceeds 130 square kilometre and the length of flow record is more than 25 years, median monthly flows can serve as the datum for assessment of instream flow needs. Thus, the instream flow requirement for each month were taken as 100% of median monthly flows (Row1, Table 3.3) and listed below.

Month	Instream Flow Requirement (m ³ /s)
April	1190
May	2010
June	3400
July	16100
August	40200
September	33975
October	14750
November	6195
December	3725
January	2850
February	2515
March	2220

Mean Annual Flow Method -- According to this method, instream flow requirement ranges from 10 percent of mean annual flow (MAF) for severely degraded conditions, barely sufficient for short term survival, to 200 percent MAF for flushing flows.

From Table A.2, it is seen that the average mean annual flow for the period from 1934 - 35 to 1974 - 75 is 11,539 m³/s, and 10% and 200% of MAF are 1,154 m³/s and 23,078 m³/s, respectively. Accordingly computed instream flow for severely degraded conditions in dry period and flushing flow conditions in wet period is found to be 1,154 m³/s and 23,078 m³/s, respectively.

In the National Water plan (Harza, 1991), February, March and April are considered as the critical months in terms of available flows in the Ganges and the report of Floods of North Bengal (1995) noted that the Ganges generally reach flood peaks during August and September. Based on this the months of February to April can be considered to fall under

CHAPTER 4

DISCUSSION AND CONCLUSIONS

4.1 Discussion

Initially, perhaps because the legal need to recognise and consider environment formally and explicitly in planning and management of water resource projects arose earlier in the United States than others, the techniques for determining instream flow needs were almost exclusively developed in the USA. Many techniques, ranging from those designed for localised site or specific applications to those with more general utility, have been used by different researchers, with some of them being applied and discussed more widely than others. Some of the techniques which were developed in the USA and have been used at one or more geographical locations in and outside the USA .

The methods based on historic flows, such as flow duration, constant yield and mean annual flow methods are the easiest to use, require less data, and are the cheapest in monetary terms and were used for this study. The computed instream flow requirements based on analysis flow duration curve ranged from about 1,580 m³/s in dry season to 40,000 m³/s in the wet season. The corresponding values for the constant yield method ranged from 1,990 m³/s to 40,200 m³/s and those for the MAF method varied from 1,150 to 23,080 m³/s. A comparison of these values with the minimum discharges revealed that in the pre-Farakka period, the minimum discharge met the flow requirement for instream protection whereas that for the post-Farakka period falls much below the required flow. The bankfull discharge agrees with the higher value of the instream flow requirement during wet season.

The methods used herein retain the basic simplicity of using hydrological records only. The method based on flow duration curve is more accurate than other techniques because of a better representation of flow variability.

However, none of these methods analyze site specific habitat alteration or biological response and tend to oversimplify the situation. In this case, it is assumed that the recommended flows would be adequate throughout the channel by filling it sufficiently to the required depth and width. This assumption may or may not be true, particularly for the minimum flow. Moreover, MAF method, ignores variability. In general, the absence of exact

similarity of watershed conditions and channel geometry renders the use of historic flow methods inaccurate.

An ideal technique would be that which is able to quantify all the parameters and interactions specific to a particular river or stream. However, such a technique is not yet available. This lack of a "perfect" model should be borne in mind when deciding as to what methodology should be adopted. Before making any decisions as to the technique to be used, or for that matter the level of instream flows to be specified, potential limiting factors other than those considered in the techniques should be examined. It is quite possible that factors other than insufficient water may be responsible for habitat degradation. In the event of insufficiency of information resulting in either indecision or the inability to use a high resolution technique, a simple method that gives some answer might be preferable.

Ideally, the methodology to determine the instream flow requirements should be able to consider the individual and joint effects of the various parameters. However, consideration of those effects, even at the individual parameter level, is very complex issue; fully validated and accepted comprehensive methodologies will likely not become available for some time. Furthermore, even such a methodology has been developed, the problem of spatial variation is likely to require the site specific methods. In the absence of comprehensive methodologies, it is not, however, possible to ignore the need to make the best possible prediction of instream flow requirements and the best possible use of techniques and knowledge has to be made. Of course different recommendations can be developed with the same methods after detailed studies of a particular stream . However, the same resources used for such detailed studies would perhaps be better utilized in carrying out more thorough investigations.

This methods can, however, be a useful tool for short term purposes prior to detailed studies for existing reservoir operations. All the techniques used in this study have the common advantage of being relatively simple, requiring only hydrological data, and therefore being relatively inexpensive. Correspondingly, all suffer from lack of true representation of site specifics, ranging from hydraulic parameters to biological responses.

Furthermore, recommendations provided by these methods can be used only if similarity of watershed characteristics between the location where the recommendations were developed and the location to which they were subsequently applied is clearly demonstrated.

4.2 Conclusions

The study shows that the minimum instream requirement is about 1154 m³/sec whereas the minimum flow of the Ganges ranged between 261 - 889 m³/sec with the exception of one year when minimum flow was 1210 m³/s. Since the minimum flow is less than the recommended flow for instream protection, the Ganges has suffered substantial morphological and environmental degradation. On other hand, the minimum flow during pre-Farakka was 1,190 m³/s which is found to be very close to the calculated minimum instream requirement. Based on the results obtained the instream flow requirements in the dry months should be 1,150 - 2,000 m³/s, in order to restore and sustain the natural environment of the Ganges. The methods are easy to apply and can provide preliminary estimates of instream flow before undertaking any detailed, expensive and time-consuming analysis and study.

Combing the computed instream flow requirement estimates (1,150 - 2,000 m³/s) with the diversion requirement to meet agricultural needs (1,000 m³/s) and domestic water supply (150-200 m³/s) as estimated by FA4 (1993) and presented in Table 2.4, total water demand is found to be 2,300 - 3,200 m³/s.

4.3 Recommendations for Further Studies

In present study, the instream flow requirement is determined based on historical flows e.g., Flow-duration, Constant yield and MAF methods. In addition of these as mentioned, there are other methods such as Hydraulic Rating and Habitat Rating. The instream flow requirement can be determined by hydraulic and habitat rating methods and the recommended flow to be tested with these results obtained.

Although the methods are easy to apply, these methods do not analyze site specific habitat alteration and biological response and tend to oversimplify the situation. As such, these methods can provide only preliminary estimates of instream flow before undertaking any detailed, expensive and time-consuming analysis and study.

It would worthwhile to undertake studies to apply methods involving correlation of various parameters to habitat conditions. These may include Hydraulic Rating method, Habitat Rating method, Holistic Approach and Expert Panel method (Karim et al.,1995).

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APPENDIXES

APPENDIX "A" TABLES

Table A.1 Annual Total Catch by Species in Upper Padma River
for the period from 1985-86 to 1994-95.

(Unit: Metric Ton)

Year	Major Carp	Other Carp	Cat Fish	Snake Head	Hilsa	Big Shrimp	Small Shrimp	Misc.	Total
1985-86	67	43	94	0	521	7	57	1351	2140
1986-87	66	31	356	0	330	67	145	785	1780
1987-88	20	15	67	0	336	7	138	363	946
1988-89	6	2	17	0	195	15	178	300	713
1989-90	15	9	14	0	288	2	27	161	516
1990-91	21	3	32	1	233	8	125	414	837
1991-92	23	2	29	0	280	7	51	501	893
1992-93	8	2	42	0	263	1	47	888	1251
1993-94	15	1	183	0	553	16	103	1792	2663
1994-95	182	6	343	0	1238	10	464	1992	4235

Table A.2 Yearly maximum, minimum and mean discharge (m³/s) of the Ganges river at Hardinge Bridge for the period of 1934-35 to 1974-75.

Year	Maximum	Mean	Minimum
1934-35	46600	11703	1950
1935-36	44000	9509	1450
1936-37	45300	12005	1360
1937-38	39400	9991	1670
1938-39	47800	12029	1890
1939-40	35900	8590	1470
1940-41	39100	8246	1720
1941-42	38300	7841	1490
1942-43	44700	10978	1670
1943-44	43300	10438	1740
1944-45	43300	9421	1890
1945-46	42200	10826	1860
1946-47	49100	13169	1870
1947-48	51200	11083	1550
1948-49	61100	14851	1830
1949-50	52600	12180	2100
1950-50	52600	11585	1950
1951-51	42200	8594	1830
1952-53	52600	11371	1390
1953-54	50900	11388	1190
1954-55	58600	12735	1390
1955-56	60300	16646	1870
1956-57	60100	16957	2190
1957-58	46200	10669	2300
1958-59	56300	13364	2140
1959-60	52700	12577	2360
1960-61	48000	12281	1870
1961-62	73200	16745	1830
1962-63	58700	13803	2260
1963-64	56100	13854	2210
1964-65	49000	12688	2180
1965-66	36800	7727	1750
1966-67	41900	8200	1420
1967-68	50800	10341	1360
1968-69	45200	10192	1660
1969-70	55200	11904	1690
1970-71	48700	11250	2030
1972-72	38200	8541	2240
1973-74	50700	13586	1930
1974-75	50700	11711	1770
1934-35 to 1974-75	73200	11539	1190
Range	35900-73200	7727-16957	1190-2360

Table A.3 Yearly maximum, minimum, and mean discharge (m^3/s) of the Ganges river at Hardinge Bridge for the period of 1975-76 to 1993-94.

Year	maximum	Mean	Minimum
1975-76	51100	12943	657
1976-77	65400	10418	696
1977-78	51100	11311	889
1978-79	67900	14135	1210
1979-80	36900	6618	874
1980-81	57800	12542	877
1981-82	47900	10285	877
1982-83	61600	9988	695
1983-84	60000	10670	700
1984-85	56500	11262	742
1985-86	50300	12969	687
1986-87	53500	11160	859
1987-88	75800	12248	901
1988-89	71800	11547	436
1989-90	31500	8648	449
1990-91	51000	12006	527
1991-92	55600	8814	383
1992-93	41800	6321	261
1993-94	44700	8638	267
1975-76 to 1993-94	75800	10659	261
Range	31500-75800	6321-14135	261-889*

* with the exception of 1978-79 when 1210 m^3/s was available

Table A.4 Mean annual flow (MAF) in m³/ses of Ganges based on daily mean discharge of Ganges River at Hardinge Bridge for the period from 1934-35 to 1974-75 (pre-Farakka).

Year	Mean annual flow (MAF) in m ³ /ses
1934-35	11703
1935-36	9509
1936-37	12005
1937-38	9991
1938-39	12029
1939-40	8590
1940-41	8246
1941-42	7841
1942-43	10978
1943-44	10438
1944-45	9421
1945-46	10826
1946-47	13169
1947-48	11083
1948-49	14851
1949-50	12180
1950-51	11585
1951-52	8594
1952-53	11371
1953-54	11388
1954-55	12735
1955-56	16646
1956-57	16957
1957-58	10669
1958-59	13364
1959-60	12577
1960-61	12281
1961-62	16745
1962-63	13803
1963-64	13854
1964-65	12688
1965-66	7727
1966-67	8200
1967-68	10341
1968-69	10192
1969-70	11904
1970-71	11250
1972-73	8541
1973-74	13586
1974-75	11711
1934-35 to 1974-75	11539

Table A.5 Flow duration curve for the month of April based on mean daily discharge (m^3/s) of the Ganges River at Hardinge Bridge (1934 - 1974).

Daily mean discharge , Q in m^3/s			No of days having flow in class interval	No. of days (m) having flow equal or greater	Pp = [[m/(N+1))*100] % of time
Upper boundary	Lower boundary	Mid point			
3350	3250	3300	2	2	0.17
3250	3150	3200	4	6	0.5
3150	3050	3100	15	21	1.75
3050	2950	3000	5	26	2.16
2950	2850	2900	11	37	3.08
2850	2750	2800	14	51	4.25
2750	2650	2700	19	70	5.83
2650	2550	2600	32	102	8.49
2550	2450	2500	18	120	9.99
2450	2350	2400	93	213	17.74
2350	2250	2300	118	331	27.56
2250	2150	2200	140	471	39.22
2150	2050	2100	88	559	46.54
2050	1950	2000	87	646	53.79
1950	1850	1900	158	804	66.94
1850	1750	1800	131	935	77.85
1750	1650	1700	97	1032	85.93
1650	1550	1600	44	1076	89.59
1550	1450	1500	49	1125	93.67
1450	1350	1400	50	1175	97.84
1350	1250	1300	9	1184	98.58
1250	1150	1200	16	1200	99.92

N = 1200

Table A.6 Flow duration curve for the month of May based on mean daily discharge (m³/s) of the Ganges River at Hardinge Bridge (1934 - 1974)

Daily mean discharge , Q in m ³ /s			No of days having flow in class interval	No. of days (m) having flow equal or greater	Pp=[{m/(N+1)}*100] % of time
Upper boundary	Lower boundary	Mid point			
4350	4200	4275	4	4	0.32
4200	4050	4125	2	6	0.48
4050	3900	3975	3	9	0.73
3900	3750	3825	6	15	1.21
3750	3600	3675	2	17	1.37
3600	3450	3525	4	21	1.69
3450	3300	3375	10	31	2.5
3300	3150	3225	6	37	2.98
3150	3000	3075	20	57	4.59
3000	2850	2925	66	123	9.91
2850	2700	2775	39	162	13.05
2700	2550	2625	51	213	17.16
2550	2400	2475	106	319	25.71
2400	2250	2325	97	416	33.52
2250	2100	2175	151	567	45.69
2100	1950	2025	177	744	59.95
1950	1800	1875	193	937	75.5
1800	1650	1725	139	1076	86.7
1650	1500	1575	108	1184	95.41
1500	1350	1425	40	1224	98.63
1350	1200	1275	15	1239	99.84
1200	1050	1125	1	1240	99.92

N = 1200

Table A.7 Flow duration curve for the month of June based on mean daily discharge (m^3/s) of Ganges River at Hardinge Bridge (1934 - 1974)

Daily mean discharge , Q in m^3/s			No. of days having	No. days (m) having	$P_p = \left\{ \frac{m}{(N+1)} \right\} \times 100$
Upper boundary	Lower boundary	Mid point	flow in class interval	flow equal or greater	% of time
20400	19600	20000	3	3	0.25
19600	18800	19200	1	4	0.33
18800	18000	18400	2	6	0.5
18000	17200	17600	1	7	0.58
17200	16400	16800	1	8	0.67
16400	15600	16000	2	10	0.83
15600	14800	15200	5	15	1.25
14800	14000	14400	5	20	1.67
14000	13200	13600	1	21	1.75
13200	12400	12800	7	28	2.33
12400	11600	12000	7	35	2.91
11600	10800	11200	9	44	3.66
10800	10000	10400	11	55	4.58
10000	9200	9600	13	68	5.66
9200	8400	8800	22	90	7.49
8400	7600	8000	33	123	10.24
7600	6800	7200	29	152	12.66
6800	6000	6400	73	225	18.73
6000	5200	5600	65	290	24.15
5200	4800	5000	47	337	28.06
4800	4400	4600	54	391	32.56
4400	4000	4200	69	460	38.3
4000	3600	3800	79	539	44.88
3600	3200	3400	160	699	58.2
3200	2800	3000	164	863	71.86
2800	2400	2600	161	1024	85.26
2400	2000	2200	142	1166	97.09
2000	1600	1800	34	1200	99.92

N = 1200

P_p = Percentage time indicated discharge is equalled or exceeded

Table A.8 Flow duration curve for the month of July based on mean daily discharge (m³/s) of the Ganges River at Hardinge Bridge (1934 - 1974).

Daily mean discharge, Q in m ³ /s		Mid point	No of days having	No. of days (m)	Pp=[{m/(N+1)}*100]
Upper boundary	Lower boundary		flow in class interval	flow equal or greater	
50800	48800	49800	5	5	0.4
48800	46800	47800	2	7	0.56
46800	44800	45800	1	8	0.65
44800	42800	43800	1	9	0.73
42800	40800	41800	4	13	1.05
40800	38800	39800	11	24	1.93
38800	36800	37800	15	39	3.14
36800	34800	35800	18	57	4.59
34800	32800	33800	33	90	7.25
32800	30800	31800	38	128	10.31
30800	28800	29800	46	174	14.02
28800	26800	27800	56	230	18.53
26800	24800	25800	54	284	22.89
24800	22800	23800	62	346	27.88
22800	20800	21800	65	411	33.12
20800	18800	19800	70	481	38.76
18800	16800	17800	106	587	47.3
16800	14800	15800	87	674	54.31
14800	12800	13800	112	786	63.34
12800	10800	11800	132	918	73.97
10800	8800	9800	109	1027	82.76
8800	7800	8300	66	1093	88.07
7800	6800	7300	51	1144	92.18
6800	6300	6550	22	1166	93.96
6300	5800	6050	25	1191	95.97
5800	5300	5550	18	1209	97.42
5300	4800	5050	10	1219	98.23
4800	4300	4550	17	1236	99.6
4300	3800	4050	2	1238	99.76
3800	3300	3550	2	1240	99.92

N = 1240

Table A.9 Flow duration curve for the month of August based on mean daily discharge (m³/s) of the Ganges River at Hardinge Bridge (1934-74)

Daily mean discharge, Q in m ³ /s		Mid point	No. of days having flow in class interval	No. of days (m) having flow equal or greater	P _p ={m/(N+1)}*100 % of time
Upper boundary	Lower boundary				
72000	68000	70000	2	2	0.16
68000	64000	66000	1	3	0.24
64000	60000	62000	7	10	0.81
60000	57000	58500	21	31	2.5
57000	54000	55500	33	64	5.16
54000	51000	52500	47	111	8.94
51000	48000	49500	76	187	15.07
48000	45000	46500	115	302	24.34
45000	42000	43500	163	465	37.47
42000	39000	40500	126	591	47.62
39000	36000	37500	148	739	59.55
36000	33000	34500	149	888	71.55
33000	30000	31500	91	979	78.89
30000	27000	28500	76	1055	85.01
27000	26000	26500	22	1077	86.78
26000	25000	25500	24	1101	88.72
25000	24000	24500	26	1127	90.81
24000	23000	23500	27	1154	92.99
23000	22000	22500	18	1172	94.44
22000	21000	21500	16	1188	95.73
21000	20000	20500	11	1199	96.62
20000	19000	19500	11	1210	97.5
19000	18000	18500	9	1219	98.22
18000	17000	17500	3	1222	98.47
17000	16000	16500	9	1231	99.19
16000	15000	15500	6	1237	99.67
15000	14000	14500	2	1239	99.84
14000	13000	13500	1	1240	99.92

N = 1240

Table A.10 Flow duration curve for the month of September based on mean daily discharge (m³/s) of the Ganges River at Hardinge Bridge (1934 - 1974)

Mean daily discharge (m ³ /s)		Mid point	No. of days having flow in class interval	No. days (m) having flow equal or greater	Pp= {m/(N+1)}*100 % of time
Upper boundary	Lower boundary				
74000	70000	72000	6	6	0.48
70000	66000	68000	1	7	0.56
66000	62000	64000	9	16	1.29
62000	58000	60000	18	34	2.74
58000	54000	56000	39	73	5.88
54000	52000	53000	10	83	6.69
52000	50000	51000	22	105	8.46
50000	48000	49000	40	145	11.68
48000	46000	47000	54	199	16.04
46000	44000	45000	61	260	20.95
44000	42000	43000	69	329	26.51
42000	40000	41000	74	403	32.47
40000	38000	39000	91	494	39.81
38000	36000	37000	88	582	46.9
36000	34000	35000	104	686	55.28
34000	32000	33000	113	799	64.38
32000	30000	31000	82	881	70.99
30000	28000	29000	86	967	77.92
28000	26000	27000	75	1042	83.96
26000	24000	25000	50	1092	87.99
24000	22000	23000	41	1133	91.3
22000	20000	21000	43	1176	94.76
20000	19000	19500	12	1188	95.73
19000	18000	18500	10	1198	96.54
18000	17000	17500	8	1206	97.18
17000	16000	16500	6	1212	97.66
16000	15000	15500	5	1217	98.07
15000	14000	14500	14	1231	99.19
14000	13000	13500	7	1238	99.76
13000	12000	12500	2	1240	99.92

N = 1240

Table A.11 Flow duration curve for the month of October based on mean daily discharge (m³/s) of the Ganges River at Hardinge Bridge (1934 - 1974).

Daily mean discharge , Q in m ³ /s			No. of days having flow in class interval	No. of days (m) having flow equal or greater	Pp=[{m/(N+1)}*100] % of time
Upper boundary	Lower boundary	Mid point			
58000	56000	57000	4	4	0.32
56000	54000	55000	1	5	0.4
54000	52000	53000	1	6	0.48
52000	50000	51000	2	8	0.65
50000	48000	49000	0	8	0.65
48000	46000	47000	13	21	1.69
46000	44000	45000	2	23	1.85
44000	42000	43000	3	26	2.1
42000	40000	41000	8	34	2.74
40000	38000	39000	11	45	3.63
38000	36000	37000	12	57	4.59
36000	34000	35000	15	72	5.8
34000	32000	33000	25	97	7.82
32000	30000	31000	52	149	12.01
30000	28000	29000	32	181	14.59
28000	26000	27000	52	233	18.78
26000	24000	25000	60	293	23.61
24000	22000	23000	62	355	28.61
22000	20000	21000	58	413	33.28
20000	18000	19000	20	433	34.89
18000	16000	17000	141	574	46.25
16000	14000	15000	119	693	55.84
14000	12000	13000	131	824	66.4
12000	10000	11000	132	956	77.03
10000	8000	9000	160	1116	89.93
8000	6000	7000	105	1221	98.39
6000	4000	5000	19	1240	99.92

N = 1240

Table A.12 Flow duration curve for the month of November based on mean daily discharge (m³/s) of the Ganges River at Hardinge Bridge (1934 - 1974).

Daily mean discharge , Q in m ³ /s			No of days having flow in class interval	No. of days (m) having flow equal or greater	Pp={m/(N+1)}*100]
Upper boundary	Lower boundary	Mid point			
26500	25500	26000	1	1	0.08
25500	24500	25000	1	2	0.16
24500	23500	24000	1	3	0.25
23500	22500	23000	2	5	0.42
22500	21500	22000	2	7	0.58
21500	20500	21000	2	9	0.75
20500	19500	20000	1	10	0.83
19500	18500	19000	2	12	1
18500	17500	18000	2	14	1.17
17500	16500	17000	4	18	1.5
16500	15500	16000	5	23	1.92
15500	14500	15000	6	29	2.42
14500	13500	14000	8	37	3.08
13500	12500	13000	26	63	5.25
12500	11500	12000	29	92	7.66
11500	10500	11000	36	128	10.66
10500	9500	10000	41	169	14.07
9500	8500	9000	75	244	20.32
8500	7500	8000	137	381	31.72
7500	6900	7200	127	508	42.3
6900	6300	6600	100	608	50.62
6300	5700	6000	153	761	63.36
5700	5100	5400	143	904	75.27
5100	4700	4900	91	995	82.85
4700	4300	4500	111	1106	92.09
4300	3900	4100	56	1162	96.75
3900	3500	3700	38	1200	99.92

N = 1200

Table A.13 Flow duration curve for the month of December based on mean daily discharge (m³/s) of the Ganges River at Hardinge Bridge (1934 - 1974).

Daily mean discharge , Q in m ³ /s			No. of days having flow in class interval	No. of days (m) having flow equal or greater	Pp=[{m/(N+1)}*100] % of time
Upper boundary	Lower boundary	Mid point			
11200	10800	11000	1	1	0.08
10800	10400	10600	1	2	0.16
10400	10000	10200	1	3	0.24
10000	9600	9800	1	4	0.32
9600	9200	9400	1	5	0.4
9200	8800	9000	1	6	0.48
8800	8400	8600	1	7	0.56
8400	8000	8200	4	11	0.89
8000	7600	7800	5	16	1.29
7600	7200	7400	7	23	1.85
7200	6800	7000	9	32	2.58
6800	6400	6600	23	55	4.43
6400	6000	6200	48	103	8.3
6000	5600	5800	54	157	12.65
5600	5200	5400	67	224	18.05
5200	4800	5000	102	326	26.27
4800	4600	4600	56	382	30.78
4600	4400	4500	57	439	35.37
4400	4200	4300	56	495	39.89
4200	4000	4100	83	578	46.58
4000	3800	3900	82	660	53.18
3800	3600	3700	90	750	60.44
3600	3400	3500	110	860	69.3
3400	3200	3300	121	981	79.05
3200	3000	3100	109	1090	87.83
3000	2800	2900	91	1181	95.17
2800	2600	2700	47	1228	98.95
2600	2400	2500	12	1240	99.92

N = 1240

Table A.14 Flow duration curve for the month of January based on mean daily discharge (m³/s) of the Ganges River at Hardinge Bridge (1934 - 1974).

Daily mean discharge , Q in m ³ /s			No. of days having flow in class interval	No. days (m) having flow equal or greater	Pp={m/(N+1)}*100 % of time
Upper boundary	Lower boundary	Mid point			
6000	5800	5900	3	3	0.24
5800	5600	5700	3	6	0.48
5600	5400	5500	4	10	0.81
5400	5200	5300	3	13	1.05
5200	5000	5100	8	21	1.69
5000	4800	4900	11	32	2.58
4800	4600	4700	20	52	4.19
4600	4400	4500	19	71	5.72
4400	4200	4300	35	106	8.54
4200	4000	4100	52	158	12.73
4000	3800	3900	54	212	17.08
3800	3600	3700	48	260	20.95
3600	3400	3500	84	344	27.72
3400	3200	3300	86	430	34.65
3200	3000	3100	105	535	43.11
3000	2800	2900	140	675	54.39
2800	2600	2700	219	894	72.04
2600	2400	2500	165	1059	85.33
2400	2200	2300	118	1177	94.84
2200	2000	2100	44	1221	98.39
2000	1800	1900	19	1240	99.92

N = 1240

Table A.15 Flow duration curve for the month of February based on mean daily discharge (m³/s) of the Ganges River at Hardinge Bridge (1934 - 19874).

Daily mean discharge , Q in m ³ /s			No. of days having flow in class interval	No. of days (m) having flow equal or greater	Pp=[{m/(N+1)}*100] % of time
Upper boundary	Lower boundary	Mid point			
5050	4850	4950	16	16	1.41
4850	4650	4750	8	24	2.11
4650	4450	4550	13	37	3.26
4450	4350	4400	6	43	3.79
4350	4250	4300	4	47	4.14
4250	4150	4200	8	55	4.85
4150	4050	4100	4	59	5.2
4050	3950	4000	4	63	5.5
3950	3850	3900	2	65	5.73
3850	3750	3800	2	67	5.9
3750	3650	3700	17	84	7.4
3650	3550	3600	16	100	8.81
3550	3450	3500	16	116	10.22
3450	3350	3400	7	123	10.84
3350	3250	3300	38	161	14.19
3250	3150	3200	30	191	16.83
3150	3050	3100	35	226	19.91
3050	2950	3000	39	265	23.35
2950	2850	2900	47	312	27.49
2850	2750	2800	47	359	31.63
2750	2650	2700	84	443	39.03
2650	2550	2600	75	518	45.64
2550	2450	2500	126	644	56.74
2450	2350	2400	95	739	65.11
2350	2250	2300	101	840	74.01
2250	2150	2200	100	940	82.82
2150	2050	2100	79	1019	89.78
2050	1950	2000	60	1079	95.07
1950	1850	1900	27	1106	97.44
1850	1750	1800	28	1134	99.91

N = 1134

Table A.16 Flow duration curve for the month of March based on mean daily discharge (m³/s) of the Ganges River at Hardinge Bridge (1934 - 1974)

Daily mean discharge, Q in m ³ /s			No. of days having flow in class interval	No. of days (m) having flow equal or greater	Pp=[{m/(N+1)}*100] % of time
Upper boundary	Lower boundary	Mid point			
4150	4050	4100	3	3	0.24
4050	3950	4000	2	5	0.41
3950	3850	3900	6	11	0.89
3850	3750	3800	8	19	1.54
3750	3650	3700	11	30	2.44
3650	3550	3600	6	36	2.93
3550	3450	3500	13	49	3.98
3450	3350	3400	11	60	4.88
3350	3250	3300	10	70	5.69
3250	3150	3200	21	91	7.4
3150	3050	3100	13	104	8.46
3050	2950	3000	11	115	9.35
2950	2850	2900	17	132	10.73
2850	2750	2800	11	143	11.63
2750	2650	2700	24	167	13.58
2650	2550	2600	55	222	18.05
2550	2450	2500	116	338	27.48
2450	2350	2400	139	477	38.78
2350	2250	2300	139	616	50.08
2250	2150	2200	112	728	59.19
2150	2050	2100	101	829	67.4
2050	1950	2000	113	942	76.59
1950	1850	1900	135	1077	87.56
1850	1750	1800	70	1147	93.25
1750	1650	1700	19	1166	94.8
1650	1550	1600	22	1188	96.59
1550	1450	1500	28	1216	98.86
1450	1350	1400	13	1229	99.92

N = 1229

Table A.17 Median Monthly Flow (m³/s) of the Ganges River at Hardinge Bridge
for the period from 1934 to 1975.

Year	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mach
34-35	2140	1980	2700	23300	35400	40500	14200	6000	3510	2800	2445	2200
35-36	1850	1640	3095	13000	40500	26400	11600	4370	3340	2370	2050	1590
36-37	1445	1800	5420	26100	38300	37800	15900	6415	3630	2890	2330	2460
37-38	1760	1830	3400	13600	34900	28600	19000	5940	3400	2610	2510	2380
38-39	2230	2000	6565	26000	45300	35900	9000	4710	3230	2580	2110	2220
39-40	1770	1670	2680	9010	28700	26350	11900	5115	3030	2280	2155	2110
40-41	1880	1790	2535	12200	30300	22750	7060	4310	3190	2740	2280	1950
41-42	1565	2000	3605	10500	23100	27000	10600	4590	2940	2330	2230	2310
42-43	1800	1920	2345	16200	39900	38350	13000	5310	3400	2630	2520	2050
43-44	1790	2020	4115	14700	35300	33800	12800	6395	3400	2630	2340	2370
44-45	2460	2440	3370	11000	28900	26600	13500	6155	3360	2760	2600	1970
45-46	1940	1970	2540	16100	25800	35400	18500	8885	4810	3170	2480	2220
46-47	1990	2420	4285	30400	46100	38300	15500	7355	4470	3170	2520	1910
47-48	1720	1650	3090	16100	36500	41850	17300	6555	4040	2810	2460	2070
48-49	1910	2040	3095	15100	45600	56550	22100	7145	6200	3680	3400	2640
49-50	2260	2890	4840	14200	43900	34650	14800	10650	5090	3740	3280	2750
50-51	2200	2070	5520	18300	47300	33150	9400	5150	3400	2700	2620	2070
51-52	1990	1910	3195	18000	24300	27650	9280	4555	3280	2380	2080	1870
52-53	1830	2100	3430	22900	43300	33950	12400	4700	2820	2000	1900	1610
53-54	1235	1330	2350	19200	42700	33950	14800	5370	3060	2330	1815	1930
54-55	1470	1440	3285	12400	43900	37600	20700	7940	4270	3290	2960	2650
55-56	2165	2070	3405	25500	55800	47000	31400	10900	6250	4190	3540	2740
56-57	2400	2800	6395	22400	47800	46750	28600	14200	5830	4980	4900	3590
57-58	2630	2510	3230	12700	35700	32150	11000	6620	4750	3590	3110	2400
58-59	2350	2400	2600	9900	50700	34000	24300	8685	5410	4180	4470	3620
59-60	2970	2890	4920	15800	44200	31200	25500	8210	5410	3900	2890	2450
60-61	2210	2000	3200	19800	43400	41550	26800	5895	3280	2490	2150	2150
61-62	1925	1940	3510	19800	49600	62350	43600	11350	6030	4240	3650	3310
62-63	2630	3000	6880	19700	45300	44200	19900	7160	4360	3680	3060	2510
63-64	2390	2730	5390	19200	39700	49050	19200	9025	4840	3620	2860	2410
64-65	2210	2490	2985	23800	41900	41850	18600	6850	4200	3170	2640	2395
65-66	2210	2170	2885	10200	24900	24700	8070	5375	3570	2910	2260	1950
66-67	1615	1730	3525	13400	34200	23650	7440	3940	3110	2270	1945	1530
67-68	1515	1620	2215	18600	32900	43400	10500	5235	3710	3060	2810	2200
68-69	1750	1750	2720	18500	37000	17700	19200	5745	3710	2730	2210	1840
69-70	1740	1810	4995	14600	45000	33250	14700	7285	4410	3030	2655	2500
70-71	2240	2240	3595	18100	32300	33550	14500	6055	3740	2580	2325	2200
72-73	2340	2450	3400	9880	22000	28050	11900	6130	4240	3140	2860	2380
73-74	1990	2800	4055	15200	41500	43450	30200	9110	5150	3820	2875	2430
74-75	2390	2350	3660	13400	45100	32350	13600	6235	4048	2710	2300	1950
Median (1934-75)	1990	2010	3400	16100	40200	33975	14750	6195	3725	2850	2515	2220

Table A.18 Computation of Water Level to Meet the Navigation Requirement Based on the Analysis of Cross-sec. G-13, of Ganges at Harding Bridge, 1992-97.

(a) Water Level Requirement to Maintain Class I & Class II Route

Date of Measurement (Sounding)	Class I (LAD = 3.60-3.90), Class II (LAD = 2.10-2.40), Horizontal Clearance = 75 m				
	Highest Bed Level (PWD) in the Deepest/ Main Channel	Measured Water Level (PWD)	Depth of Flow (m)	Required Water Level, m (PWD) for Navigation of Class I Route (HBL + LAD)	Required Water Level, m (PWD) for Navigation of Class II Route (HBL + LAD)
06-12-92	-2.150	+7.100	9.25	+1.450 to +1.750	- 0.050 to +0.250
03-01-94	+1.945			+5.545 to +5.845	+4.045 to +4.345
27-03-95	-2.335			+1.265 to +1.565	- 0.235 to +0.065
30-11-95	-1.850	+8.150	10.00	+1.750 to +2.050	+0.250 to +0.550
04-12-96	+0.665	+8.165	7.50	+4.265 to +4.565	+2.765 to +3.065
08-12-97	+0.665			+4.265 to +4.565	+2.765 to +3.065
Range	-2.335 to +1.945			+1.265 to +5.845	-0.235 to +4.345

(b) Water Level Requirement to Maintain Class III & Class IV Route

Date of Measurement (Sounding)	Class III (LAD = 1.5-1.8m), Class IV (LAD = 1.50m), Horizontal Clearance = 30 m				
	Highest Bed Level (PWD) in the Deepest/ Main Channel	Measured Water Level (PWD)	Depth of Flow (m)	Required Water Level (PWD) for Navigation for Class III Route (HBL + LAD)	Required Water Level (PWD) for Navigation for Class IV Route (HBL + LAD)
06-12-92	- 2.150	+7.100	9.25	- 0.650 to - 0.350	- 0.650
03-01-94	+1.945			+ 3.445 to + 3.745	+3.445
27-03-95	-2.335			- 0.835 to - 0.535	- 0.835
30-11-95	-1.850	+8.150	10.00	- 0.350 to - 0.050	- 0.350
04-12-96	+0.665	+8.165	7.50	+ 2.165 to + 2.465	+ 2.165
08-12-97	+0.665			+ 2.165 to + 2.465	+ 2.165
Range	-2.335 to +1.945			-0.835 to +3.745	-0.835 to +3.445

(c) Required water level for various LAD & clear span to meet the navigation standard

Route	Least Available Depth (LAD) (m)	Horizontal Clearance (m)	River Bed Level (m)	Required water level (m)
Class I	3.60-3.90	75	-2.335 to +1.945	+1.265 to +5.845
Class II	2.10-2.40	75	-2.335 to +1.945	-0.235 to +4.345
Class III	1.5-1.8	30	-2.335 to +1.945	-0.835 to +3.745
Class IV	1.5	30	-2.335 to +1.945	-0.835 to +3.445*

* The water levels to maintain LAD, 1.5m & horizontal clearance, 30m for class-IV route of Ganges.

APPENDIX "B" FIGURES

Fig.B.1 Variation of Discharge of Ganges
Hardinge Bridge (1934-1974)

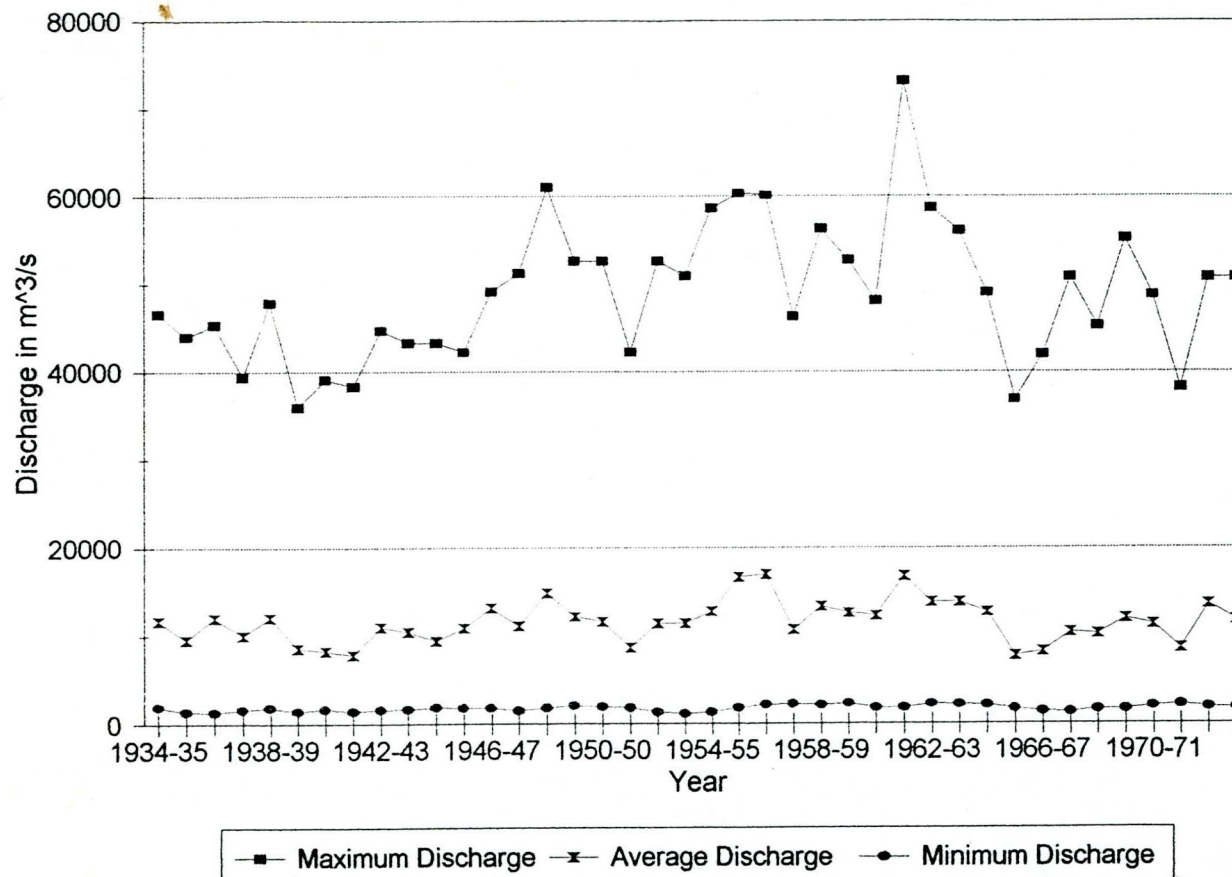


Fig.B.2 Variation of Discharge of Ganges
Hardinge Bridge (1975-1993)

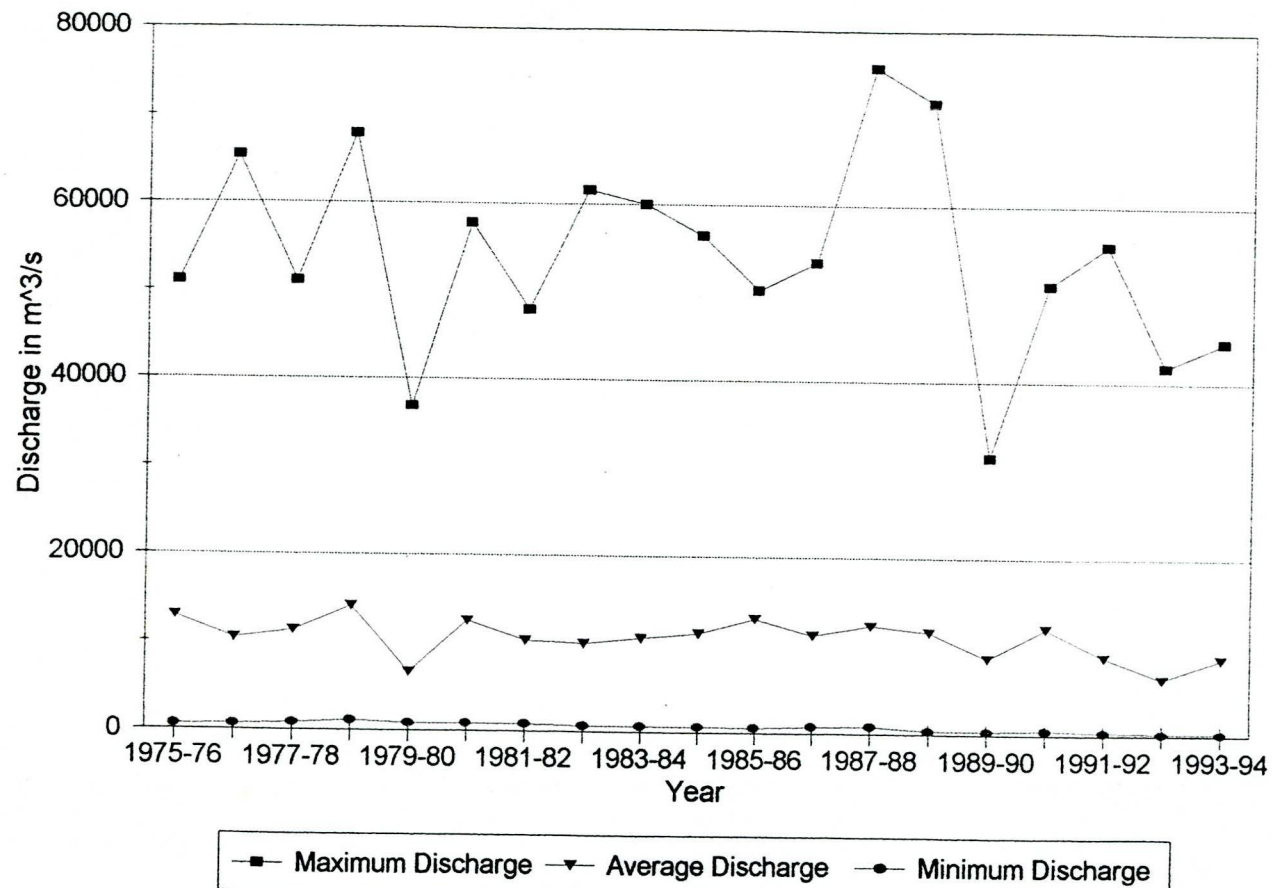
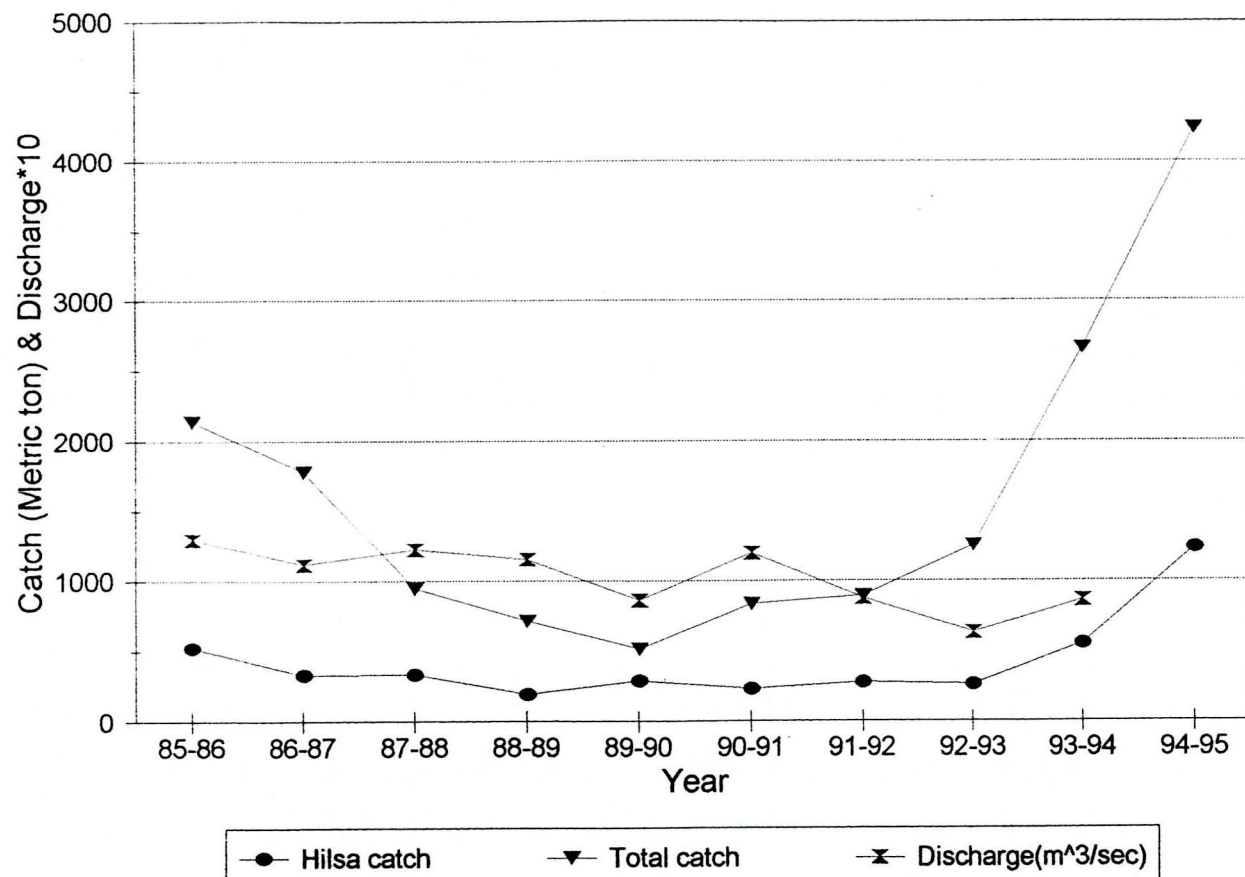


Fig.B.3 Discharge & Fish catch
for the period from 1985 to 1995



92723

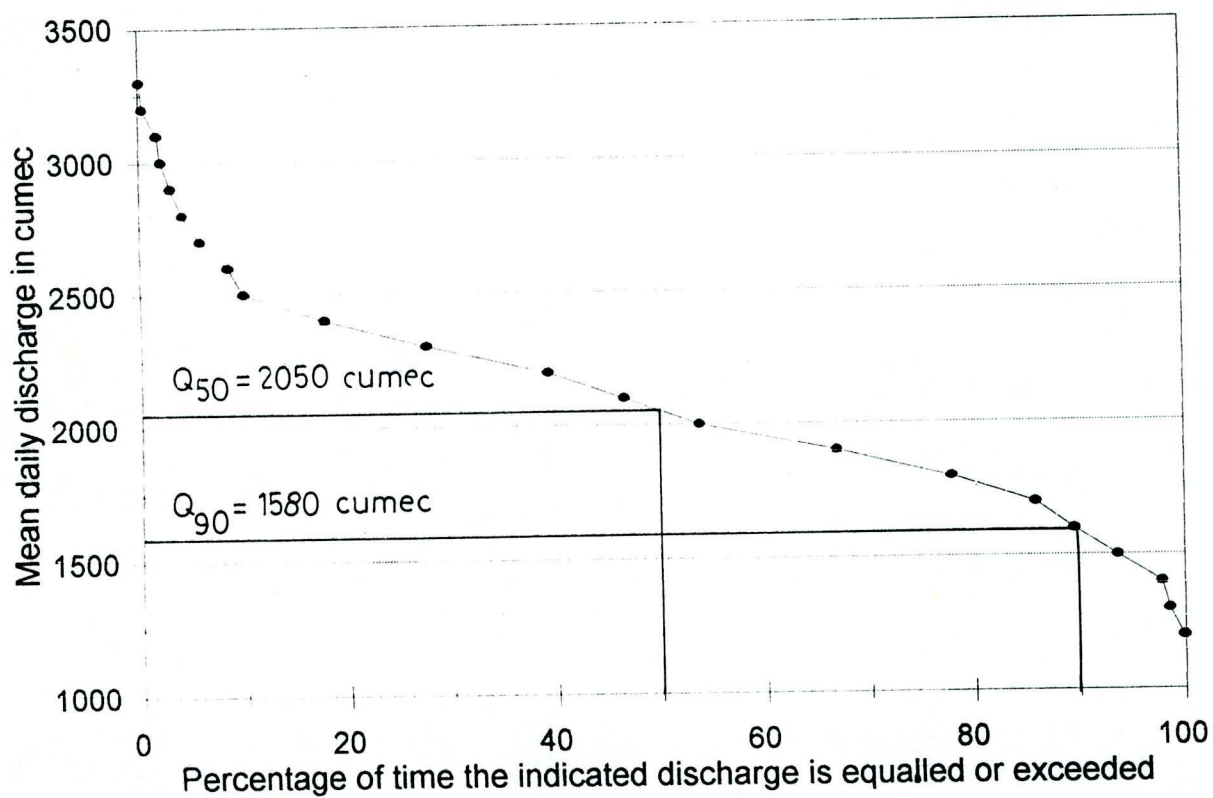


Fig. B.4 Flow duration curve for the month of April, Ganges River, 1934-1994.

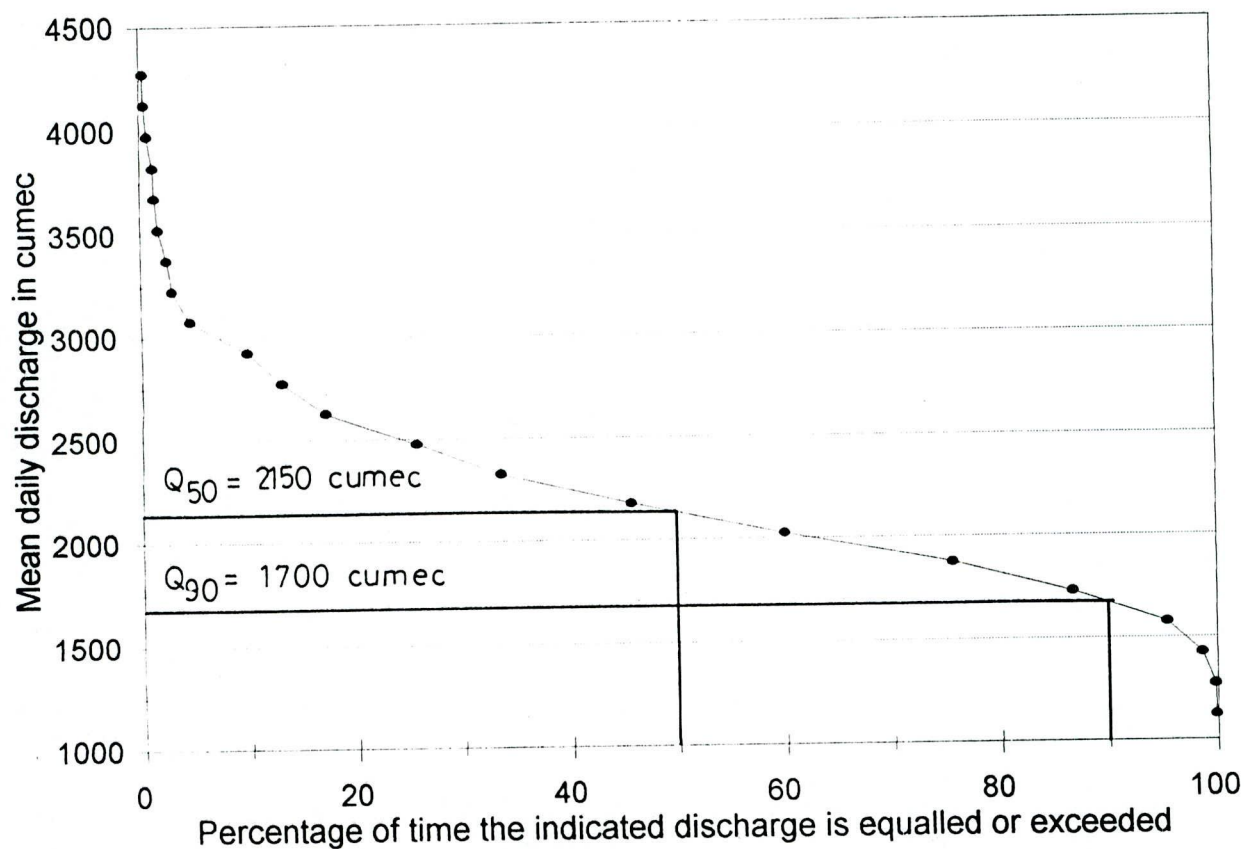


Fig. B.5 Flow duration curve for the month of May, Ganges River, 1934-1994.

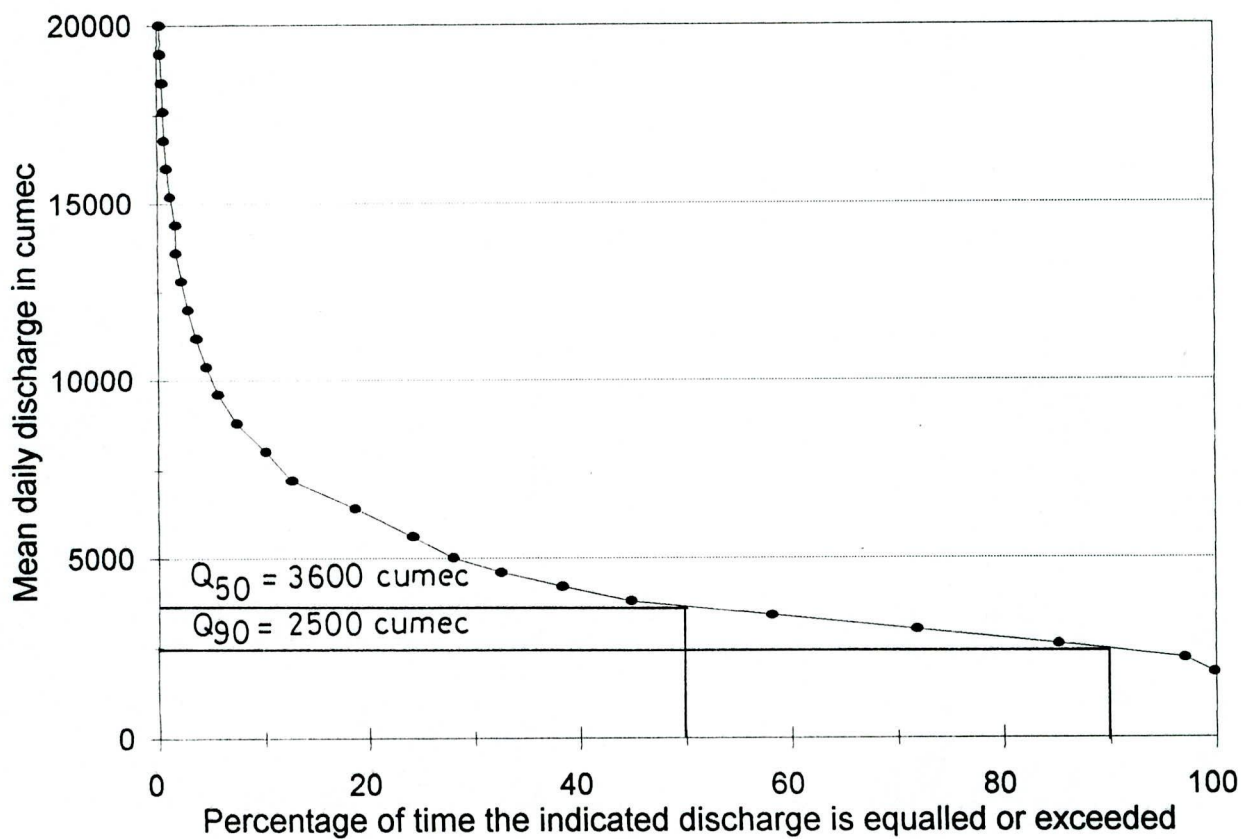


Fig. B.6 Flow duration curve for the month of June, Ganges River, 1934-1994.

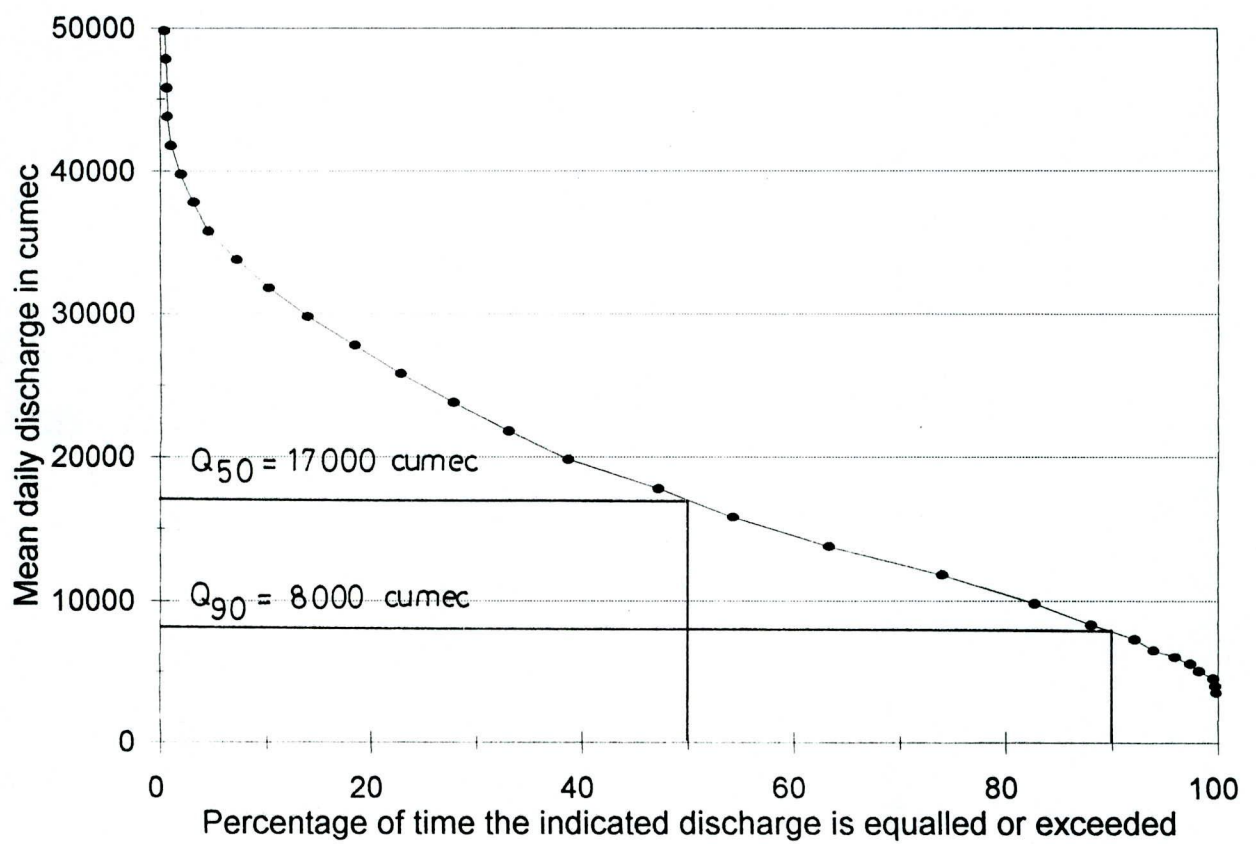


Fig. B.7 Flow duration curve for the month of July, Ganges River, 1934-1994.

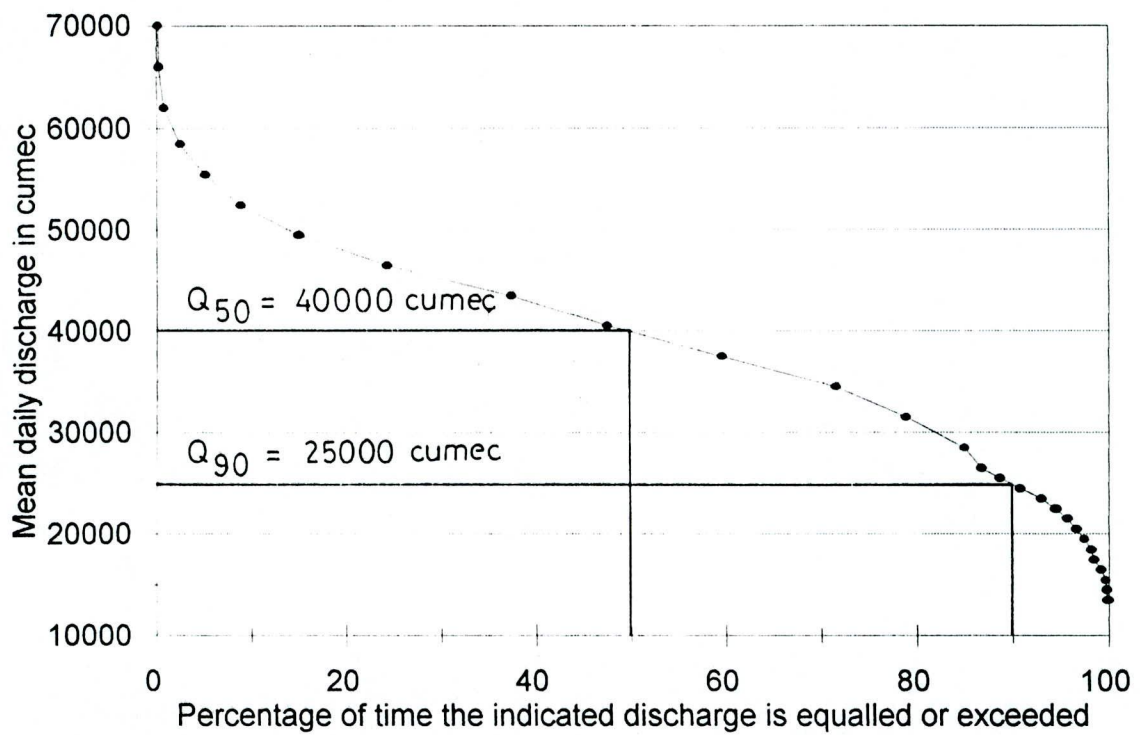


Fig. B.8 Flow duration curve for the month of August, Ganges River, 1934-1994.

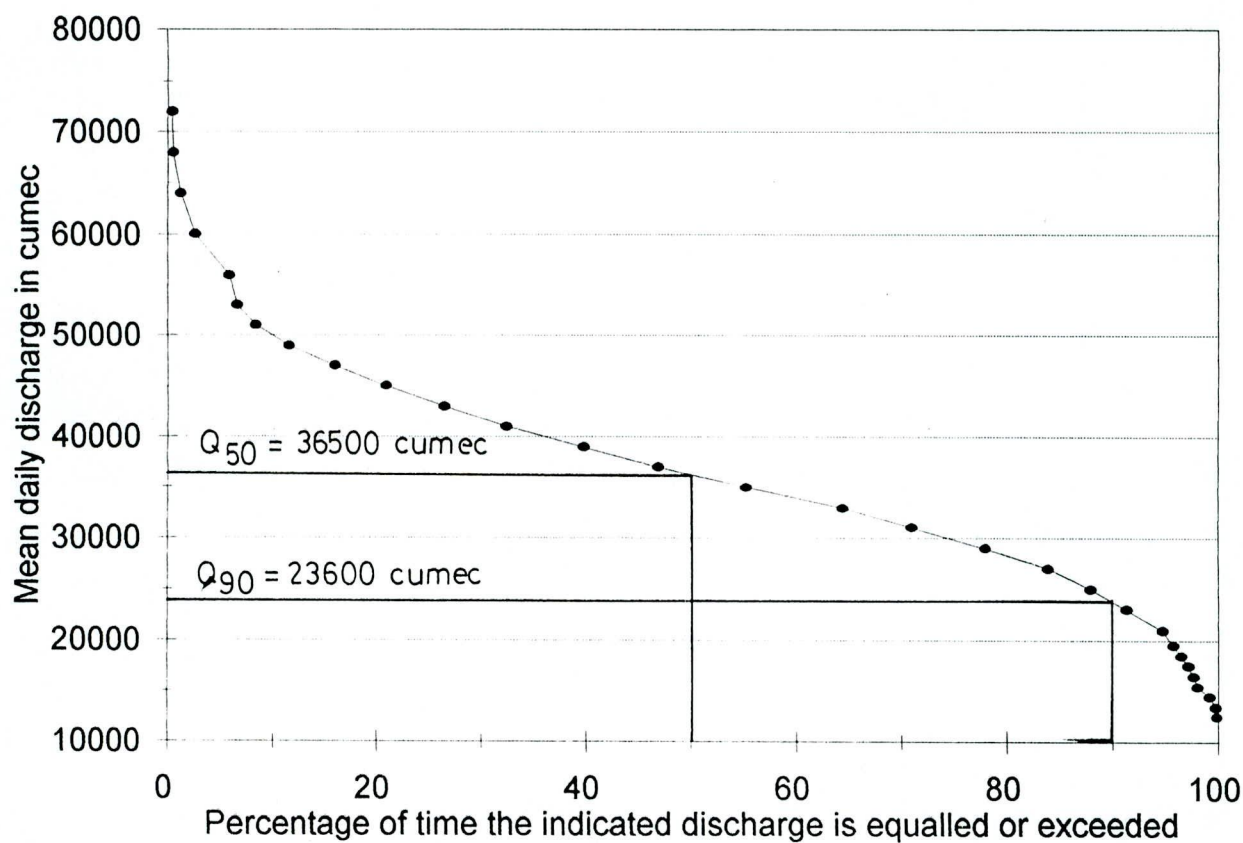


Fig. B.9 Flow duration curve for the month of September, Ganges River, 1934-1994.

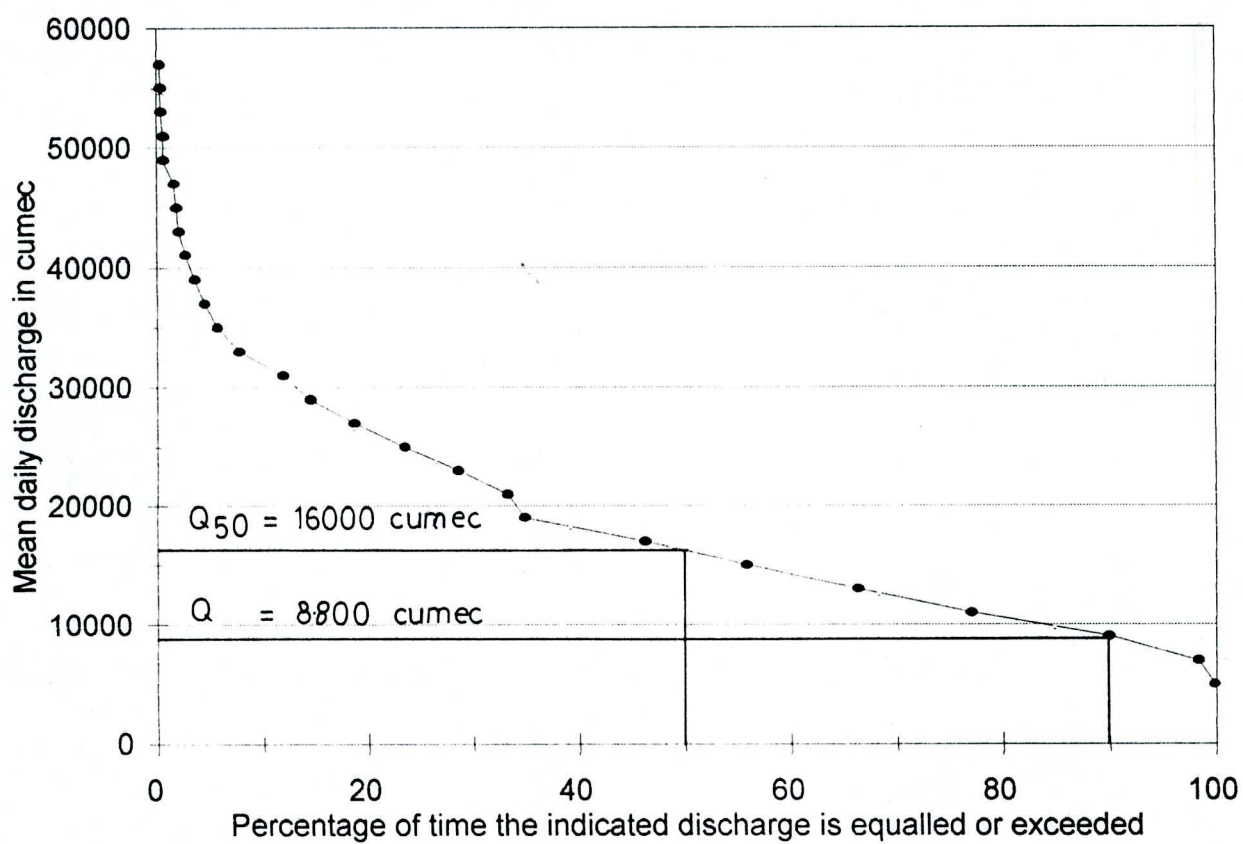


Fig. B.10 Flow duration curve for the month of October, Ganges River, 1934-1994.

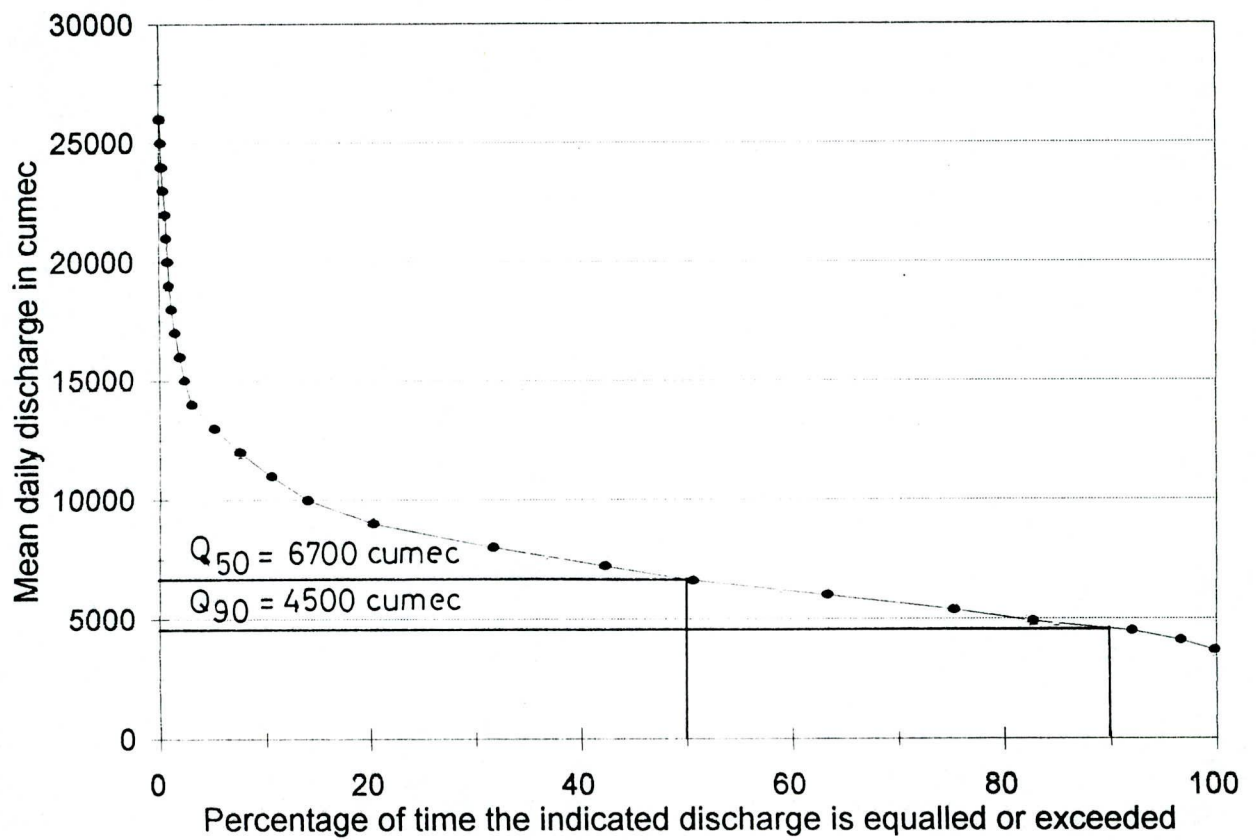


Fig. B.11 Flow duration curve for the month of November, Ganges River, 1934-1994.

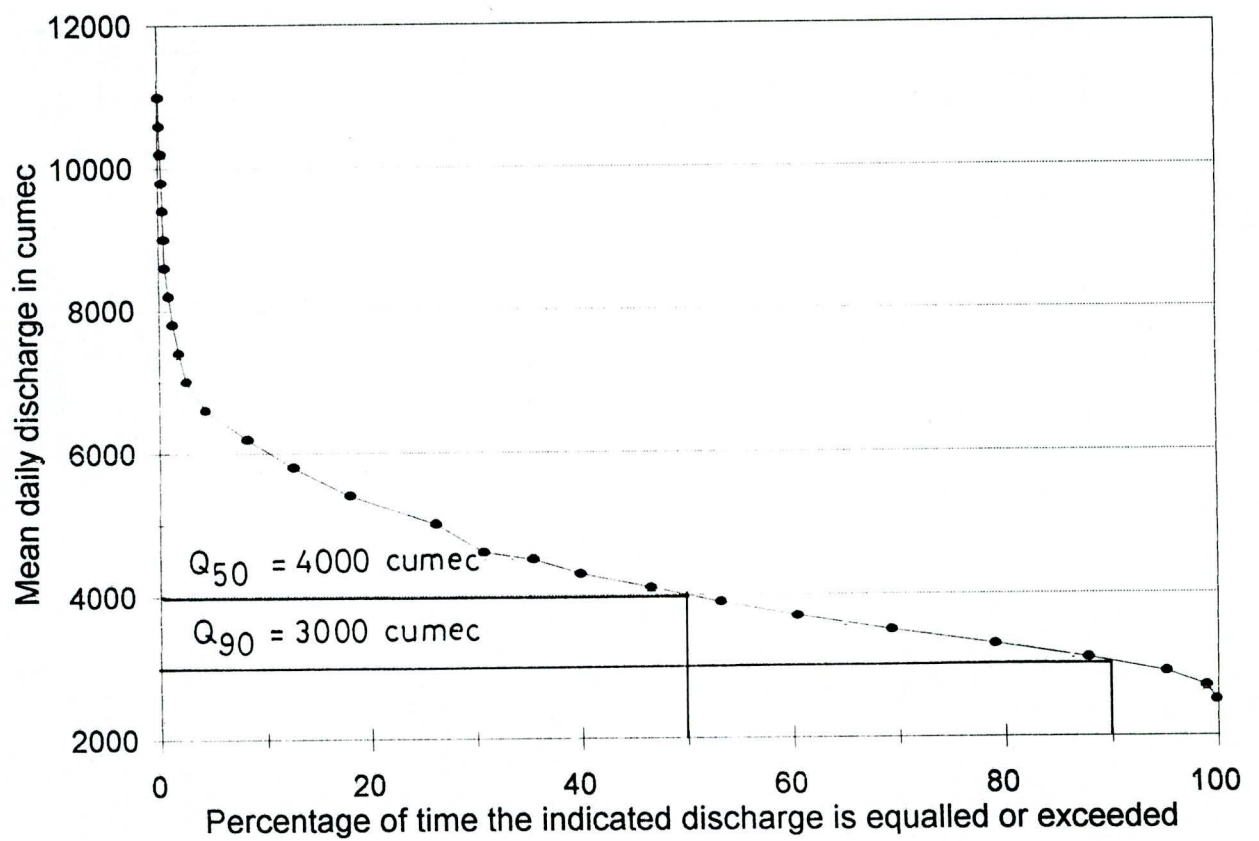


Fig. B.12 Flow duration curve for the month of December, Ganges River, 1934-1994.

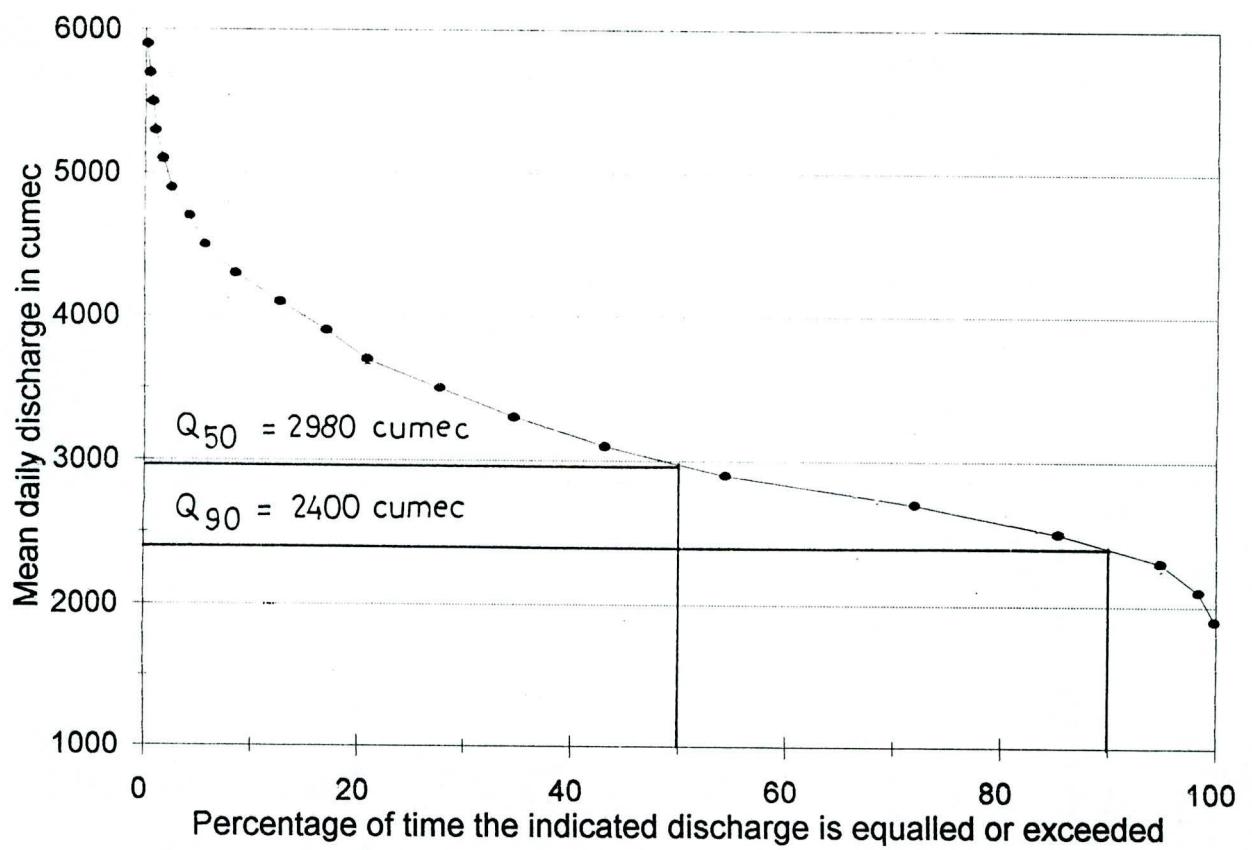


Fig. B.13 Flow duration curve for the month of January, Ganges River, 1934-1994.

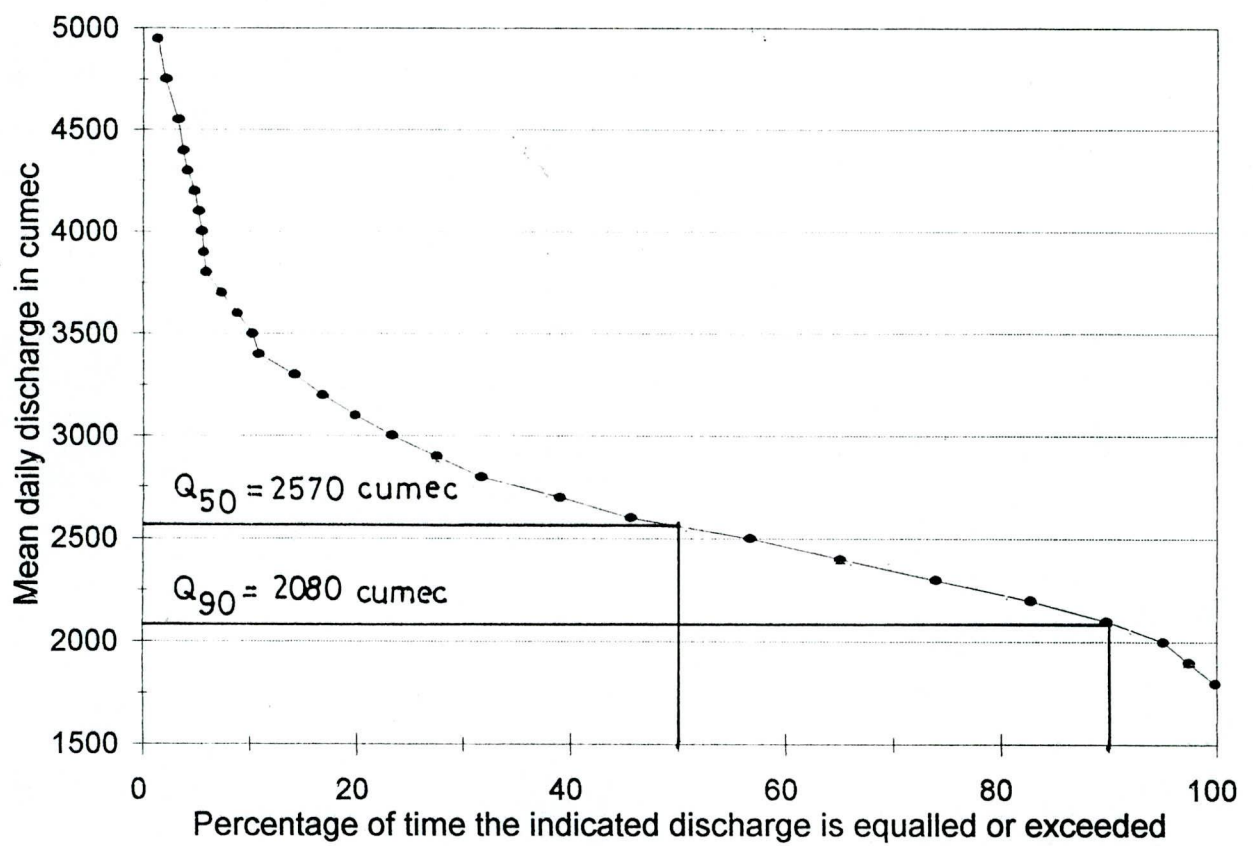


Fig. B.14 Flow duration curve for the month of February, Ganges River, 1934-1994.

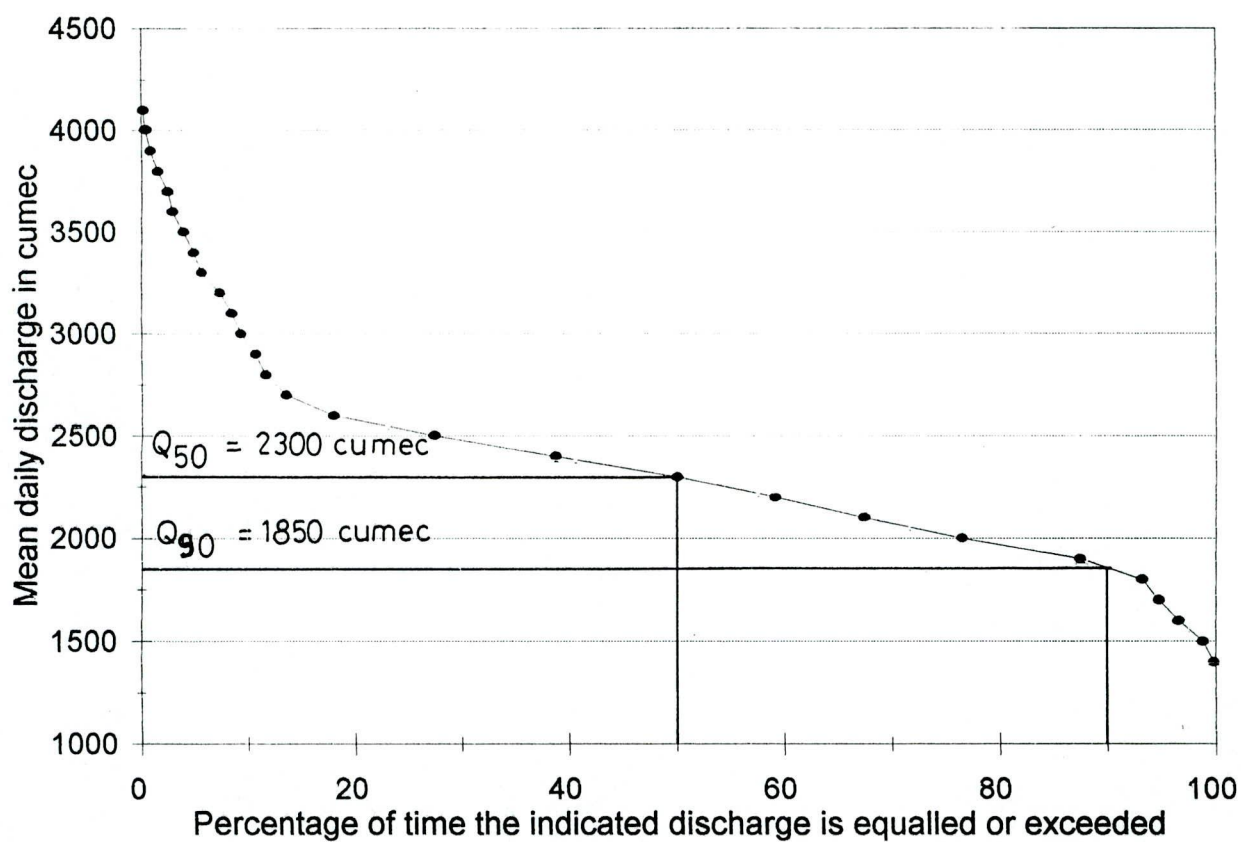


Fig. B.15 Flow duration curve for the month of March, Ganges River, 1934-1994.

APPENDIX "C"

OBSERVED MEAN DAILY DISCHARGE OF THE GANGES AT HARDINGE BRIDGE
FOR THE PERIOD 1934-35 TO 1993-94

**Table C.1 : Observed Mean Daily Discharge of the Ganges at Hardinge Bridge
for the Period from 1934-35 to 1974-75 (pre-Farakka).**

Year: 1934-35												
Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2200	2050	2190	7840	30000	45300	34900	8770	3930	2970	2570	2390
2	2200	2030	2230	8660	30700	46000	35400	8550	3880	2970	2560	2380
3	2190	2010	2260	9230	31900	46600	35400	8240	3820	2940	2540	2370
4	2190	1990	2280	9710	32300	46600	33600	8040	3740	2920	2530	2370
5	2190	1980	2310	10100	33200	46000	31900	7840	3710	2910	2520	2370
6	2200	1960	2330	11000	34000	46000	29600	7640	3620	2890	2500	2360
7	2200	1980	2360	12300	34500	45300	28200	7530	3570	2890	2490	2360
8	2190	1950	2390	13300	34900	44000	27200	7330	3590	2890	2480	2340
9	2180	1950	2430	14100	34900	42800	25200	7190	3570	2860	2480	2320
10	2180	1950	2460	14500	34900	41600	23100	7020	3540	2860	2470	2300
11	2160	1950	2470	14900	34900	40500	21600	6790	3540	2830	2460	2280
12	2140	1950	2480	15600	35400	38900	19600	6590	3540	2830	2450	2260
13	2130	1950	2490	17300	35400	37800	17800	6400	3540	2820	2440	2240
14	2130	1950	2590	20900	35400	37800	16400	6250	3540	2810	2430	2230
15	2140	1960	2640	23300	35400	37800	15200	6060	3480	2800	2430	2220
16	2140	1970	2760	25500	35400	38300	14200	5940	3510	2800	2430	2200
17	2140	1980	2830	26700	36300	39400	13600	5890	3510	2780	2440	2180
18	2140	2000	2910	27000	36800	40500	13200	5690	3450	2770	2450	2160
19	2130	2000	3060	26400	36800	41000	13000	5540	3400	2760	2450	2160
20	2110	1980	3340	25800	36800	41600	12800	5430	3370	2740	2440	2150
21	2110	1950	3740	25200	36800	41600	12500	5320	3310	2710	2440	2140
22	2090	1950	4390	24600	36800	41600	12200	5340	3280	2700	2430	2130
23	2080	1950	4950	24300	36300	40500	11600	5120	3250	2680	2420	2130
24	2080	1980	5600	24100	36300	38900	11200	4950	3200	2670	2420	2120
25	2100	1990	6110	23500	36800	36300	10800	4780	3140	2650	2420	2130
26	2100	1990	6370	23300	36900	33600	10200	4610	3140	2640	2420	2130
27	2100	2000	6570	23800	39900	31900	9850	4500	3110	2630	2410	2130
28	2080	2010	6650	25200	42200	31100	9540	4390	3060	2620	2390	2140
29	2070	2050	6850	27000	43400	31900	9340	4220	3030	2610		2130
30	2050	2080	7330	28600	44000	33600	9230	4100	3030	2600		2130
31		2110		29300	45300		9000		3000	2580		2130

Year: 1935-36												
Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2130	1680	1980	3620	29300	33600	31500	6030	3540	2710	2100	1900
2	2110	1610	2030	3760	29600	30700	29900	5940	3540	2690	2100	1890
3	2100	1600	2090	4100	30400	28200	26700	5860	3540	2680	2090	1860
4	2090	1600	2170	4390	31500	26400	24600	5770	3540	2660	2080	1840
5	2090	1600	2260	4750	31900	24900	22800	5600	3540	2650	2070	1810
6	2080	1550	2380	5380	32300	24100	21100	5460	3570	2640	2140	1790
7	2070	1550	2540	6110	32700	23500	19800	5320	3590	2630	2130	1770
8	2050	1550	2610	7020	33600	23300	19000	5150	3590	2520	2120	1760
9	2040	1550	2740	7730	34000	23800	17800	5040	3590	2510	2100	1710
10	2010	1550	2860	8550	35400	24600	16800	4900	3570	2500	2100	1680

11	2000	1560	2910	8890	36800	26400	15700	4750	3540	2480	2090	1670
12	1990	1560	2940	9230	37300	27600	14700	4610	3480	2470	2080	1660
13	1950	1580	3030	9340	38900	27300	13900	4560	3450	2430	2070	1640
14	1910	1610	3060	9590	40500	26700	13100	4470	3450	2420	2050	1620
15	1870	1640	3140	11200	41600	25800	12300	4410	3400	2380	2050	1610
16	1830	1620	3230	13000	42800	24300	11600	4330	3340	2370	2050	1590
17	1790	1620	3310	13600	42800	23300	10200	4240	3310	2330	2040	1580
18	1780	1670	3230	13600	42800	22600	10400	4160	3280	2320	2050	1570
19	1770	1680	3170	13400	42800	21800	9710	4160	3250	2280	2030	1540
20	1760	1680	3110	14100	44000	21800	9230	4050	3250	2270	2030	1530
21	1750	1690	3080	15200	44000	22800	8770	3990	3230	2270	2030	1510
22	1750	1700	3140	16200	43400	25500	8460	3910	3200	2260	2040	1510
23	1730	1700	3170	17100	43400	28900	8150	3850	3170	2240	2050	1510
24	1730	1700	3170	17800	42800	32300	7840	3790	3170	2230	2040	1510
25	1740	1700	3170	18700	41900	34000	7530	3740	3170	2200	2040	1510
26	1720	1710	3230	19600	41300	35400	7240	3680	3170	2190	2030	1490
27	1710	1720	3250	22300	40500	35900	6930	3620	3140	2180	2010	1480
28	1710	1750	3340	24600	40500	36300	6650	3590	3140	2170	1920	1470
29	1710	1790	3450	27000	40500	35400	6450	3540	3140	2150		1450
30	1700	1840	3540	27600	39800	34000	6200	3540	3080	2120		1450
31		1900		28200	36300		6100		3060	2120		1470

Year:1936-37

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1470	1370	2510	8890	32300	37800	27600	8670	5020	3250	2360	2430
2	1450	1380	2690	9470	33600	37300	21400	8450	4880	3250	2360	2460
3	1450	1450	2840	10100	34000	36800	24900	8240	4750	3250	2330	2460
4	1450	1470	3100	11000	34000	36300	24100	8030	4690	3250	2330	2460
5	1450	1470	3400	12100	35400	35900	23600	7930	4560	3230	2280	2480
6	1470	1470	3480	12900	36300	35400	22100	7930	4500	3170	2280	2480
7	1470	1470	4260	14200	37300	34500	23300	7830	4380	3140	2280	2480
8	1470	1490	4620	15200	37300	36300	23300	7730	4320	3080	2260	2480
9	1470	1510	4830	17000	38300	36800	23300	7730	4260	3060	2260	2480
10	1470	1590	4880	19000	39900	37300	22800	7630	4150	3000	2260	2500
11	1490	1630	4950	20700	41000	37800	21600	7430	4100	3000	2230	2500
12	1490	1660	5160	22300	42200	37800	20000	7230	4040	3000	2230	2500
13	1480	1670	5380	24100	42800	38300	19000	8930	3930	3000	2260	2510
14	1470	1700	5610	24900	43400	40500	18000	6640	3830	2940	2260	2500
15	1450	1770	5690	25500	44000	40500	17000	6460	3680	2940	2260	2480
16	1440	1800	5610	26100	44700	41600	15900	6370	3630	2890	2260	2500
17	1440	1800	5540	26700	45300	42200	15200	6110	3580	2860	2310	2450
18	1430	1810	5460	27300	45300	42800	14400	5830	3530	2820	2330	2500
19	1430	1820	5460	27300	44700	42800	13900	5690	3490	2790	2330	2480
20	1420	1820	5310	27300	44000	42800	13000	5610	3440	2740	2330	2460
21	1400	1830	5380	27600	42200	42800	12400	5460	3440	2740	2330	2430
22	1390	1860	5610	28200	41000	42800	11900	5460	3400	2690	2360	2430
23	1390	1900	6030	28900	39900	42200	11300	5460	3350	2640	2380	2410
24	1390	1950	6280	29300	38900	40500	10800	5460	3310	2590	2380	2410
25	1390	1980	6460	29300	37800	38300	10400	5460	3270	2540	2380	2410
26	1390	1990	6550	29600	37800	36300	9960	5460	3270	2540	2410	2380
27	1390	2050	6460	29600	37800	34500	9710	5380	3220	2480	2410	2380
28	1380	2230	6550	30000	38300	31900	9350	5310	3220	2480	2430	2360

29	1360	2360	7030	30700	38300	30000	9230	5160	3180	2430	2260	2330
30	1360	2380	8030	31500	38300	28600	9000	5090	3180	2430		2310
31		2450		32300	38300		8870		3140	2380		2260

Year: 1937-38

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2180	1800	2200	4500	20200	34700	19200	9840	4320	2820	2480	2450
2	2130	1800	2280	4610	23800	35900	19400	9590	4260	2820	2480	2430
3	2100	1800	2330	4900	27300	37600	19400	9230	4150	2790	2460	2440
4	2080	1800	2460	5090	29300	37800	18800	8890	4100	2790	2460	2450
5	2000	1800	2590	5460	31300	38300	18400	8560	3980	2760	2460	2450
6	1970	1800	2660	6200	33200	39400	18200	8240	3930	2740	2510	2460
7	1870	1770	2760	6740	35100	39400	19000	7930	3880	2740	2510	2450
8	1820	1820	2940	6930	36800	38900	21400	7630	3830	2710	2510	2450
9	1770	1820	3140	7430	37300	37300	23600	7430	3780	2690	2510	2460
10	1770	1830	3310	7930	36800	35400	24900	7130	3720	2690	2510	2460
11	1750	1820	3400	8890	36300	33600	25800	6930	3680	2660	2510	2430
12	1750	1830	3400	10100	35900	32100	25800	6640	3580	2640	2510	2430
13	1720	1820	3400	11000	34900	31100	25800	6460	3530	2640	2510	2430
14	1720	1830	3340	12200	34900	28600	24600	6280	3490	2610	2480	2410
15	1700	1820	3340	13000	34900	27900	23700	6020	3440	2610	2480	2410
16	1700	1830	3340	13600	35400	27900	22800	5860	3400	2610	2510	2380
17	1670	1850	3450	13900	36300	27900	21600	5690	3350	2590	2510	2380
18	1670	1860	3620	13900	37300	28200	20700	5540	3310	2590	2510	2380
19	1670	1900	3740	13700	37800	28600	19800	5460	3310	2590	2510	2360
20	1680	1870	3850	13600	37800	28900	18600	5310	3270	2560	2510	2360
21	1670	1870	3930	13700	36800	28600	17500	5160	3220	2560	2510	2360
22	1700	1870	4080	15400	35900	27300	16600	5020	3220	2560	2540	2340
23	1710	1870	4130	16600	35400	26200	15600	4880	3180	2560	2510	2340
24	1720	1870	4220	17100	34500	24900	15100	4820	3140	2540	2510	2360
25	1730	1920	4220	17500	33600	24000	14500	4690	3140	2540	2480	2340
26	1770	1950	4220	17700	33200	22300	13400	4620	3100	2540	2480	2340
27	1780	1980	4240	17700	33600	21800	12600	4560	3060	2540	2460	2340
28	1780	2000	4220	17700	34000	20900	11900	4500	3020	2540	2440	2340
29	1800	2050	4220	17000	34000	19400	11300	4440	2990	2510		2320
30	1800	2130	4270	16800	34000	19200	10800	4380	2990	2510		2310
31		2200		17800	33700		10400		2970	2480		2280

Year: 1938-39

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2280	2070	3060	19600	37200	40000	16600	6570	3790	2820	2280	2110
2	2280	2040	3280	20100	36600	38100	15800	6370	3740	2780	2280	2110
3	2280	2000	3510	20700	36400	36800	15100	6200	3680	2780	2250	2110
4	2280	1980	3740	21200	36600	35900	14500	6030	3680	2740	2250	2090
5	2280	1950	4310	21500	37200	35100	13800	5860	3620	2740	2250	2090
6	2280	1980	4750	21500	38800	35100	13400	5690	3570	2710	2220	2090
7	2280	1980	5150	20900	41000	35100	12700	5600	3570	2710	2220	2070
8	2280	2000	5550	20700	41300	35900	11900	5460	3510	2710	2200	2070
9	2280	1980	5940	20700	42800	36400	11300	5290	3480	2700	2180	2070
10	2280	1990	6110	21200	44200	37200	10900	5240	3420	2680	2180	2070

11	2280	1990	6200	22400	44400	38100	10800	5090	3370	2650	2180	2070
12	2260	1990	6280	23500	45700	38600	10500	4950	3370	2650	2180	2070
13	2260	2000	6280	24100	46500	39100	9760	4870	3340	2610	2180	2040
14	2230	2020	6280	24500	47400	39600	9400	4810	3280	2610	2180	2020
15	2230	2020	6370	25400	47600	40000	9110	4750	3280	2580	2180	2020
16	2230	2000	6760	26000	47500	39100	9000	4670	3230	2580	2180	2020
17	2230	1980	7360	27400	47400	38100	8890	4610	3200	2550	2160	2000
18	2230	1950	8260	28900	47800	37700	8890	4560	3140	2520	2160	2000
19	2200	1930	9900	30100	47100	37200	8740	4500	3140	2490	2160	2000
20	2200	1950	11500	30800	47600	35600	8600	4410	3110	2460	2130	2000
21	2180	1950	12400	31900	47000	34000	8490	4360	3110	2430	2130	1980
22	2180	1980	12900	33100	46400	32500	8380	4300	3060	2430	2130	1980
23	2150	2000	12900	34300	46400	30700	8260	4240	3000	2410	2110	1980
24	2150	2020	12700	35500	45800	28700	8150	4190	2970	2410	2110	1950
25	2130	2040	12200	37200	45800	26900	7920	4100	2940	2330	2110	1930
26	2130	2070	12400	38600	45800	24800	7700	4080	2940	2350	2110	1930
27	2130	2110	13100	39100	45300	22400	7470	4020	2890	2350	2110	1930
28	2100	2200	14200	39600	44200	20700	7240	3960	2890	2330	2110	1910
29	2080	2350	16700	39600	43100	19000	7080	3900	2860	2330		1910
30	2080	2380	18800	39300	42100	17400	6960	3850	2860	2300		1890
31		2750		38500	41100		6760		2820	2300		1890

Year: 1939-40

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1870	1550	2430	6660	28000	20900	20900	7260	3840	2520	2110	2220
2	1870	1550	2430	7160	28000	20900	19600	7160	3780	2490	2110	2220
3	1850	1540	2430	7960	28700	20700	19100	7060	3730	2490	2110	2180
4	1850	1530	2410	7360	29000	20100	18400	6860	3680	2460	2110	2180
5	1830	1520	2410	7470	30100	19900	17600	6660	3620	2460	2110	2130
6	1830	1510	2460	7580	30500	19600	17200	6470	3570	2430	2110	2130
7	1810	1500	2460	7810	30100	19600	16900	6280	3520	2430	2110	2130
8	1810	1500	2460	7810	29700	20700	16500	6110	3520	2410	2110	2130
9	1810	1470	2490	7920	31400	23200	15800	5940	3520	2380	2110	2130
10	1810	1490	2490	7920	33100	26700	15600	5770	3450	2380	2100	2110
11	1810	1530	2680	8040	34700	28400	15000	5610	3370	2380	2110	2110
12	1810	1560	2650	8150	34700	28400	14600	5460	3300	2350	2120	2110
13	1790	1580	2650	8260	34700	27700	14000	5380	3190	2330	2130	2090
14	1790	1590	2650	8490	34900	27000	13300	5230	3120	2330	2150	2070
15	1770	1640	2650	8740	33500	27700	13400	5160	3100	2300	2160	2040
16	1770	1670	2680	9010	31700	29400	11900	5070	3030	2280	2190	2040
17	1770	1710	2750	9380	30500	31600	11900	4950	3010	2250	2200	2040
18	1750	1750	2820	10000	29000	33900	11300	4810	2950	2250	2210	2020
19	1750	1780	2930	10600	27800	35100	10800	4620	2930	2220	2220	2020
20	1730	1810	3060	11000	27000	35900	9900	4490	2900	2220	2220	2020
21	1720	1850	3230	11900	26900	35900	9510	4430	2860	2200	2220	2020
22	1690	1910	3420	14200	27000	34700	9250	4430	2860	2200	2220	2020
23	1680	1980	3520	17200	26900	31900	8870	4370	2820	2180	2220	2020
24	1650	2000	3620	19600	26700	28500	8620	4310	2780	2180	2220	2040
25	1640	2070	3780	20900	26400	26000	8490	4250	2740	2160	2220	2090
26	1620	2110	3840	22600	25400	24600	8270	4190	2710	2160	2220	2110
27	1600	2200	4070	24800	23500	24500	8260	4130	2680	2130	2220	2130
28	1660	2300	4430	26000	22400	24600	7810	4070	2650	2130	2220	2130

29	1570	2410	4950	26700	21800	24500	7810	4010	2650	2110	2110
30	1560	2430	6280	26400	21500	22600	7580	3900	2610	2110	2110
31		2460		27000	21200		7360		2610	2110	2090

Year: 1940-41

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2090	1790	2110	4370	26000	35100	15000	5160	3780	2870	2590	2100
2	2110	1770	2160	4430	25100	36400	14600	5070	3730	2870	2560	2100
3	2100	1770	2160	4430	24500	37200	14400	5010	3680	2870	2510	2080
4	2090	1770	2160	4430	24100	38600	13600	4880	3620	2890	2480	2080
5	2080	1750	2160	4430	24100	38100	13100	4810	3570	2890	2460	2050
6	2040	1750	2160	4550	25400	39100	12600	4680	3570	2890	2430	2050
7	2030	1740	2180	4680	26700	39100	11800	4620	3520	2890	2380	2050
8	2000	1740	2180	5010	30400	38100	11000	4090	3470	2870	2360	2030
9	1960	1740	2200	5300	32300	34700	10300	4430	3420	2840	2330	2030
10	1950	1740	2220	5780	33100	35300	9760	4460	3420	2820	2330	2000
11	1930	1740	2250	6660	34300	30400	9910	4760	3370	2790	2310	2000
12	1930	1740	2280	8150	35900	28400	8740	4400	3330	2760	2310	2000
13	1930	1740	2380	10600	36800	26400	8320	4370	3330	2790	2310	1980
14	1910	1720	2430	12400	37700	25400	7810	4340	3280	2760	2280	1980
15	1890	1720	2490	13100	37700	23700	7470	4310	3230	2740	2280	1950
16	1870	1740	2580	13400	37200	21800	7060	4280	3190	2740	2260	1950
17	1870	1790	2740	13100	35900	20600	6860	4310	3140	2740	2260	1920
18	1850	1790	2900	12700	35100	19200	6570	4340	3140	2710	2230	1920
19	1850	1810	3060	12200	33900	18100	6280	4310	3100	2690	2230	1920
20	1830	1810	3190	12100	32300	17700	6110	4290	3060	2690	2200	1900
21	1830	1870	3370	12100	30300	16200	5860	4190	3010	2660	2180	1870
22	1810	1870	3520	13400	29000	15800	5690	4190	2970	2660	2180	1870
23	1810	1890	3680	16700	28700	15600	5690	4130	2930	2690	2150	1850
24	1810	1930	3840	19100	28700	14800	5690	4130	2900	2660	2150	1820
25	1810	1980	4070	21500	28700	14400	5610	4070	2860	2660	2150	1820
26	1790	2000	4190	24100	28700	14200	5540	4010	2820	2640	2130	1770
27	1790	2020	4190	25700	28700	14400	5460	3950	2820	2640	2190	1770
28	1790	2040	4190	26700	28700	14600	5460	3900	2780	2640	2100	1770
29	1790	2060	4250	27300	29700	15000	5460	3900	2780	2640	2310	1750
30	1790	2060	4310	27300	31900	15000	5460	3840	2750	2610		1720
31		2110		27200	33400		5300		2710	2610		1720

Year 1941-42

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1720	1490	1920	6830	13600	38300	15400	6280	3540	2690	2480	2030
2	1700	1530	1920	7130	14400	37800	14500	6030	3520	2660	2510	2080
3	1700	1540	1950	7630	15600	36800	13900	5860	3460	2610	2540	2100
4	1700	1560	1980	8140	16100	35400	13400	5780	3350	2610	2540	2200
5	1670	1570	2100	8250	16400	33600	12800	5610	3290	2560	2510	2310
6	1670	1570	2200	8340	16800	33200	12200	5380	3230	2540	2480	2410
7	1670	1580	2330	8560	17500	33200	11600	5310	3170	2480	2460	2430
8	1670	1590	2430	8670	18200	33200	11000	5240	3160	2460	2430	2430
9	1670	1620	2540	8670	19200	33200	10600	5090	3140	2410	2430	2430
10	1670	1670	2590	8560	20700	32700	11000	4950	3100	2410	2410	2430
11	1620	1750	2960	8450	21800	32300	12200	4880	3060	2380	2360	2410

12	1620	1870	2840	8560	23100	31500	12500	4750	3020	2360	2330	2380
13	1610	2000	3020	9110	23600	30700	12800	4690	2990	2330	2280	2360
14	1610	2050	3310	9710	23800	29300	12600	4690	2970	2330	2260	2360
15	1570	2080	3530	9960	23600	27900	11900	4620	2970	2330	2200	2330
16	1560	2100	3680	10500	23100	26100	11000	4560	2940	2330	2180	2330
17	1560	2130	3880	10900	23100	23600	10500	4500	2920	2330	2130	2310
18	1530	2180	4560	11000	22300	22600	9840	4440	2890	2310	2080	2310
19	1520	2180	5090	11200	21800	22100	9350	4380	2870	2310	2050	2310
20	1490	2200	5860	11300	22100	21800	8890	4320	2840	2280	2030	2310
21	1490	2230	6190	11900	23100	21400	8560	4210	2840	2280	2030	2300
22	1450	2230	6460	12800	24900	20900	8240	4100	2840	2260	2030	2270
23	1440	2200	6640	13300	26400	20200	7930	4040	2820	2260	2030	2270
24	1450	2180	6640	14200	27300	19800	7730	3980	2820	2260	2030	2240
25	1440	2150	6830	14900	27600	19200	7530	3880	2790	2260	2030	2230
26	1440	2100	6830	15200	29300	18800	7500	3830	2760	2260	2030	2200
27	1430	2080	6830	15100	31100	18000	7130	3780	2760	2230	2030	2170
28	1430	2050	6830	14400	33600	17300	7030	3720	2740	2310	2030	2160
29	1430	2000	6740	13700	35900	16800	6830	3680	2710	2360		2130
30	1420	1950	6740	13300	36800	15900	6550	3560	2690	2410		2100
31		1920		13300	38300		6460		2690	2460		2080

Year: 1942-43

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2030	1700	2260	6280	32700	42200	26100	7920	4100	2760	2520	2340
2	2000	1700	2260	7730	33600	42200	25200	7580	4050	2760	2480	2340
3	1950	1700	2260	9110	34000	42200	24600	7330	3990	2720	2480	2340
4	1920	1700	2230	9960	34500	41600	23800	7270	3930	2720	2480	2300
5	1900	1670	2230	10500	35400	41000	22300	7130	3880	2720	2480	2300
6	1870	1670	2200	11000	36300	40500	21100	6880	3820	2670	2480	2270
7	1850	1670	2180	11600	36300	39400	20000	6740	3760	2630	2520	2240
8	1820	1670	2150	12500	37300	39400	19000	6680	3740	2630	2520	2240
9	1800	1700	2150	13400	38300	39400	18000	6450	3680	2630	2560	2200
10	1800	1800	2180	14700	38900	41000	17100	6280	3620	2630	2630	2170
11	1800	1800	2180	14700	39900	42200	16200	6110	3590	2600	2700	2170
12	1800	1820	2180	15100	40500	42200	15200	5860	3590	2600	2720	2140
13	1800	1850	2200	15200	41000	42200	14200	5690	3540	2600	2740	2110
14	1800	1870	2230	15200	40500	41600	13300	5550	3490	2560	2720	2080
15	1800	1900	2310	15600	39900	41000	12600	5380	3450	2560	2700	2080
16	1800	1920	2380	16200	39900	37300	12500	5240	3400	2560	2630	2050
17	1800	1980	2460	17300	39400	35900	13100	5090	3340	2560	2610	2050
18	1800	1980	2560	17500	39900	33200	13000	4950	3340	2560	2600	2050
19	1800	1980	2640	17000	38900	31900	12100	4810	3310	2560	2560	2020
20	1800	1980	2710	16200	39900	31500	11300	4750	3230	2600	2520	2000
21	1800	1980	2710	16200	40500	31900	11000	4700	3170	2630	2480	2000
22	1800	1980	2690	20500	42200	32700	10900	4610	3080	2670	2480	1940
23	1800	1980	2660	23100	42800	32300	10500	4560	3060	2720	2440	1910
24	1800	1980	2660	24900	44700	32300	9960	4500	3000	2760	2410	1890
25	1800	1980	2660	26400	44000	31900	9480	4440	2940	2760	2410	1860
26	1750	1980	2740	27300	44000	30700	9000	4390	2890	2720	2370	1810
27	1750	2030	2830	27300	44000	30400	8550	4330	2830	2670	2370	1810
28	1750	2080	3340	26800	43400	29300	8240	4270	2790	2630	2340	1810
29	1750	2100	4440	28600	42800	27600	8240	4220	2760	2600		1810

30	1720	2180	5310	30000	42800	26400	8240	4160	2710	2560		1790
31		2230		31100	42800		8240		2660	2520		1790

Year: 1943-44

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1790	1910	2170	8260	22700	42400	32500	8600	4610	2670	2440	2300
2	1790	1910	2270	8380	21000	43300	33200	8600	4560	2670	2440	2340
3	1790	1910	2270	8260	19800	43300	31900	8490	4470	2630	2410	2340
4	1790	1910	2270	8260	21300	43300	26800	8260	4270	2630	2410	2410
5	1770	1910	2270	8490	25000	42400	23000	8260	4160	2630	2410	2440
6	1770	1910	2370	8720	29400	40800	23100	8040	4100	2670	2410	2480
7	1770	1910	2520	9230	32500	38300	20700	8040	4050	2670	2410	2520
8	1770	1910	2670	9480	34500	36000	19800	7810	3960	2720	2370	2600
9	1740	1910	2930	9740	35300	34500	18100	7500	3900	2720	2370	2670
10	1740	1910	3110	10200	37500	33800	17300	7240	3850	2720	2370	2630
11	1740	1940	3310	11900	37500	33200	16400	7240	3790	2720	2340	2630
12	1770	1970	3400	12100	36000	33200	15500	7000	3740	2670	2340	2560
13	1770	2000	3570	12700	34500	32500	14500	7020	3650	2670	2340	2480
14	1770	2020	3740	13100	33800	31900	14300	6760	3670	2670	2340	2440
15	1770	2020	3960	14100	33800	30600	13700	6540	3480	2630	2340	2410
16	1790	2020	4270	14700	34500	30600	12800	6250	3400	2630	2340	2410
17	1790	2020	4610	15100	34500	30600	12400	6200	3310	2600	2340	2370
18	1790	2050	4900	15100	36700	30600	11300	6080	3310	2600	2340	2370
19	1810	2050	5180	15500	36700	32500	10700	5860	3200	2560	2340	2370
20	1840	2080	5500	15500	36700	34500	10500	5690	3110	2560	2300	2340
21	1860	2080	5940	15300	36000	37500	10900	5630	3060	2560	2300	2340
22	1860	2080	6280	15100	35300	39900	9980	5460	3030	2540	2300	2300
23	1860	2080	6450	15300	34500	39900	9980	5460	2970	2540	2300	2300
24	1860	2080	7020	15900	36000	37500	9850	5240	2940	2460	2300	2300
25	1860	2140	7610	17100	37500	33800	9990	5240	2890	2460	2340	2300
26	1890	2140	8260	18600	39100	30000	9990	5180	2890	2460	2340	2270
27	1890	2140	8720	19500	39900	26800	9990	4950	2860	2410	2340	2270
28	1890	2140	8720	20700	39900	26800	9990	4950	2860	2410	2300	2270
29	1910	2190	8490	22000	40800	28300	9590	4810	2800	2410		2270
30	1910	2170	8260	23000	39900	31200	9080	4750	2760	2410		2270
31		2170		23400	39900		8830		2720	2440		2270

Year: 1944-45

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2240	2370	2600	5320	28900	35300	25000	7920	4410	2930	2630	2200
2	2240	2370	2700	5860	28900	38300	23800	7610	4280	2890	2670	2200
3	2270	2300	2700	6540	28300	40800	23000	7410	4220	2890	2670	2170
4	2270	2300	2800	7100	28300	42400	21700	7220	4100	2840	2720	2170
5	2300	2300	2860	7700	28300	42400	20700	7220	3970	2840	2720	2140
6	2300	2300	2970	8260	26800	42400	19500	6910	3850	2800	2720	2080
7	2410	2340	3060	8600	25900	42400	18600	6820	3740	2820	2670	2080
8	2480	2410	3200	8600	26300	38300	18100	6620	3680	2760	2670	2050
9	2600	2440	3310	8720	27300	34500	18100	6450	3680	2760	2630	2050
10	2720	2440	3310	9080	27300	32500	17800	6370	3510	2720	2630	2050
11	2760	2440	3370	9590	26300	30600	17300	6280	3510	2670	2600	2050
12	2720	2440	3370	9850	27300	30000	17100	6280	3460	2670	2600	2050

13	2720	2440	3370	10200	28900	29400	15700	6280	3460	2800	2600	2050
14	2670	2440	3250	10500	30000	28300	15100	6200	3410	2800	2600	1970
15	2600	2370	3250	10800	31900	27300	14300	6200	3360	2800	2560	1970
16	2550	2370	3250	11100	34500	25900	13500	6110	3360	2720	2560	1970
17	2410	2370	3250	11100	36700	25000	12800	5860	3360	2720	2580	1940
18	2440	2370	3370	11300	39100	24200	12600	5630	3360	2800	2440	1940
19	2520	2370	3400	11300	40800	22700	12100	5460	3310	2840	2430	1940
20	2520	2370	3510	11000	42400	22000	11700	5320	3310	2840	2410	1910
21	2560	2370	3680	11000	42400	21700	11400	5180	3250	2800	2370	1910
22	2560	2440	3850	11300	43300	21700	11100	5090	3200	2760	2340	1910
23	2480	2440	3910	11700	41600	20100	9850	4950	3170	2670	2340	1910
24	2480	2480	3910	16400	39900	20100	9230	4900	3110	2630	2300	1910
25	2440	2480	3910	18200	31900	20100	9230	4810	3060	2600	2270	1910
26	2370	2480	3910	21700	34600	21000	8600	4750	3060	2600	2270	1910
27	2370	2520	3960	22700	22400	22400	8040	4750	3030	2600	2240	1910
28	2370	2560	4100	24600	22400	23800	7610	4670	3030	2600	2240	1910
29	2370	2600	4100	27300	20700	24600	7400	4610	2970	2630	2600	1910
30	2370	2600	4810	27300	21700	25000	7810	4470	2970	5630		1890
31		2600		30000	25900		7500		2940	2630		1890

Year: 1945-46

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1890	1940	2300	5020	23300	35400	27600	14600	6340	3850	2790	2300
2	1890	1940	2340	6450	23700	35400	26500	14000	6250	3740	2740	2300
3	1890	1940	2370	8150	24300	35400	25800	13500	6060	3680	2740	2300
4	1890	1910	2440	9210	24700	35400	26100	13200	5910	3650	2700	2300
5	1860	1940	2480	9590	25400	34800	26500	12500	5800	3590	2700	2300
6	1860	1910	2520	9340	25800	34200	27200	12000	5720	3510	2660	2300
7	1860	1910	2520	10600	26100	34200	27600	11600	5600	3510	2660	2300
8	1860	1890	2560	13200	26500	34200	27600	11300	5460	3400	2620	2300
9	1890	1860	2480	15000	26500	34200	26900	10900	5350	3400	2620	2300
10	1890	1940	2440	15700	25800	33700	25800	10500	5290	3370	2580	2300
11	1910	1940	2440	15200	24700	33700	24700	10300	5150	3310	2580	2260
12	1940	1910	2440	14400	26500	33700	23000	9850	5090	3280	2540	2260
13	1940	1910	2410	14000	25300	33700	21800	9400	4980	3230	2540	2260
14	2000	1940	2440	14400	23000	34800	20700	9170	4920	3230	2500	2260
15	2000	1940	2520	15200	23000	35900	19600	8940	4870	3170	2460	2220
16	2000	1970	2520	16100	23000	37600	18500	8830	4810	3170	2460	2220
17	2000	1970	2560	16800	22700	38800	17500	8600	4750	3140	2420	2180
18	2000	2000	2630	18300	22700	40500	16600	8410	4640	3080	2420	2180
19	2000	1970	2720	21200	23000	41000	15700	8410	4530	3080	2420	2140
20	2000	2020	2840	23000	23700	42200	15000	8090	4470	3060	2420	2140
21	2000	2020	2970	24300	24300	42200	14800	7810	4410	3000	2370	2100
22	2000	2050	3210	25400	26100	41600	15900	7700	4360	3000	2370	2100
23	2000	2050	3460	25000	26900	41000	16100	7530	4300	2940	2370	2070
24	2000	2110	3680	24300	27600	39900	15900	7360	4240	2940	2370	2070
25	2000	2110	3910	24000	27600	38200	15900	7100	4190	2910	2340	2070
26	1970	2170	3970	24000	29200	36500	16600	6930	4100	2910	2340	2070
27	1940	2170	4220	24000	30000	33700	16800	6850	4050	2890	2340	2030
28	1940	2170	4280	23300	31300	31700	16800	6790	3990	2890	2340	2030
29	1940	2200	4410	22700	33100	30000	16600	6620	3990	2830		2030

30	1940	2240	4680	22700	34200	28400	16100	6480	3930	2830	1990
31		2200		23000	34800		15500		3910	2790	1990

Year: 1946-47

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1990	2180	3650	12500	36500	46100	22400	11900	6200	3650	2790	2220
2	1950	2220	3510	12800	39300	46100	20900	11600	6110	3650	2750	2220
3	1910	2220	3590	12300	39900	46700	19800	11200	6000	3590	2750	2180
4	1910	2220	3400	12200	39900	47300	19000	10900	5800	3540	2700	2180
5	1870	2220	3370	12200	42200	48400	19000	10200	5660	3510	2700	2180
6	1910	2260	3280	12800	43900	49100	18800	9510	5460	3450	2660	2140
7	1910	2260	3230	13200	43900	49100	17800	9280	5350	3400	2620	2140
8	1950	2260	3170	14000	44400	47800	16600	9060	5150	3400	2620	2100
9	1910	2300	3140	15000	45000	46700	15700	8830	5040	3370	2580	2070
10	1870	2340	3080	16100	46100	45000	15500	8500	4920	3310	2580	2070
11	1870	2340	3140	18800	46700	44400	15200	8410	4870	3310	2540	2030
12	1870	2380	3230	21500	46700	41600	15200	8010	4750	3310	2540	1990
13	1910	2380	3400	24300	47300	39900	15200	7810	4700	3280	2540	1990
14	1910	2420	3680	25800	48400	37100	15200	7610	4640	3230	2540	1950
15	1950	2420	4100	28000	48400	34200	15500	7440	4530	3230	2500	1950
16	1990	2420	4470	30400	48400	32100	15700	7270	4470	3170	2500	1910
17	2030	2420	4870	31700	48400	30000	15700	7100	4410	3170	2460	1910
18	2070	2460	5040	34200	48400	28800	15200	6930	4360	3170	2460	1910
19	2100	2540	5150	36500	49100	27600	14800	6860	4300	3080	2420	1870
20	2140	2620	5240	38800	49100	28000	14600	6700	4190	3080	2380	1870
21	2220	2660	5350	39900	48400	33100	15500	6480	4160	3060	2380	1870
22	2220	2700	5350	41000	48400	36500	16100	6410	4100	3060	2340	1870
23	2220	2790	5350	41000	48400	38200	16600	6340	4050	3000	2340	1870
24	2220	2890	5410	41000	47800	38800	16400	6270	3990	2970	2300	1870
25	2260	3000	5800	38200	46700	38200	15500	6190	3930	2970	2300	1870
26	2260	3140	6250	35900	46100	35400	14600	6130	3910	2910	2260	1910
27	2220	3280	6710	34000	45000	31700	14000	6190	3850	2890	2260	1910
28	2180	3450	7440	32500	44400	38400	13500	6270	3790	2890	2260	1910
29	2180	3510	8090	30800	43900	35800	13300	6200	3790	2830		1910
30	2180	3540	11600	32100	43900	34000	12700	6200	3740	2830		1870
31		3650		34800	45000		12200		3680	2790		1870

Year: 1947-48

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1870	1720	1870	4300	28400	32100	25000	8500	4870	3310	2260	2340
2	1870	1720	1950	4410	34200	33700	25400	8310	4750	3280	2290	2300
3	1910	1720	2030	4470	36500	36500	25400	8110	4700	3230	2340	2300
4	1870	1720	2180	4530	37600	37600	25800	8010	4640	3230	2380	2260
5	1870	1760	2180	4640	37600	39900	26100	7810	4580	3230	2420	2220
6	1910	1760	2260	4870	37600	40500	26500	7810	4470	3170	2420	2180
7	1910	1720	2340	5180	38200	41000	26900	7710	4420	3140	2460	2180
8	1910	1690	2420	5790	38200	42700	27200	7610	4360	3140	2460	2180
9	1950	1650	2540	6710	38200	44400	27200	7530	4310	3080	2500	2180
10	1910	1650	2660	8010	38800	45000	26900	7360	4310	3080	2500	2140
11	1870	1690	2700	9510	38800	46100	26900	7190	4260	3000	2480	2140
12	1840	1650	2750	11200	39300	46700	25000	7020	4260	2940	2460	2100

13	1800	1610	2830	13300	39300	46700	23000	6940	4260	2910	2480	2100
14	1800	1650	2870	14400	39300	47300	21200	6780	4200	2890	2500	2070
15	1720	1650	3000	15500	38800	47800	19000	6630	4150	2830	2520	2070
16	1720	1610	3180	16100	38200	49100	17300	6480	4040	2810	2500	2070
17	1690	1610	3360	16400	37600	49000	15900	6410	3940	2790	2520	2030
18	1650	1650	3360	16400	36500	50500	14600	6270	3940	2770	2540	2030
19	1610	1650	3690	16400	34800	51200	13700	6190	3840	2790	2580	1990
20	1580	1650	4100	16400	34800	51200	12700	6060	3740	2790	2500	1990
21	1580	1610	4420	16400	33700	49800	12200	5920	3690	2750	2460	1950
22	1550	1650	4750	16800	32100	46100	11700	5790	3600	2700	2460	1950
23	1580	1610	4810	17500	30800	40500	11500	5730	3500	2660	2460	1950
24	1580	1580	4810	18500	30400	37100	11900	5600	3360	2620	2420	1910
25	1550	1580	4810	19000	30000	32500	10500	5540	3270	2540	2420	1910
26	1550	1580	4640	18000	30000	30400	10100	5410	3180	2440	2420	1910
27	1550	1580	4530	17800	30400	29200	9850	5160	3090	2380	2380	1870
28	1610	1550	4360	20700	31300	27600	9510	5110	3000	2340	2380	1830
29	1650	1610	4300	24000	32100	26500	9170	4990	2960	2260		1830
30	1690	1650	4300	27600	32100	26100	8830	4930	2870	2260		1830
31		1720		28800	32100		8600		2870	2260		1830

Year: 1948-49

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1870	1870	2940	5800	39300	55000	39600	11500	6060	5150	3140	3170
2	1870	1910	3000	5720	39900	55800	39100	10900	6110	5040	3140	3110
3	1870	1910	3030	7330	39300	55800	37900	10200	6200	4920	3140	3080
4	1870	1870	3110	10700	38800	55800	36800	9740	6340	4750	3140	3060
5	1870	1870	3110	12600	39300	55800	36500	9170	6570	4640	3140	3000
6	1870	1870	3110	13100	39300	55800	35400	8720	6620	4530	3140	2940
7	1910	1910	3080	13100	40500	55800	34200	8320	6710	4360	3140	2910
8	1950	1990	3080	13100	41700	55800	32900	7920	6710	4240	3140	2860
9	1990	2030	3080	13000	43300	55800	30400	7530	6620	4160	3230	2860
10	2030	2010	3030	13000	45600	56200	28800	7360	6570	4050	3280	2810
11	2030	1990	3030	12800	47800	56900	27600	7270	6480	4020	3310	2770
12	2070	1970	3000	13200	49800	57200	26900	7190	6480	3910	3400	2720
13	2070	1950	3000	13800	49800	57600	25400	7100	6340	3850	3450	2680
14	2070	1970	3000	14200	49800	58000	24000	7100	6340	3790	3540	2680
15	2030	2030	2940	14700	50500	57600	23000	7100	6250	3710	3590	2640
16	2030	2120	2940	15100	49100	58300	22100	7270	6250	3680	3680	2640
17	2030	2100	3000	16600	47800	59000	21200	7360	6200	3620	3790	2600
18	1990	2100	3080	18500	46100	59700	20400	7270	6200	3540	3910	2600
19	1990	2040	3310	21800	43900	59700	19600	7020	6110	3540	3990	2600
20	1950	2100	3650	25900	42700	60400	19000	6790	6060	3540	4020	2560
21	1950	2120	3390	30000	41000	61100	18500	6710	6000	3420	3910	2560
22	1910	2180	4580	30200	39300	61100	18000	6620	5860	3400	3740	2520
23	1910	2220	4350	30200	38800	61100	17500	6570	5800	3340	3650	2520
24	1910	2240	6000	29800	42200	60400	17000	6340	5720	3280	3510	2480
25	1870	2300	6570	31300	46100	59000	16400	6200	5660	3280	3400	2440
26	1870	2380	6710	32100	49100	56200	15700	6110	5600	3250	3310	2400
27	1870	2480	6710	32500	52900	51200	15000	6110	5550	3200	3280	2360
28	1870	2580	6480	33700	54300	45800	14400	6110	5460	3200	3170	2320
29	1830	2780	6250	33700	55000	41900	13700	6060	5410	3170	3450	2280
30	1870	2860	6060	35900	55000	40200	12800	6060	5350	3140		2280

31	2940	37600	55000	12200	5290	3140	2280
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Year: 1949-50

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2260	2660	3910	8600	28400	47800	28000	11000	6620	4300	3310	3080
2	2470	2700	3990	9060	28000	43300	26500	11000	6480	4300	3310	3080
3	2160	2660	4050	9170	28000	38200	25400	11200	6340	4240	3280	3060
4	2200	2700	4100	9400	27600	35700	24300	11500	6250	4160	3280	3000
5	2180	2750	4160	9740	27600	33400	23300	12200	6110	4160	3280	2940
6	2140	2790	4160	10500	27600	32300	22700	12700	6060	4100	3280	2910
7	2120	2890	4190	11500	27600	31900	21500	12800	6000	4050	3310	2890
8	2120	2890	4300	12200	28800	32300	20700	12800	5860	4050	3310	2890
9	2100	2890	4360	12300	33100	32800	19600	12800	5720	3990	3310	2830
10	2100	2830	4410	12800	39300	33400	18800	12700	5660	3930	3310	2830
11	2100	2830	4410	13200	41600	34500	17800	12200	5550	3900	3310	2790
12	2100	2830	4360	13700	42700	35700	17000	11900	5410	3850	3310	2790
13	2140	2890	4410	14000	43900	36800	16400	11500	5350	3850	3310	2790
14	2180	2910	4530	14400	44400	38500	15700	10900	5290	3790	3310	2750
15	2180	2890	4640	14800	43900	39100	15000	10800	5240	3790	3310	2750
16	2180	2890	5040	14800	43300	39100	14800	10500	5090	3740	3280	2750
17	2260	2890	6110	14200	43300	37900	14200	9960	5090	3680	3280	2660
18	2300	2890	6340	14200	43300	36200	14000	9740	4980	3680	3230	2660
19	2340	2890	6340	14200	44400	33700	14000	9400	4920	3650	3230	2620
20	2340	2910	6340	14400	46700	32100	14000	9060	4870	3590	3170	2620
21	2340	3000	6340	14800	48400	32100	14200	8720	4810	3540	3170	2580
22	2420	3060	6340	15200	50500	33100	13700	8410	4750	3540	3170	2580
23	2460	3170	6400	15700	51200	33700	13500	8210	4700	3540	3140	2580
24	2500	3310	6400	17300	51900	35400	13000	7920	4640	3510	3140	2540
25	2540	3510	6340	20100	51900	35900	12800	7700	4580	3510	3140	2540
26	2540	3650	6340	22100	51900	36500	12700	7530	4530	3450	3140	2500
27	2540	3790	6480	23300	52600	34800	12500	7360	4470	3450	3090	2500
28	2580	3850	6710	25000	51900	33100	12300	7190	4470	3450	3090	2460
29	2620	3850	7360	26900	51600	31300	11900	7020	4410	3450		2460
30	2660	3850	7700	27600	50500	29200	11600	6850	4360	3370		2460
31		3850		28400	49800		11000		4300	3370		2460

Year: 1950-51

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2420	1950	2260	15500	28800	46700	25000	6000	4240	2910	2700	2420
2	2380	1950	2300	16100	30000	45600	22700	5860	4160	2890	2700	2420
3	2380	1950	2300	17800	32500	44400	20900	5800	4100	2890	2700	2390
4	2380	1990	2380	18500	37600	43900	19600	5660	4100	2830	2700	2340
5	2380	1990	2460	19000	40500	42700	19000	5550	3990	2790	2700	2340
6	2340	1950	2890	18800	42700	41600	18000	5460	3910	2790	2700	2300
7	2340	1950	2910	18300	44400	40500	17800	5400	3850	2790	2700	2260
8	2340	1950	2940	18000	46100	39300	16400	5290	3740	2790	2700	2260
9	2340	1990	3000	17500	46700	37600	15700	5240	3650	2750	2700	2220
10	2340	1990	3080	17000	47800	36500	14200	5240	3590	2750	2700	2180
11	2340	1990	3280	17000	46100	38200	13200	5240	3540	2750	2660	2180
12	2340	1990	3400	17800	44400	38800	12200	5240	3540	2700	2660	2140
13	2260	2030	3590	18300	43900	38200	11600	5150	3510	2700	2660	2140
14	2220	2030	4190	18300	43300	37100	10900	5090	3450	2700	2620	2100

15	2220	2030	5040	18000	44400	34200	9960	5150	3450	2660	2620	2070
16	2180	2070	6000	17800	46700	32100	9400	5150	3400	2660	2620	2070
17	2180	2070	6200	17800	48400	30000	8830	5150	3370	2660	2620	2030
18	2180	2070	6480	18300	50500	28800	8210	5150	3310	2660	2580	2030
19	2160	2070	6930	18800	50500	27200	7910	5090	3280	2620	2580	1990
20	2120	2100	7020	18300	52600	26900	7810	5040	3280	2620	2580	1990
21	2100	2100	7100	19600	51900	26100	7700	4920	3230	2620	2580	1990
22	2080	2140	7440	20600	52600	25800	7610	4870	3170	2620	2540	1990
23	2080	2140	7700	21800	52600	25000	7270	4750	3140	2620	2540	1990
24	2070	2180	8410	23000	51900	24700	7270	4700	3140	2660	2500	1990
25	2010	2180	9620	24700	51200	23700	7100	4640	3080	2660	2500	1990
26	2010	2180	11000	26100	49800	25800	6850	4580	3060	2660	2460	1990
27	1950	2180	12700	26500	49100	28400	6710	4530	3060	2660	2460	1990
28	1950	2220	14200	26900	48400	29200	6570	4470	3000	2660	2460	1990
29	1950	2220	15000	27600	48400	28800	6400	4410	3000	2660		1990
30	1950	2220	15000	27600	47800	26900	6250	4240	2940	2700		1990
31		2260		28000	47300		6110		2940	2700		1990

Year: 1951-52

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1990	1910	2140	5910	15500	40500	16100	6570	4300	2790	2300	1950
2	1990	1870	2140	6060	15200	38200	15700	6340	4190	2790	2260	1950
3	1950	1870	2180	6480	15700	39300	14600	6110	4190	2700	2260	1950
4	1950	1870	2140	6710	16100	37600	13800	6000	4100	2700	2220	1910
5	1950	1830	2220	7610	16400	33700	13200	5800	3990	2620	2220	1910
6	1950	1830	2220	8720	16100	31300	12300	5600	3930	2580	2220	1910
7	1950	1830	2220	11500	15900	30000	12000	5550	3850	2580	2180	1870
8	1950	1830	2220	14000	17000	28800	11600	5410	3790	2500	2180	1870
9	1950	1870	2260	17800	17500	26900	11000	5350	3740	2500	2180	1870
10	1950	1870	2300	21200	22100	25400	11000	5240	3650	2460	2180	1870
11	1990	1870	2340	23300	23000	24300	10900	5090	3510	2460	2140	1910
12	1990	1870	2380	23300	23300	23300	10600	4920	3510	2380	2140	1910
13	2030	1870	2540	21800	23700	22700	10300	4750	3400	2380	2100	1910
14	2030	1870	2790	20400	23700	22400	10100	4580	3310	2380	2100	1910
15	2030	1870	3080	19000	24000	24700	9620	4580	3310	2380	2060	1910
16	2030	1910	3310	18300	24300	28800	9280	4530	3280	2380	2060	1910
17	2070	1910	3540	19000	25000	32500	9060	4360	3230	2380	2030	1910
18	2070	1910	3910	19000	25400	35400	8720	4240	3230	2340	2030	1870
19	2030	1910	4190	19000	25800	36500	8490	4300	3170	2340	2060	1870
20	2030	1910	4470	18800	26900	32500	8210	4360	3140	2340	2030	1870
21	2070	1990	4810	18300	27600	30000	8010	4360	3140	2340	2030	1870
22	2070	2070	5150	18300	29600	28400	7920	4410	3080	2340	1990	1870
23	2070	2070	5550	18500	30800	26500	7810	4470	3080	2340	1990	1870
24	2030	2070	5800	18800	31700	25400	7700	4470	3060	2340	1990	1870
25	2030	2070	5800	18000	33100	24000	7610	4530	3000	2380	2030	1870
26	1990	2100	5800	17300	33700	22700	7530	4360	2940	2340	1990	1870
27	1950	2180	5860	17300	35900	21200	7360	4410	2910	2340	1990	1870
28	1910	2180	5910	17000	40500	20100	7190	4470	2910	2340	1950	1870
29	1910	2470	6060	16600	41600	18500	7020	4360	2890	2340		1870
30	1910	2180	6060	15900	42200	17300	6850	4360	2890	2340		1870

31 2180 15700 41600 6710 2890 2340 1870

Year: 1952-53

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1870	1800	2700	11300	29300	48800	25900	6370	3420	2410	2000	1800
2	1870	1800	2960	12700	32000	49500	24700	6200	3400	2370	2000	1800
3	1870	1830	3050	14600	32400	50200	23300	6110	3340	2330	2000	1770
4	1870	1830	3090	14600	32000	51800	21600	6030	3280	2290	2000	1770
5	1870	1870	3140	17500	32400	52600	20400	5860	3230	2260	1970	1770
6	1870	1870	3330	18400	34500	51800	19500	5860	3200	2220	1970	1770
7	1870	1870	3320	22900	35500	50200	18400	5690	3140	2180	1970	1770
8	1910	1910	3410	25500	39900	49500	17700	5550	3080	2110	1970	1740
9	1910	1950	3500	25500	40500	47400	17100	5480	3060	2070	1930	1710
10	1870	1950	3450	24700	41600	46000	16400	5330	3060	2030	1930	1710
11	1870	1990	3550	23900	41600	43300	15500	5260	3000	2000	1930	1710
12	1870	1990	3500	23300	41600	41600	14800	5190	2970	2000	1930	1680
13	1870	2030	3500	22600	42200	38800	14200	5050	2970	1970	1900	1640
14	1870	2030	3410	23300	42200	36500	13400	4910	2910	1930	1900	1640
15	1830	2060	3270	25500	42200	35000	12800	4730	2860	1930	1900	1610
16	1830	2100	3230	28800	43300	32900	12400	4670	2820	1900	1860	1610
17	1830	2100	3230	30600	43900	32000	11900	4560	2780	1930	1860	1580
18	1800	2180	3230	29700	44600	30200	11400	4500	2780	1930	1860	1580
19	1800	2140	3230	27100	45300	29300	10900	4390	2740	1930	1860	1580
20	1800	2140	3360	24300	45300	28400	10500	4330	2700	1970	1860	1580
21	1800	2140	3600	22900	45300	27500	10100	4160	2650	1970	1830	1560
22	1800	2140	3990	21900	45300	26700	9620	4110	2650	1970	1830	1560
23	1800	2180	4470	20900	45300	26300	9060	4000	2610	2000	1830	1530
24	1800	2220	4870	20100	46000	27100	8990	3940	2570	1970	1830	1530
25	1800	2220	5160	19200	46000	27900	8320	3890	2570	1970	1800	1470
26	1760	2300	5540	18700	46700	28800	7870	3730	2530	2000	1800	1470
27	1760	2340	6200	18400	47400	29300	7640	3680	2530	2000	1800	1440
28	1760	2340	7610	18400	46700	29300	7410	3630	2490	2000	1800	1440
29	1800	2380	9170	20100	46700	28400	6990	3540	2450	2030	1900	1420
30	1800	2460	9960	23300	46700	27100	6710	3480	2450	2030		1420
31		2620		25500	47400		6450		2410	2000		1390

Year: 1953-54

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1390	1190	1710	4390	41600	46000	22600	7640	4050	2530	2220	1830
2	1360	1220	1710	5120	46000	42700	23300	7300	4000	2530	2220	1830
3	1360	1220	1710	5770	47400	38800	24300	7100	3890	2490	2180	1830
4	1330	1220	1710	5640	48100	36000	25500	6910	3840	2490	2180	1830
5	1330	1220	1680	7300	48100	33400	25500	6810	3730	2450	2180	1830
6	1330	1220	1740	8090	48100	32900	24300	6620	3680	2450	2110	1860
7	1330	1220	1800	8910	46700	31100	23300	6450	3530	2410	2070	1860
8	1300	1250	1830	9760	46000	29300	21900	6280	3480	2410	2030	1900
9	1300	1250	1830	10900	44600	27500	20900	6110	3380	2410	2000	1930
10	1300	1250	1830	12600	43900	26700	20100	6030	3330	2410	1970	1970
11	1270	1270	1860	15000	42200	27100	19000	5940	3240	2410	1930	1970

12	1270	1270	1860	15900	39900	28400	17700	5770	3240	2410	1900	1970
13	1250	1270	2030	16600	38200	30200	17100	5550	3190	2410	1830	1970
14	1250	1300	2180	17600	38200	34500	16700	5480	3140	2410	1800	1970
15	1250	1300	2290	18200	39900	39900	15500	5410	3140	2330	1800	1970
16	1220	1330	2410	19200	40500	45300	14800	5330	3060	2330	1800	1970
17	1220	1360	2450	20900	39900	46700	13800	5260	3060	2330	1800	1970
18	1220	1390	2490	25500	38800	48100	13000	5190	3060	2330	1800	1970
19	1220	1440	2530	29300	36500	47400	12400	5050	2970	2330	1800	1970
20	1220	1440	2530	31500	35500	46000	11900	4980	2970	2260	1800	1970
21	1220	1470	2570	32400	35500	44600	11100	4840	2860	2260	1800	1970
22	1220	1500	2610	32900	36500	41600	10600	4670	2860	2260	1800	1970
23	1220	1500	2700	32900	40500	38200	10300	4610	2780	2260	1800	1970
24	1220	1530	2820	31500	41000	35500	9900	4560	2780	2260	1800	1930
25	1220	1580	2960	32000	42700	32400	9480	4500	2780	2260	1800	1900
26	1220	1580	3010	33500	44600	28400	9200	4440	2700	2260	1800	1830
27	1190	1640	3050	35500	47400	26300	8770	4390	2650	2260	1800	1800
28	1190	1740	3190	37100	48800	25100	8550	4270	2570	2260	1830	1770
29	1190	1740	3380	38800	50900	24300	8430	4220	2530	2260		1740
30	1190	1740	3840	39300	50900	23300	8210	4160	2570	2260		1740
31		1740		39900	49500		7870		2530	2220		1680

Year: 1954-55

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1680	1390	1800	9620	38800	54300	31500	10300	5890	3620	2820	3010
2	1640	1390	2150	10000	41000	56000	31100	9960	5630	3570	2820	2960
3	1640	1420	2330	10300	42700	53500	31500	9790	5420	3570	2780	2960
4	1610	1440	2330	10500	43900	52600	31500	9480	5280	3540	2780	2960
5	1610	1440	2330	10900	43900	49500	30600	9200	5210	3540	2730	2910
6	1610	1440	2260	11700	43300	44600	29700	9060	4990	3540	2730	2910
7	1580	1440	2490	12400	42700	42700	27500	9060	4990	3570	2960	2870
8	1560	1440	2570	12800	42200	39900	27500	8770	4920	3540	3100	2870
9	1560	1440	2610	12600	41600	37100	28400	8630	4920	3480	3100	2870
10	1530	1440	2610	12600	39900	34500	30600	8490	4920	3480	3010	2820
11	1530	1440	2610	12400	39900	32400	31500	8350	4710	3420	2960	2820
12	1500	1440	2740	12300	39300	30200	30200	8210	4640	3400	2960	2780
13	1500	1440	2820	12100	38200	27800	28800	8210	4570	3400	2960	2730
14	1500	1440	2960	12100	38200	26700	25900	8070	4500	3340	2910	2690
15	1470	1440	3140	11900	40500	24700	23900	8070	4330	3380	2910	2690
16	1470	1440	3430	11600	42200	23900	20700	7810	4270	3290	2960	2650
17	1470	1440	3730	11200	45300	27100	18400	7700	4220	3290	2960	2650
18	1470	1470	4050	11200	49500	31100	16600	7470	4100	3290	2960	2650
19	1440	1530	4390	11900	52600	34500	15000	7240	4050	3190	2960	2600
20	1420	1610	4670	12600	55200	37100	13800	7130	4000	3190	2960	2600
21	1420	1610	5120	13400	56000	37600	13000	7020	4000	3190	2960	2560
22	1420	1610	5550	14000	56900	38800	11900	6910	4000	3190	2960	2560
23	1390	1610	6110	14800	57700	39900	10600	6740	3890	3100	2960	2560
24	1390	1580	7410	17900	57700	41600	10000	6570	3890	3100	2960	2520
25	1390	1560	7410	22200	56900	42200	9620	6480	3830	3100	2960	2520
26	1390	1560	7750	26300	58600	41000	9340	6400	3780	3010	2960	2480
27	1390	1560	8430	29700	58600	39900	8770	6310	3780	3010	2960	2480
28	1390	1580	9200	32000	57700	37600	8430	6230	3730	3010	3010	2480
29	1390	1580	9760	34000	56900	34500	8090	6140	3730	3010		2480

30	1390	1640	9760	35500	56900	32400	10800	6060	3680	2910		2430
31		1740		36500	56000		10500		3630	2910		2430

Year: 1955-56

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2430	1870	2350	9200	47800	51700	33100	17400	8240	4680	3740	3170
2	2430	1870	2350	9480	47400	50000	32000	16700	8010	4610	3740	3110
3	2430	1910	2310	9960	47000	57800	32000	16200	7900	4610	3740	3110
4	2430	1990	2310	9790	45700	45700	32000	15600	7900	4540	3740	3110
5	2390	1990	2350	10600	44100	44100	32400	15300	7670	4470	3740	3030
6	2390	1990	2520	11000	43000	43800	32000	14900	7560	4540	3680	3030
7	2390	1990	2600	11800	42200	43800	31100	14500	7330	4400	3680	3030
8	2390	1990	2780	16600	41400	44900	30800	13400	7130	4400	3680	3030
9	2350	2030	2910	18300	43000	46100	30100	12800	7030	4340	3590	2970
10	2350	2030	3050	20900	44900	47000	30100	12500	6930	4400	3590	2910
11	2310	2030	3100	24100	47000	47400	30100	12000	6830	4340	3540	2860
12	2310	2070	3100	24900	49100	47000	34100	11800	6740	4340	3540	2860
13	2220	2070	3100	24900	50800	47000	37100	11700	6540	4340	3540	2860
14	2180	2110	3140	24900	53100	46600	39200	11300	6440	4330	3540	2800
15	2180	2110	3330	25200	55800	45300	40000	11000	6340	4270	3540	2740
16	2150	2110	3480	25500	57200	45700	37800	10800	6250	4190	3540	2740
17	2110	2070	3570	26100	58500	45300	35800	10500	6170	4130	3540	2740
18	2110	2030	3730	26800	59900	47400	33400	10500	6080	4080	3540	2740
19	2070	2030	3830	33100	60300	51300	31400	10300	5910	4080	3540	2740
20	2030	2030	3830	35800	60300	54000	29500	10000	5740	4080	3480	2680
21	1990	2070	3890	38100	60300	56300	29500	9760	5660	3990	3400	2680
22	1990	2110	3940	41100	60300	58100	31700	9480	5580	3930	3400	2680
23	1990	2150	4050	43800	60300	57600	31700	9370	5490	3930	3340	2630
24	1950	2180	4440	45700	59400	57200	28200	9250	5320	3930	3340	2630
25	1950	2180	5630	47400	59400	54400	27600	9030	5290	3930	3280	2570
26	1910	2220	6820	49100	59400	51700	26500	8910	5180	3850	3230	2570
27	1910	2220	7810	50400	59400	46600	25900	8960	5040	3850	3230	2510
28	1910	2220	8490	50800	59000	42600	26900	8570	4970	3790	3170	2510
29	1910	2220	8770	50800	57600	38500	24300	8460	4970	3790		2510
30	1870	2260	9340	49500	56300	36100	20600	8240	4900	3740		2460
31		2310		48300	53700		18100		4750	3740		2460

Year: 1956-57

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2460	2190	4630	19000	41400	49500	28200	26500	11200	4750	4980	4080
2	2400	2190	4700	18500	41900	48400	26500	25500	10800	4750	4980	4080
3	2400	2190	4700	17800	42400	47300	25200	24300	10200	4700	4900	4080
4	2400	2240	4530	17600	42900	46200	24300	23300	9760	4700	4980	3990
5	2400	2240	4470	17600	43500	44500	23600	22700	9370	4610	4900	3930
6	2400	2300	4470	17800	42400	42900	22700	21800	8910	4610	4980	3930
7	2400	2400	4410	18100	41400	40400	22400	21800	8570	4530	4980	3850
8	2400	2510	4410	18300	39900	38400	22400	20900	8320	4470	4980	3850
9	2400	2680	4470	18700	38400	37900	22400	19500	8010	4410	4980	3850
10	2400	2680	4980	18700	36600	37900	22400	18100	7440	4700	4980	3790
11	2400	2740	5740	18700	37000	38400	22100	16900	7020	4980	4980	3740
12	2400	2800	6000	18500	41900	39400	22100	16200	6620	5260	5040	3740

13	2400	2740	6080	18500	44500	42900	22100	15500	6340	5580	4900	3740
14	2400	2680	6170	19200	45600	48400	22700	14700	6080	5910	4900	3740
15	2400	2680	6340	21100	46200	49000	26200	14300	5910	5910	4900	3680
16	2400	2800	6450	22400	47800	51200	29300	14100	5830	5830	4810	3590
17	2350	2800	8460	22700	49000	54100	34400	13700	5740	5740	4750	3540
18	2350	2910	9620	23600	51200	56900	38400	13500	5740	5660	4700	3400
19	2350	3110	10300	24900	52400	58700	41400	13400	5580	5580	4700	3400
20	2350	3280	10900	27200	53500	60100	43500	13200	5410	5490	4610	3400
21	2300	3540	12200	30100	55200	60100	45600	13200	5260	5410	4610	3400
22	2240	3790	13200	32700	55800	58700	46700	13000	5260	5260	4530	3400
23	2240	4000	14500	35200	56300	56300	46700	13000	5260	5260	4410	3340
24	2240	4190	15100	36100	56900	52400	45100	13000	5180	5180	4330	3340
25	2190	4270	16200	34800	56900	49500	44000	12800	5090	5090	4330	3280
26	2190	4330	18100	34400	57500	44000	40900	12700	5040	5040	4270	3280
27	2190	4270	19000	34000	56900	39400	37000	12300	4980	4980	4190	3230
28	2190	4190	20000	34000	55200	35200	34000	12300	4980	4900	4190	3230
29	2190	4080	20300	35700	53500	32700	32300	12200	4900	4900	4900	3170
30	2190	4130	19800	37900	52400	30400	30800	11700	4900	4900		3170
31		4270		40400	51200		28600		4810	4980		3110

Year: 1957-58

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	3030	2570	2570	6080	37500	30100	19200	8240	5660	4190	3280	2510
2	3030	2570	2570	6170	37000	32300	18300	8010	5580	4130	3280	2460
3	2970	2510	2570	6250	36100	35700	17600	7780	5490	4080	3230	2460
4	2910	2510	2630	6250	35200	37500	17100	7560	5400	3990	3230	2460
5	2910	2510	2680	6250	35200	38900	16700	7560	5320	3930	3230	2460
6	2800	2460	2740	6340	34800	40900	16200	7440	5260	3930	3280	2460
7	2800	2460	2740	6620	34800	43500	15600	7330	5180	3850	3280	2460
8	2800	2460	2800	6930	35700	44000	15000	7240	5180	3790	3280	2460
9	2800	2400	2800	7440	36100	45100	14500	7240	5040	3790	3230	2460
10	2800	2400	2860	7780	36600	46200	13900	7130	5040	3740	3170	2460
11	2800	2400	2910	8570	36600	46200	13400	7020	4980	3740	3170	2460
12	2680	2400	3030	9030	36600	45600	12900	6930	4980	3740	3110	2460
13	2680	2460	3110	9760	35700	41900	12300	6850	4980	3680	3110	2460
14	2680	2460	3230	10300	35700	37900	11800	6740	4900	3590	3110	2460
15	2630	2460	3230	11200	35700	36100	11300	6620	4810	3590	3110	2400
16	2630	2460	3230	12700	36100	34800	11000	6620	4750	3590	3030	2400
17	2630	2460	3230	13700	36100	32000	10900	6620	4750	3590	2970	2400
18	2630	2510	3340	15300	36100	30400	10600	6540	4750	3590	2970	2400
19	2630	2510	3480	17400	36100	29000	10300	6450	4700	3540	2910	2350
20	2630	2510	3540	17100	36600	27600	10000	6250	4700	3540	2910	2350
21	2630	2510	3680	17800	36600	27600	9900	6170	4610	3480	2860	2350
22	2630	2510	3740	19500	36100	28600	9760	6170	4610	3480	2800	2350
23	2630	2510	3850	20900	35700	30400	9480	6080	4530	3480	2740	2350
24	2630	2510	3930	28200	34800	30400	9370	6000	4530	3480	2680	2350
25	2570	2510	4080	30800	34800	30100	9250	5910	4470	3400	2680	2350
26	2570	2510	4410	32700	34400	28600	9030	5830	4470	3340	2630	2350
27	2570	2510	4750	32700	33100	26500	8800	5830	4410	3340	2510	2350
28	2570	2510	5040	33500	32000	24600	8570	5830	4410	3340	2510	2350
29	2570	2570	5490	35700	30400	22100	8460	5740	4410	3340		2350
30	2570	2570	6000	37500	29300	20300	8350	5740	4410	3350		2300

31 2570 37900 28600 8240 4330 3280 2300

Year: 1958-59

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2350	2140	2510	5240	35700	42900	23300	13900	6170	5040	4240	3990
2	2300	2140	2630	5320	39400	42900	22400	13500	6170	4950	4240	3930
3	2300	2140	2740	5580	40900	42400	21800	13200	6080	4900	4390	3930
4	2350	2240	2740	5910	41900	40400	20900	12800	6080	4750	4440	3880
5	2300	2300	2680	6250	46700	38900	20900	12500	6000	4700	4560	3880
6	2350	2350	2630	6740	47800	37000	24600	11500	5910	4700	4640	3820
7	2350	2400	2510	7440	50100	35200	29000	11000	5740	4700	4700	3820
8	2300	2400	2460	7900	50100	34000	33100	10800	5740	4700	4700	3820
9	2350	2350	2460	8240	50700	33100	36100	10300	5740	4640	4700	3820
10	2350	2400	2510	8570	51200	33100	37900	9900	5740	4560	4700	3740
11	2350	2400	2510	8910	52400	33500	38400	9480	5660	4560	4640	3740
12	2350	2400	2460	9140	52400	33500	38400	8910	5580	4560	4640	3740
13	2350	2350	2400	9030	54100	33500	38400	8910	5580	4500	4640	3680
14	2400	2400	2460	9370	55800	33500	37000	8910	5580	4500	4640	3680
15	2400	2350	2460	9760	56300	32700	34800	8800	5490	4110	4560	3680
16	2400	2400	2460	9900	56300	32300	32300	8570	5410	4110	4560	3620
17	2400	2460	2400	10300	56300	34000	30800	8350	5410	4110	4500	3620
18	2350	2570	2400	11500	56300	36600	28600	8120	5320	4110	4500	3570
19	2350	2570	2460	13500	55800	38400	26900	7900	5320	4110	4390	3570
20	2350	2630	2570	15100	54600	40600	25500	7670	5320	4110	4300	3570
21	2350	2630	2680	17400	52900	41900	24300	7560	5320	4110	4240	3510
22	2300	2680	2860	20600	52400	41400	22700	7440	5260	4110	4190	3510
23	2240	2630	2970	22400	51800	39800	21500	7130	5260	4110	4190	3370
24	2240	2570	3170	23000	50700	37000	20300	7020	5180	4110	4130	3310
25	2240	2570	3540	23000	49000	33500	19200	6940	5180	4110	4130	3310
26	2240	2510	4080	22700	46200	30400	18300	6850	5180	4110	4130	3310
27	2240	2510	4470	23000	44500	28600	17600	6740	5090	4180	4050	3250
28	2190	2460	4980	24300	43500	26900	16900	6450	5090	4180	3990	3250
29	2190	2460	5090	25500	43500	25500	16000	6340	5040	4180		3200
30	2190	2460	5090	28600	43500	24300	15300	6250	5040	4180		3110
31		2460		32700	42900		14500		5040	4240		3110

Year: 1959-60

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	3200	2750	2940	7920	29200	30400	26300	12500	6740	4440	3330	2640
2	3260	2750	2940	7920	29200	28800	27700	12100	6650	4370	3320	2590
3	3260	2690	3060	7920	31200	27400	26700	11700	6480	4370	3310	2580
4	3200	2690	3200	7920	32900	27400	30200	11100	6400	4300	3230	2580
5	3110	2750	3260	7840	35000	28400	31000	10600	6400	4300	3220	2530
6	3110	2810	3370	7730	37200	29600	30600	10100	6170	4230	3200	2490
7	3060	2810	3420	7640	39000	30800	30600	9960	6110	4230	3140	2480
8	3060	2890	3570	7640	39900	32500	29800	9710	5940	4160	3120	2480
9	3060	2890	3620	7840	42300	33700	29000	9450	5890	4090	3110	2480
10	3060	2810	3740	8240	43700	35000	27200	9230	5800	4030	3040	2470
11	3060	2810	4130	8830	44200	36700	26500	9000	5740	3960	2980	2470
12	3060	2890	4300	10300	44200	39500	26500	8890	5660	3960	2970	2460
13	3060	2940	4390	11400	44200	40400	26800	8660	5600	3960	2910	2420
14	3060	3000	4500	12600	44700	40800	26800	8380	5520	3960	2900	2460

15	3000	3000	4750	13800	47200	41300	26200	8210	5460	3900	2880	2460
16	2940	3000	5090	15800	49400	40800	25500	8210	5410	3900	2820	2470
17	2940	2940	5380	18000	50500	39900	24600	8180	5320	3910	2820	2440
18	2890	2890	5630	20600	52100	38500	23300	8070	5260	3850	2820	2440
19	2890	2810	6140	20000	52700	35800	22100	7920	5180	3860	2770	2450
20	2890	2810	6450	19100	52700	34600	20900	7810	5120	3800	2770	2450
21	2890	2890	6850	18300	52700	32900	20000	7700	4980	3750	2710	2420
22	2890	2940	7270	17700	52100	31600	18600	7580	4920	3750	2710	2430
23	2810	2940	7750	18300	51000	30400	17800	7500	4780	3690	2700	2430
24	2810	2940	7920	19700	50500	30000	17000	7500	4730	3640	2700	2440
25	2750	3000	8040	22500	49400	30800	16200	7360	4670	3690	2700	2440
26	2750	3000	8040	25700	48300	30800	15700	7160	4670	3510	2700	2400
27	2750	3000	8040	27700	46200	29600	15000	7080	4580	3500	2640	2400
28	2750	3000	7920	29200	41800	28400	14300	6960	4580	3490	2640	2400
29	2810	2940	7840	29600	38500	27000	13900	6820	4530	3420		2400
30	2810	2940	7920	29600	35800	26700	13500	6820	4530	3410		2360
31		2940		29200	32400		13000		4470	3400		2360

Year: 1960-61

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2360	2130	2770	6480	26500	46800	28500	11200	4190	2670	2150	2630
2	2360	2120	2940	6950	25800	47100	29000	10600	4110	2670	2100	2580
3	2320	2120	3040	7340	26600	47600	29900	10000	4030	2670	2100	2540
4	2320	2120	3200	7440	26100	48000	29900	9550	3950	2630	2150	2540
5	2320	2080	3260	7640	27200	46800	29200	8930	3870	2630	2150	2450
6	2280	2070	3200	7640	29000	45600	28100	8570	3830	2630	2150	2400
7	2280	2070	3150	7640	30600	45300	26800	8120	3720	2630	2100	2350
8	2280	2060	3100	7740	32400	43800	25800	7690	3650	2630	2100	2310
9	2240	2020	3100	7740	33500	43400	24900	7390	3520	2610	2060	2270
10	2240	2010	3100	7740	35000	43100	24000	7090	3450	2580	2060	2230
11	2240	2000	3100	8170	36500	42800	27000	6800	3400	2580	2060	2230
12	2240	2000	3100	9450	38100	42500	27100	6520	3400	2580	2060	2230
13	2200	1950	3100	11800	38800	42200	30600	6380	3330	2580	2060	2180
14	2200	1950	3040	14700	39700	42400	30700	6180	3330	2540	2150	2180
15	2210	1940	2990	17400	42000	42100	32400	5980	3270	2540	2270	2150
16	2230	1920	2880	19800	43400	41000	32400	5810	3280	2490	2310	2150
17	2200	1890	3100	21900	43400	39600	31300	5610	3310	2450	2310	2100
18	2210	1870	3480	23100	43400	38200	28600	5510	3150	2350	2450	2060
19	2210	1880	3660	23900	43400	36300	26600	5410	3000	2350	2540	2020
20	2190	1880	3840	25400	44400	35900	26800	5230	2950	2310	2580	2020
21	2200	1930	4230	28000	45800	35400	22400	5060	2910	2310	2630	2020
22	2210	1930	4440	31000	46800	34500	21000	4950	2870	2270	2630	2020
23	2220	1930	4580	32500	47700	33200	19700	4940	2880	2270	2630	1980
24	2190	1930	4730	33800	47700	31600	18000	4920	2840	2230	2630	1980
25	2190	1930	4880	35100	47500	30500	16700	4750	2840	2230	2670	1980
26	2180	1930	4960	35100	46800	29400	15200	4660	2830	2230	2670	1980
27	2180	1940	5040	35100	46600	28200	14500	4550	2710	2230	2670	1940
28	2170	2000	5270	34100	46400	29600	13700	4460	2680	2230	2670	1940
29	2170	2120	5600	31900	46800	28000	12900	4370	2640	2180	2060	1940
30	2170	2270	6030	30400	47100	28800	12500	4270	2650	2150		1940
31		2440		28800	47100		11900		2650	2150		1940

Year: 1961-62

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1940	1870	2060	7240	19800	73200	31800	20700	7780	5180	3740	3480
2	1940	1910	2060	7470	21300	73200	32600	20200	7670	5090	3740	3480
3	1940	1910	2020	7810	23000	73200	37400	19200	7560	4920	3540	3480
4	1940	1910	2020	7810	25500	73200	46500	17900	7440	4840	3590	3420
5	1940	1910	1980	7920	28500	72000	51600	17000	7330	4700	3650	3420
6	1940	1910	1940	11000	32600	72000	54400	16100	7220	4640	3850	3370
7	1940	1940	2060	8600	34900	68600	57000	15700	7100	4560	4100	3370
8	1940	1940	2270	9170	35400	62900	57800	15100	6880	4500	4440	3370
9	1940	1940	2630	10100	37700	62900	57800	14500	6760	4360	4360	3310
10	1940	1940	2910	10300	39400	61800	57000	13700	6540	4300	4240	3310
11	1940	1910	2970	10100	42800	61800	52100	12900	6450	4240	3740	3250
12	1940	1910	3030	11300	45400	62900	51600	12400	6370	4160	3740	3250
13	1940	1910	3030	12500	47900	65200	46500	12000	6370	4100	3740	3250
14	1940	1910	3110	17900	48800	65200	41400	11700	6280	4050	3740	3250
15	1940	1910	3400	20100	49600	65200	39600	11400	6200	3910	3650	3250
16	1910	1940	3620	20400	49600	65200	40200	11300	6030	3910	3590	3480
17	1910	1940	3760	21700	50500	62900	40800	11200	5860	4050	3590	3480
18	1910	1940	6680	21300	51300	59500	43600	10500	5770	4100	3590	3480
19	1870	1940	9030	20800	51300	52700	46500	10300	5770	4160	3540	3480
20	1870	1940	11300	23800	50500	48200	47600	9740	5770	4240	3540	3480
21	1870	1940	10600	26400	49600	41900	47600	9480	5520	4240	3590	3540
22	1870	1940	9620	27600	49600	41900	47600	9370	5260	4300	3740	3540
23	1830	1940	8770	27600	49600	38000	47000	9250	5090	4360	3650	3310
24	1830	1910	7700	27600	49600	36000	41400	9030	5090	4300	3650	3200
25	1830	1870	7130	26400	50500	35200	36800	8910	5090	4100	3650	3170
26	1830	1910	7470	25100	59500	34700	33000	8570	5010	3910	3650	3110
27	1830	1940	7920	23800	60700	34700	28400	8350	5010	3910	3650	3250
28	1830	1980	7920	22600	62900	34700	26100	8240	4920	3850	3540	3200
29	1830	2020	7700	20400	66300	34700	24600	8120	5090	3850		3170
30	1830	2060	7470	19800	70900	33500	23200	8010	5090	3790		3170
31		2020		19600	72000		21800		5260	3790		3170

Year: 1962-63

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	3170	2430	2800	12700	36000	57800	47600	9140	5770	3910	3310	2730
2	3170	2460	2800	16100	40200	55300	47600	8800	5690	3910	3310	2730
3	3110	2550	2860	18100	43100	53600	47600	8570	5600	3910	3310	2680
4	3110	2550	2910	18900	42500	50400	47600	8350	5430	3910	3250	2680
5	3110	2550	3060	19700	40800	46500	41400	8120	5260	3910	3250	2590
6	3060	2630	3200	20400	43100	47000	34300	8010	5090	3910	3250	2590
7	3060	2690	3310	21000	45300	50400	31300	7780	5010	3960	3250	2550
8	3000	2720	3420	21000	45300	51200	28400	7560	4840	4050	3200	2510
9	2910	2720	3420	21000	45300	50400	24400	7780	4780	3960	3200	2510
10	2860	2800	3480	21300	45300	49300	25500	8010	4700	3910	3200	2510
11	2720	2910	3540	21300	45900	48200	24100	7900	4560	3850	3170	2510
12	2690	3000	3960	21300	46500	47000	22400	7670	4500	3850	3110	2470

13	2690	3000	5090	20700	46500	45300	21500	7560	4500	3790	3060	2470
14	2690	3000	5690	20200	44200	43100	20400	7330	4500	3740	3060	2430
15	2630	3000	6540	19700	42500	41900	19900	7220	4440	3740	3000	2430
16	2630	3060	7220	19700	40800	37400	20700	7100	4360	3680	3000	2470
17	2630	3060	7900	19400	39100	33500	19900	7100	4300	3680	2940	2510
18	2600	3060	8350	19400	37400	31800	19700	6990	4300	3590	2940	2550
19	2600	3060	9140	19200	37400	34300	18900	6760	4240	3540	2910	2550
20	2520	3060	8910	18900	39700	33800	18900	6650	4160	3540	2910	2510
21	2410	3140	8910	18100	41400	34300	17900	6450	4160	3480	2910	2490
22	2350	3140	9030	17700	43100	35100	15500	6370	4100	3480	2860	2510
23	2260	3140	9250	17500	47000	34700	14500	6280	4050	3420	2860	2470
24	2290	3110	9620	17500	49900	35100	13700	6280	4050	3420	2860	2430
25	2350	3060	10300	18400	52700	35500	12900	6370	4100	3420	2820	2430
26	2410	3000	10800	18900	56100	36000	12400	6370	4160	3370	2820	2390
27	2410	3000	11300	19400	57800	36800	11700	6200	4100	3370	2770	2390
28	2410	3000	11900	19900	58700	41400	11300	6110	4100	3370	2730	2390
29	2350	2910	12200	21500	58700	45300	11000	6030	4050	3370	3060	2390
30	2350	2860	12900	25800	58700	47900	10200	5940	4050	3370	3060	2360
31	2630	2800	6540	31800	58700	41900	9370	7220	3960	3370	3000	2360

Year: 1963-64

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2360	2360	3000	9480	32600	53500	32100	12900	6200	4080	3060	2600
2	2360	2390	2940	9620	33000	53500	31300	12500	6110	4080	3030	2520
3	2390	2390	2910	10000	33000	54400	30900	12000	6030	4080	3060	2520
4	2430	2390	2910	10800	33000	55300	30900	11700	5940	4020	3030	2520
5	2430	2470	2940	11300	33000	55300	30900	11300	5860	4020	3000	2550
6	2430	2470	3060	11700	33800	54400	30500	11000	5770	4020	3000	2520
7	2430	2510	3200	12000	33800	54400	30500	10900	5690	3960	2970	2520
8	2430	2640	3250	12000	34300	54400	30500	10900	5600	3960	2970	2550
9	2430	2640	3370	12000	34300	56100	27100	10600	5520	3910	2970	2520
10	2430	2590	3420	12400	35100	56100	26100	10200	5430	3910	2940	2520
11	2430	2590	3540	12400	35100	56100	24900	10200	5260	3850	2940	2490
12	2430	2550	3650	12500	35500	55300	23500	9740	5180	3850	2890	2490
13	2430	2590	4100	13200	36000	52700	22700	9480	5090	3790	2890	2490
14	2430	2640	4700	14300	36400	51600	21800	9370	5010	3740	2860	2460
15	2390	2680	5180	16800	38000	49900	20400	9140	4920	3680	2860	2460
16	2360	2730	5600	19200	39700	48200	19200	8910	4840	3620	2860	2410
17	2320	2770	5940	21800	40800	44800	17900	8570	4840	3620	2800	2410
18	2360	2820	6200	25500	41900	41900	17000	8350	4780	3570	2800	2380
19	2360	2820	6760	30900	42200	40200	15900	8240	4700	3570	2800	2380
20	2360	2820	7330	34300	44800	40200	15100	8120	4640	3510	2750	2380
21	2360	2820	7560	34700	44800	48100	14500	8010	4640	3510	2750	2320
22	2390	2910	7670	34700	44800	43100	13900	7670	4530	3420	2750	2320
23	2390	2940	7900	34700	44800	44200	13400	7440	4440	3370	2690	2290
24	2390	3000	9620	33400	45900	44200	13200	7220	4360	3310	2660	2290
25	2390	3000	10300	32600	46500	44200	13700	6990	4360	3230	2600	2290
26	2390	3060	10900	32600	48700	44200	14500	6880	4240	3230	2520	2260
27	2360	3060	10900	33500	49900	35500	15300	6650	4160	3140	2460	2260
28	2360	3060	10600	33800	51000	34300	14300	6540	4160	3080	2600	2260
29	2360	2940	10200	33800	52100	32100	14300	6450	4100	3060		2240
30	2360	2940	9620	33500	52100	32100	13700	6370	4050	3030		2240

31 2940 33000 52700 13400 4050 3030 2210

Year: 1964-65

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2210	2260	2460	6510	35300	42200	36800	10700	5180	3590	2830	2410
2	2210	2260	2410	7360	37500	42200	39500	10300	5120	3590	2780	2380
3	2210	2260	2410	8210	39900	43100	40600	9800	5050	3550	2780	2380
4	2210	2260	2410	8970	42800	44100	39800	9440	4990	3510	2780	2350
5	2210	2260	2380	10100	44400	44400	35300	9120	4920	3470	2780	2350
6	2210	2240	2380	10700	46100	44100	32000	8860	4860	3470	2740	2350
7	2210	2240	2320	11700	47800	45100	28800	8600	4790	3420	2740	2330
8	2210	2260	2320	12300	47800	45800	26300	8340	4730	3380	2710	2330
9	2210	2290	2260	12900	45900	47300	24900	8080	4670	3340	2710	2330
10	2210	2290	2290	13200	43900	48300	24400	7850	4550	3340	2670	2330
11	2210	2320	2290	13800	43100	49000	24300	7650	4440	3300	2670	2300
12	2210	2410	2320	15300	41200	48300	23100	7440	4380	3300	2640	2300
13	2210	2460	2460	17100	38700	48700	22200	7240	4320	3250	2640	2300
14	2180	2490	2520	18800	37100	48300	20700	7040	4320	3210	2640	2280
15	2180	2490	2860	20500	35600	44800	19600	6930	4260	3170	2610	2280
16	2180	2490	3110	23800	34600	41500	18600	6770	4200	3170	2610	2280
17	2240	2490	3110	26700	32900	40300	17800	6610	4150	3130	2570	2280
18	2240	2520	3250	28100	32000	39200	16900	6520	4090	3130	2570	2260
19	2240	2520	3200	30000	31600	38900	16300	6190	4040	3080	2570	2260
20	2240	2580	3960	30800	31600	38700	15700	6190	4040	3080	2540	2250
21	2260	2520	4080	31200	32900	38100	15000	6110	3980	3040	2540	2240
22	2260	2520	4080	31200	36600	37100	14800	6040	3980	3040	2510	2240
23	2260	2490	4020	31200	42800	37100	13900	5970	3870	3000	2510	2250
24	2260	2490	4020	31200	44800	37100	13600	5890	3870	3000	2510	2260
25	2240	2490	4220	30000	45500	36100	13100	5820	3810	2950	2470	2280
26	2240	2490	4560	29200	44800	33700	12700	5740	3760	2950	2470	2280
27	2240	2490	5010	29200	43400	30800	12400	5600	3760	2910	2440	2260
28	2260	2520	5290	29200	41500	29800	12300	5520	3760	2870	2410	2260
29	2290	2520	5520	29600	41900	30400	12000	5380	3700	2870	2640	2260
30	2290	2520	5740	31600	42200	33300	11800	5310	3650	2830		2250
31		2490		33300	42300		11500		3590	2830		2250

Year: 1965-66

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2140	2210	2170	5740	14100	24500	17000	6270	4210	3010	2560	2160
2	2140	2170	2210	6130	16500	26000	15600	6150	4160	3010	2560	2120
3	2140	2170	2250	6480	18500	28900	14700	6010	4100	2960	2520	2120
4	2140	2170	2290	7080	20300	29200	13800	5940	4050	2960	2520	2120
5	2140	2170	2370	7500	20900	30000	12900	5790	4000	2960	2480	2120
6	2140	2140	2410	7670	21300	28900	12200	5790	3950	2960	2480	2090
7	2170	2140	2450	7750	24000	27700	11600	5720	3900	2910	2480	2090
8	2210	2140	2480	7750	26000	24900	11100	5720	3850	2910	2440	2090
9	2170	2140	2560	7920	27200	22300	10600	5790	3800	2910	2440	2090
10	2170	2140	2740	8690	26600	21600	10200	5790	3760	2960	2400	2050
11	2170	2170	2820	8570	26000	23500	9790	5790	3710	2960	2360	2020
12	2210	2170	2860	10300	24900	27200	9400	5660	3710	3010	2320	2020
13	2210	2170	2910	11100	24900	31100	8970	5600	3670	3010	2320	1990

14	2250	2140	2910	11900	24500	34100	8630	5550	3620	2960	2280	1990
15	2250	2140	2820	12200	24900	36100	8380	5430	3570	2960	2240	1950
16	2250	2140	2770	12100	26000	36800	8070	5320	3570	2910	2200	1950
17	2210	2140	2860	11700	27200	35400	7800	5260	3520	2910	2200	1920
18	2210	2140	3000	11300	28300	31700	7570	5150	3470	2880	2200	1920
19	2210	2140	3200	11100	28900	28300	7240	5030	3420	2880	2160	1920
20	2250	2170	3310	11000	28300	23500	7010	4990	3370	2840	2160	1880
21	2250	2170	3460	10600	28300	21300	6800	4790	3320	2800	2160	1880
22	2290	2170	3580	10300	27200	19900	6740	4740	3320	2760	2120	1880
23	2290	2170	3790	10000	26000	18500	6670	4660	3280	2720	2160	1850
24	2290	2170	4080	9740	25500	17500	6530	4610	3230	2720	2200	1850
25	2290	2170	4320	9650	25500	16700	6460	4570	3230	2780	2240	1850
26	2290	2170	4510	9740	24900	18700	6400	4480	3190	2780	2240	1820
27	2290	2170	4600	10200	24500	20900	6400	4430	3140	2640	2200	1820
28	2290	2170	4700	11000	24000	21300	6400	4430	3140	2600	2200	1820
29	2250	2170	4830	11500	24500	20300	6330	4330	3100	2600		1780
30	2250	2170	5010	11700	24000	18500	6330	4370	3100	2600		1780
31		2170		12400	24000		6330		3050	2560		1750

Year: 1966-67

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1830	1570	1990	4640	15100	41900	11800	5150	3540	2690	2030	1840
2	1830	1600	2020	5400	16500	40800	11200	5010	3540	2650	2030	1810
3	1830	1600	2130	6760	18100	40200	10600	4950	3490	2650	2030	1780
4	1860	1600	2200	8180	19400	38500	10000	4810	3490	2610	2070	1720
5	1860	1570	2240	9850	21100	37900	9620	4680	3440	2570	2070	1690
6	1860	1570	2280	11300	22400	36400	9340	4610	3440	2530	2030	1620
7	1830	1570	2350	13200	24900	36100	9160	4540	3390	2530	2030	1590
8	1790	1600	2390	15000	28500	34600	9070	4470	3340	2530	2030	1560
9	1760	1630	2510	16200	30600	32700	8800	4350	3340	2490	2030	1530
10	1730	1660	2640	16500	32700	30100	8710	4280	3290	2450	2000	1530
11	1730	1700	2810	16500	33800	28500	8520	4220	3290	2420	2000	1530
12	1700	1730	3110	16000	34200	27700	8330	4160	3250	2380	1960	1500
13	1660	1760	3400	15500	34200	26100	8140	4100	3250	2340	1960	1500
14	1660	1790	3540	15100	34200	24600	7840	4040	3200	2310	1960	1470
15	1630	1830	3650	14600	34200	24000	7640	3970	3160	2310	1930	1470
16	1600	1830	3880	14600	34200	23300	7440	3910	3110	2270	1930	1470
17	1570	1790	4080	14800	34500	22400	7190	3910	3060	2270	1930	1440
18	1570	1790	4050	15000	35000	21600	6930	3850	3020	2230	1930	1440
19	1570	1760	3990	15000	35300	20800	6680	3850	3020	2200	1900	1440
20	1540	1730	3930	14500	35700	20300	6510	3850	2980	2160	1900	1420
21	1540	1730	3820	13800	35700	19500	6440	3850	2980	2160	1900	1420
22	1510	1730	3710	13400	35300	19200	6200	3850	2930	2160	1870	1440
23	1510	1730	3590	13200	35000	18400	6040	3850	2930	2120	1870	1470
24	1510	1730	3540	12900	35300	17400	5880	3800	2890	2120	1870	1470
25	1540	1730	3540	12800	36100	16700	5800	3750	2890	2120	1840	1470
26	1540	1790	3510	12800	36800	15600	5670	3700	2850	2090	1840	1500
27	1540	1830	3510	12700	37900	14900	5600	3700	2810	2070	1840	1530
28	1540	1830	3590	12900	39100	14100	5530	3700	2770	2070	1840	1560
29	1510	1860	3930	13100	40200	13300	5390	3650	2770	2030		1590
30	1540	1890	4300	13700	40800	12500	5260	3590	2770	2030		1620
31		1920		13400	41300		5190		2730	2030		1660

Year: 1967-68

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1680	1470	1800	5290	21200	42700	24700	6510	4440	3280	2940	2340
2	1680	1500	1800	5660	20600	42700	22400	6370	4390	3230	2940	2310
3	1680	1530	1800	5890	19500	42700	20600	6280	4390	3200	2890	2310
4	1650	1560	1770	5890	19000	42700	19000	6140	4330	3200	2860	2310
5	1650	1560	1770	5800	18300	41300	18000	6000	4270	3140	2860	2270
6	1650	1590	1740	5720	18000	40600	16700	5940	4220	3110	2860	2230
7	1620	1620	1800	5660	18700	39900	15700	5890	4160	3110	2810	2230
8	1620	1620	1810	5800	20000	39900	14900	5800	4130	3060	2810	2230
9	1590	1650	1930	6340	21800	40600	14100	5740	4080	3030	2810	2200
10	1590	1650	1990	7300	23400	41300	13500	5660	4020	3030	2810	2200
11	1560	1620	2060	8520	25700	44100	13000	5600	3960	3030	2810	2200
12	1560	1620	2160	10100	29700	45600	12400	5550	3910	2970	2860	2200
13	1560	1590	2160	12500	32400	47000	11800	5410	3850	2970	2860	2230
14	1530	1590	2200	15100	34200	48000	11300	5320	3800	2940	2860	2230
15	1530	1560	2200	17100	35400	49000	10900	5260	3740	2940	2860	2200
16	1500	1560	2230	18600	36500	49900	10500	5210	3710	2970	2810	2200
17	1470	1620	2380	19700	36500	50800	10200	5120	3710	3030	2770	2200
18	1470	1680	2700	20300	35900	50800	9740	5070	3650	3060	2730	2200
19	1470	1680	2940	20800	34800	48900	9420	5070	3590	3060	2690	2200
20	1500	1650	3080	21100	34200	47900	9200	4980	3590	3060	2610	2200
21	1470	1650	3230	21600	32900	47000	8800	4920	3570	3060	2570	2200
22	1420	1650	3310	22200	32900	47000	8380	4870	3510	3060	2530	2200
23	1390	1620	3620	22800	32400	48000	8150	4810	3450	3060	2530	2200
24	1360	1620	4050	23400	32900	46200	7950	4810	3400	3110	2490	2200
25	1360	1620	4360	23400	33800	44900	7700	4750	3400	3110	2450	2200
26	1420	1590	4470	23400	34200	42700	7410	4700	3370	3060	2420	2160
27	1440	1590	4670	23100	35400	38200	7330	4700	3370	3060	2380	2160
28	1470	1620	4730	22800	37100	33300	7160	4640	3370	3060	2380	2160
29	1470	1680	4920	22500	39900	30100	7080	4560	3310	3030		2160
30	1470	1740	5290	22200	41300	27900	6850	4500	3310	2980		2120
31		1770		22100	42000		6680		3280	2980		2120

Year: 1968-69

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1930	1680	1930	9760	41700	42300	21700	8350	4560	3110	2400	2000
2	1930	1660	2010	10600	41200	40100	21100	8070	4500	3110	2370	1980
3	1900	1660	2140	11300	40700	38000	20100	7870	4410	3060	2370	1980
4	1880	1660	2230	12000	39100	34500	19200	7670	4240	3030	2330	1980
5	1880	1660	2230	12100	37000	30400	19200	7470	4190	3000	2300	1920
6	1880	1660	2300	12400	35000	26300	20600	7270	4130	2940	2270	1920
7	1850	1660	2330	12700	33500	23900	21400	7080	4080	2940	2270	1900
8	1850	1660	2330	12900	30900	21900	23200	6910	4080	2940	2240	1900
9	1830	1680	2330	13300	29900	20600	25600	6620	3990	2910	2240	1900
10	1800	1700	2300	13700	30900	19500	27800	6370	3930	2860	2240	1880
11	1800	1700	2300	13800	33500	18200	28500	6280	3930	2830	2210	1880
12	1780	1700	2300	13700	37000	17200	27800	6230	3880	2830	2210	1880
13	1780	1730	2370	13800	38500	16300	25600	6140	3820	2800	2210	1860
14	1780	1730	2410	14600	39100	15400	23200	5970	3760	2760	2210	1860
15	1750	1750	2550	15400	38000	14800	20900	5830	3710	2760	2210	1860

16	1750	1750	2890	18500	36500	14200	19200	5660	3710	2730	2210	1840
17	1750	1780	3110	23200	36500	13800	17700	5520	3650	2690	2180	1840
18	1750	1800	3450	27400	37000	13300	16500	5380	3590	2660	2180	1840
19	1730	1830	4020	28500	36000	13300	15500	5290	3540	2630	2150	1820
20	1730	1800	4530	28500	33500	13300	14400	5210	3540	2590	2150	1820
21	1700	1800	4900	28100	30900	13500	13600	5210	3510	2590	2150	1820
22	1700	1780	5240	28100	30400	13800	12800	5150	3510	2560	2130	1800
23	1700	1780	6000	28700	30900	14000	12200	5070	3450	2560	2130	1800
24	1700	1750	7080	29900	33500	14200	11600	4920	3400	2520	2100	1800
25	1700	1750	8070	30400	36000	15000	11100	4870	3340	2520	2080	1800
26	1700	1780	8490	31400	39600	16700	10600	4810	3280	2490	2080	1800
27	1700	1800	8890	33500	42300	18200	10100	4730	3280	2490	2050	1800
28	1680	1830	8890	36000	43900	20300	9740	4730	3330	2460	2030	1800
29	1680	1830	9000	38000	45200	21400	9250	4670	3200	2430	2210	1820
30	1680	1850	9140	39600	44400	21900	8910	4610	3140	2400		1820
31		1880		40700	43900		8570		3140	2400		1820

Year: 1969-70

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1770	1710	2600	6370	30600	50400	35700	8660	5970	3540	2800	2590
2	1760	1730	2710	6340	31400	48400	35700	8430	5860	3480	2820	2600
3	1760	1740	2770	6450	30800	45800	35400	8210	5690	3350	2830	2610
4	1770	1750	2820	6710	30800	43900	34800	8010	5630	3420	2820	2620
5	1780	1770	2820	6910	31400	40800	34000	7900	5490	3420	2810	2630
6	1790	1770	2740	6910	32500	38800	32300	7750	5350	3400	2800	2630
7	1710	1750	2750	6910	33400	37100	29100	7580	5210	3340	2760	2630
8	1720	1780	2970	7050	34800	35100	25900	7440	5070	3340	2740	2630
9	1710	1800	3240	7390	36800	34200	23600	7330	4950	3250	2730	2640
10	1790	1810	3680	7700	37900	33400	21500	7240	4810	3230	2710	2640
11	1780	1810	4050	8460	39300	32500	20100	7330	4750	3200	2690	2630
12	1770	1810	4300	9370	40800	31700	18800	7270	4640	3170	2680	2610
13	1750	1800	4580	11000	42200	30600	17300	7300	4610	3140	2670	2580
14	1730	1800	4810	12700	44100	30600	16400	7470	4640	3110	2660	2550
15	1710	1790	4920	13900	44400	29700	15500	7640	4500	3060	2650	2520
16	1690	1780	5070	14600	45000	29100	14700	7610	4410	3030	2640	2500
17	1690	1770	5210	15500	46400	29400	14100	7470	4330	2970	2620	2470
18	1730	1780	5240	16600	46400	29400	13400	7240	4240	2940	2610	2440
19	1730	1820	5260	18500	47300	30800	12900	7240	4220	2910	2580	2420
20	1720	1870	5320	19900	48700	32000	12300	7190	4160	2910	2580	2400
21	1740	1880	5380	21800	51200	33100	11800	7080	4130	2910	2580	2420
22	1760	1880	5380	22500	51500	34000	11300	6930	4080	2890	2550	2420
23	1740	1890	5350	23500	51500	34000	10900	6790	3960	2830	2530	2420
24	1740	1960	5430	26500	52400	33100	10500	6650	3910	2810	2520	2420
25	1770	2000	5740	27800	53200	32800	10200	6450	3850	2800	2510	2420
26	1770	2060	5910	28800	54300	34000	9990	6310	3760	2770	2500	2390
27	1740	2150	6000	29500	55200	32500	9680	6230	3710	2770	2520	2390
28	1710	2250	6170	30500	55200	32800	9370	6170	3680	2760	2570	2390
29	1700	2370	6340	30600	54100	33400	9200	6080	3680	2750		2380
30	1700	2440	6400	31600	52400	34800	9000	6030	3620	2750		2370
31		2500		30600	51500		8860		3580	2770		2370

Year: 1970-71

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2360	2060	2300	10700	32300	27100	24300	8430	4730	3030	2420	2200
2	2350	2070	2310	10600	30800	28300	24600	8240	4760	3000	2410	2200
3	2350	2090	2370	10400	30300	29700	24100	8010	4710	2940	2400	2200
4	2340	2100	2420	10400	30300	31100	23100	7870	4560	2910	2390	2200
5	2340	2120	2430	10200	30300	32500	22000	7670	4470	2890	2380	2200
6	2320	2140	2500	10200	30300	34000	21000	7530	4390	2860	2360	2200
7	2310	2170	2610	10300	30600	35700	20000	7330	4300	2810	2350	2200
8	2310	2200	2800	10600	30800	36800	19000	7130	4220	2800	2340	2210
9	2310	2230	2970	10800	30800	37600	18400	6960	4160	2790	2330	2210
10	2310	2240	3140	11000	31100	37400	17700	6710	4100	2770	2330	2210
11	2300	2240	3200	11200	32000	35400	17300	6620	4020	2730	2320	2200
12	2290	2240	3280	11600	33700	32300	16600	6480	3960	2680	2310	2200
13	2280	2240	3400	12600	35400	30300	16100	6370	3910	2650	2300	2200
14	2250	2230	3540	14900	36500	30000	15600	6250	3820	2620	2290	2200
15	2250	2220	3650	16600	37400	31700	15000	6110	3760	2600	2280	2190
16	2230	2220	3760	18100	38800	33100	14500	6000	3740	2580	2270	2190
17	2210	2250	3740	19600	39600	34800	14000	5890	3710	2560	2260	2190
18	2200	2340	3180	21300	40800	35900	13400	5740	3680	2550	2260	2180
19	2180	2430	3820	23000	39100	37400	12900	5720	3650	2540	2240	2180
20	2180	2500	4050	24400	38500	39900	12200	5600	3590	2520	2240	2170
21	2220	2560	4470	25900	38800	44400	11700	5430	3540	2500	2240*	*****
22	2030	2620	4920	26500	39100	47300	11400	5350	3480	2480	2230*	*****
23	2040	2640	5690	27300	38800	48700	11000	5320	3450	2480	2220*	*****
24	2030	2600	6570	27600	38200	44700	10400	5240	3400	2470	2220*	*****
25	2030	2520	8180	28200	36500	37100	10100	5150	3370	2450	2220*	*****
26	2030	2440	9200	29100	32300	31400	9820	5070	3340	2440	2210*	*****
27	2030	2380	10300	30600	28900	27200	9510	5040	3340	2450	2200*	*****
28	2040	2350	10600	31400	25900	25200	9230	4950	3310	2430	2200*	*****
29	2050	2370	10700	32000	24500	24600	8940	4870	3280	2410		*****
30	2050	2330	10800	32800	24400	24300	8770	4810	3230	2410		*****
31		2310		33100	25800		8600		3140	2420		*****

Year: 1972-73

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2370	2240	3200	6280	20900	21300	20700	7410	4920	3510	2910	2490
2	2340	2260	3280	6140	21900	22800	20000	7270	4870	3510	2890	2460
3	2330	2280	3340	6030	22900	26200	18900	7270	4870	3450	2890	2430
4	2310	2290	3370	5940	23800	30500	17600	7270	4870	3400	2860	2430
5	2320	2320	3400	5890	24400	33600	16800	7220	4870	3370	2860	2430
6	2340	2330	3450	5860	23900	35400	16000	7190	4870	3340	2860	2410
7	2360	2340	3450	5910	22700	36900	15000	7190	4830	3310	2830	2410
8	2370	2340	3400	6110	21700	38200	14200	7100	4810	3310	2830	2410
9	2390	2330	3400	6200	20700	38200	13800	7020	4730	3280	2830	2380
10	2390	2390	3400	6400	19700	36700	13200	6910	4700	3250	2830	2380
11	2410	2420	3370	6680	19600	31100	12900	6740	4750	3250	2850	2380
12	2410	2450	3370	7100	21300	30600	12700	6590	4530	3230	2910	2350
13	2390	2450	3370	7750	23300	28400	12500	6420	4440	3200	2940	2350
14	2390	2450	3310	8720	24300	27000	12400	6310	4360	3170	2970	2380
15	2390	2450	3230	9340	24300	25300	12200	6200	4300	3140	3000	2410
16	2380	2440	3250	9880	24300	24000	11900	6060	4240	3140	2970	2410

17	2370	2440	3310	9930	24000	22800	11400	6000	4190	3140	2970	2410
18	2370	2460	3340	10000	24900	22600	10800	5910	4160	3110	2940	2410
19	2340	2470	3420	10500	23100	25000	10500	5860	4130	3110	2910	2410
20	2330	2500	3510	11900	27100	28800	10300	5770	4100	3110	2890	2410
21	2330	2540	3590	14200	25800	31700	10000	5720	3990	3080	2860	2380
22	2310	2550	3850	16400	23800	31900	9680	5660	3960	3060	2800	2380
23	2310	2690	4270	18500	22000	31000	9300	5600	3910	3030	2750	2380
24	2300	2970	4640	20300	20500	29800	9000	5490	3840	3030	2720	2380
25	2280	3000	4980	21900	19800	27700	8630	5430	3790	3000	2690	2350
26	2270	3000	5460	22600	19200	25400	8350	5350	3760	3000	2600	2350
27	2260	3000	6000	21900	18800	23100	8180	5240	3710	3000	2580	2350
28	2260	3000	6280	20600	18700	21800	8010	5150	3710	2970	2520	2350
29	2240	2970	6420	19600	19000	21400	7840	5140	3650	2940	2940	2350
30	2240	2970	6400	19300	19400	21100	7700	5010	3620	2910		2320
31		3080		20000	20200		7590		3570	2910		2320

Year: 1973-74

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	1930	2050	3100	16200	41500	31500	33000	13500	6850	4560	3360	2610
2	1930	2020	3070	16500	43400	33600	32000	12900	6840	4520	3330	2610
3	1960	2020	3080	17200	44100	36000	30800	12600	6740	4470	3290	2610
4	1960	2020	3130	17800	44100	37400	30200	12200	6610	4420	3270	2610
5	1990	2050	3200	18100	43000	39000	29900	12000	6460	4380	3240	2580
6	1990	2110	3240	17600	41500	40700	29800	11600	6370	4360	3220	2540
7	1990	2180	3320	16800	39800	42800	30400	11400	6300	4320	3190	2540
8	1990	2210	3450	15800	38600	44100	31700	11200	6230	4290	3150	2530
9	1960	2240	3540	15200	37300	44900	33000	11000	6130	4250	3110	2500
10	1960	2280	3630	15000	37600	46000	33300	10700	6010	4220	3090	2500
11	1960	2290	3720	14800	37600	46000	33300	10400	5950	4140	3060	2500
12	1990	2390	3790	14700	37300	46000	33300	10100	5860	4090	3010	2480
13	1990	2450	3790	14300	37300	45400	32200	9720	5610	4020	2960	2480
14	2020	2530	3840	13700	38000	44500	32000	9520	5340	3980	2900	2450
15	2020	2650	3880	13100	39800	45800	31300	9210	5250	3970	2850	2430
16	2020	2800	4230	12500	42400	47500	30800	9010	5150	3820	2820	2430
17	2020	2900	5150	12100	44100	47900	32100	8820	5070	3690	2810	2390
18	1990	3060	6270	11900	45600	48300	30800	8530	5060	3650	2770	2350
19	1990	3230	7090	11600	45800	48800	28400	8330	5000	3610	2730	2330
20	1990	3350	8080	11600	48300	50700	25900	8240	4940	3600	2690	2280
21	2020	3390	9270	11600	49600	46600	23500	8160	4900	3570	2690	2260
22	1990	3410	11000	11600	49600	44900	21600	8330	4870	3510	2690	2240
23	2050	3400	12300	12100	49600	41500	20400	7820	4800	3510	2690	2210
24	2080	3340	13400	12500	49000	36900	19300	7630	4800	3510	2690	2210
25	2110	3340	14100	18200	46600	34200	18300	7510	4780	3510	2670	2210
26	2150	3340	14800	21700	44400	30600	17500	7410	4730	3470	2650	2210
27	2110	3320	15300	24700	37000	28900	16700	7300	4720	3420	2680	2210
28	2080	3280	15600	28100	31500	28900	15800	7180	4660	3420	2610	2210
29	2080	3230	17000	32000	29000	31100	15200	7040	4620	3420		2210
30	2080	3140	16100	35600	28600	32500	14700	7000	4570	3380		2210
31		3110		38100	29900		14100		4530	3380		2240

Year: 1974-75

Day	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March
1	2200	2310	2710	7900	41600	49200	24800	9960	4310	3800	2530	2050
2	2170	2290	2650	7790	43200	50700	24600	9680	4460	3200	2470	2050
3	2080	2310	2650	7910	43900	48400	23800	9480	4810	3070	2620	2050
4	2080	2350	2730	8560	43900	46400	22500	8930	4810	3000	2490	2030
5	2080	2300	2920	9540	45100	44100	21800	8560	4810	3190	2510	1950
6	2120	2300	3120	10700	45900	43200	20900	8680	4790	3150	2430	1890
7	2200	2260	3250	11600	45900	42300	19700	8430	4130	3280	2230	2000
8	2300	2230	3510	13000	45900	41100	18500	7900	4130	3220	2470	2150
9	2390	2200	3790	13200	46700	38700	18600	7470	4080	3020	2530	2110
10	2470	2200	3960	13400	47600	35900	17400	7120	4080	2980	2420	2070
11	2510	2190	4620	13400	48300	34100	16300	6980	4050	2930	2690	2020
12	2580	2190	3930	13200	48400	32600	15800	6980	3960	2820	2540	1890
13	2650	2180	3740	13100	48400	32100	15500	6940	3910	2750	2270	1860
14	2730	2210	3560	12500	49000	32600	15000	6830	3990	2510	2180	1990
15	2800	2260	3420	12500	49800	33300	14100	6300	4530	2150	2300	2100
16	2800	2310	3340	12600	48600	33300	13600	6170	4680	2050	2350	2100
17	2750	2390	3340	13300	46900	32100	13400	6130	4280	2110	2320	2010
18	2690	2480	3340	15000	45000	30200	12800	5830	3850	2220	2240	1950
19	2620	2590	3420	16700	43800	28500	12200	5870	3250	2450	2210	1910
20	2560	2670	3580	18200	43000	27400	12000	5830	3060	2710	2210	1880
21	2500	2700	3760	19800	43800	28100	11800	5400	3980	2820	2210	1830
22	2480	2730	4020	21100	43000	29000	11400	5260	4190	2740	2240	1800
23	2450	2760	4460	23000	44300	29100	10700	5870	3930	2680	2180	1810
24	2350	2800	5180	25200	43000	28400	12100	6000	3630	2580	2200	1870
25	2310	2820	6040	27200	42300	27500	11600	5470	3560	2120	2420	1920
26	2270	2860	6610	29300	42100	27200	11300	5150	3340	2260	2210	1950
27	2230	2920	7240	31100	43000	27200	11500	5330	3200	2440	2150	1910
28	2140	2910	7840	32900	44200	25200	11200	5110	3120	2450	2040	1840
29	2170	2900	7900	35700	45800	24300	10700	4840	3040	2620	2270	1810
30	2140	2760	7790	37300	47300	24400	10400	4750	4080	2600		1770
31	2800	2730		39800	48700		10400		4080	2460		1770
Av.	2035	2151	4383	17817	38201	36003	17798	7078	4188	3081	2672	2297
Median	2000	2050	3410	16100	38300	35400	15200	6370	3910	2890	2510	2260
Stdev	380.5	490	2678	9107	9764	10445	9427	2928	1183	726.5	635	475.2

Table C.2 : Observed Mean Daily Discharge (m³/s) of the Ganges at Hardinge Bridge for the Period from 1975-76 to 1993-94 (post-Farakka).

YEAR: 1975-76												
DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	1660	1600	2000	11700	47000	49400	30200	10100	4270	2410	1650	1130
2	1730	1560	2020	13000	47500	47100	29500	9620	4190	2370	1610	1080
3	1810	1490	2020	13900	47500	44100	29000	9310	4220	2320	1580	1020
4	1860	1610	2010	15100	47100	40500	28100	9200	3990	2270	1560	988
5	1830	1430	2050	16900	45900	36800	27300	9000	3960	2180	1560	988
6	1830	1470	2120	19500	45100	34900	26100	8910	3960	2150	1550	996
7	1850	1540	2060	21300	44700	35800	25700	8630	3820	2130	1540	979
8	1960	1540	1950	22800	44300	34200	25400	8570	3880	2090	1550	959
9	2070	1520	1850	23900	44100	34400	25000	8410	3850	2040	1540	945
10	2110	1520	1810	24600	43800	35200	24500	8010	3760	1990	1510	908
11	2070	1540	1800	25100	43600	35700	24500	7750	3740	1960	1470	883
12	2000	1560	1840	25600	44200	37100	23900	7560	3680	1950	1420	874
13	1960	1560	1880	26400	44300	38500	23300	7240	3650	1940	1460	857
14	1950	1520	1940	26700	44300	39900	22900	7100	3620	1900	1460	826
15	1960	1520	1930	26600	44300	40800	22200	6820	3570	1860	1460	809
16	1960	1550	1880	26700	43700	41100	20500	6590	3480	1840	1480	809
17	1990	1640	2430	26400	43000	41800	19200	6570	3400	1830	1520	792
18	2090	1750	3280	27200	41000	42500	18700	6450	3370	1800	1540	775
19	2180	1800	3650	27600	38300	43700	17400	6170	3280	1770	1590	761
20	2180	1760	3540	28500	35700	44600	16900	6000	3200	1760	1570	736
21	2030	1770	3450	32500	35200	45100	15800	5830	3170	1730	1500	727
22	1930	1790	3620	35500	34800	45600	15300	5660	3110	1680	1420	727
23	1830	1940	3820	38500	35300	44900	14600	5460	2970	1640	1400	719
24	1770	1980	4330	40800	39100	43400	13500	5320	2890	1630	1360	699
25	1800	2050	4920	42200	43300	41100	13200	5120	2830	1610	1310	702
26	1660	1990	5770	42800	46500	37500	12600	4980	2790	1590	1290	705
27	1600	1940	6990	43700	48600	34700	12200	4840	2690	1590	1270	688
28	1560	2010	8010	44800	50100	33000	11600	4780	2630	1580	1260	668
29	1560	2100	8910	45500	51000	32300	11000	4730	2590	1520	1190	657
30	1600	2060	10100	46400	51100	31200	10700	4610	2540	1580		659
31		2000		46500	50800		10500		2460	1630		679

YEAR: 1976-77												
DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	710	792	1650	6170	19300	49100	27100	6340	3170	1750	1250	988
2	696	809	1670	6910	20200	47200	24700	6110	3060	1710	1220	980
3	696	846	1740	8070	21400	45800	23300	6000	3030	1660	1220	948
4	710	911	1750	9480	23200	42400	22600	5830	2910	1620	1230	974
5	713	968	1790	11100	24400	39300	20300	5690	2820	1560	1210	974
6	696	1010	1910	12200	24800	38000	19800	5580	2770	1510	1170	965
7	716	1020	2010	12800	25400	36700	18500	5430	2760	1470	1160	925
8	744	1110	2090	12700	25100	35700	17300	5290	2680	1460	1150	906
9	758	1220	2250	12600	24600	35500	16300	5120	2610	1460	1140	900
10	747	1270	2610	12300	24600	35300	15500	5040	2530	1440	1120	908

09

11	736	1310	2940	12200	24900	35500	14400	4920	2570	1400	1080	917
12	722	1310	3080	12800	26600	35300	13800	4810	2560	1410	1070	908
13	716	1290	3710	13500	30000	35300	13300	4670	2500	1430	1110	891
14	710	1280	4810	13900	32200	36000	12800	4610	2500	1430	1100	880
15	727	1290	5430	14100	33500	37000	12100	4500	2560	1420	1080	883
16	727	1290	5890	14300	34400	39900	11300	4440	2560	1410	1060	883
17	716	1310	6370	14700	36000	44300	10700	4360	2520	1400	1050	883
18	710	1370	7020	15100	36600	48400	10100	4270	2480	1400	1050	872
19	719	1470	6960	16300	37100	52800	9740	4160	2420	1390	1040	866
20	741	1610	7470	18500	38200	54800	9280	3960	2300	1370	1040	857
21	767	1590	7360	19300	39500	57400	8860	3960	2280	1340	1020	872
22	775	1550	6820	19200	41300	61500	8490	3790	2250	1340	1020	900
23	767	1540	6340	19500	42400	65100	8120	3760	2210	1330	1040	914
24	747	1560	5800	19500	43700	65400	7840	3740	2130	1320	1030	931
25	716	1570	5410	19500	45500	63200	7580	3650	2050	1310	1050	925
26	705	1580	5120	19200	47500	58600	7390	3570	1960	1300	1040	908
27	716	1580	5240	19200	49100	50300	7130	3510	1890	1290	1030	914
28	727	1610	5630	19500	50000	41300	6930	3370	1870	1280	1020	914
29	744	1620	5720	19400	50000	35000	6760	3200	1890	1300		897
30	767	1660	5800	19100	50000	30800	6570	3280	1860	1320		897
31		1660		19100	49800		6480		1800	1310		906

YEAR: 1977-78

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	897	979	1360	3250	34200	37500	20500	8120	4100	2730	1860	2170
2	897	1000	1430	3370	38000	39100	19600	7840	4050	2720	1870	2090
3	889	1030	1540	3740	41700	40600	19300	7560	3990	2720	1840	2050
4	894	1070	1700	4500	44200	41900	20100	7270	4080	2670	1810	1960
5	894	1130	1940	6620	46000	42300	21300	6990	4020	2570	1780	1850
6	894	1230	2020	8240	47200	42700	21900	6760	3930	2500	1750	1770
7	894	1270	2040	9140	46900	42500	22400	6740	3850	2470	1740	1700
8	920	1280	2110	9880	46200	41900	23300	6680	3820	2500	1730	1680
9	928	1290	2140	10600	46000	40300	25100	6710	3680	2510	1740	1640
10	920	1280	2150	11200	46200	38400	26400	6570	3590	2530	1730	1590
11	914	1230	2180	12100	47600	35500	26700	6540	3480	2540	1710	1570
12	931	1190	2210	13500	48900	34000	25500	6450	3420	2490	1690	1560
13	948	1180	2200	17200	49100	32500	23400	6230	3400	2420	1670	1500
14	990	1180	2150	20200	51100	32100	21800	6080	3370	2420	1660	1440
15	1030	1130	2170	23000	51100	31400	20200	5830	3370	2410	1690	1430
16	1040	1080	2350	25800	50400	30900	19000	5720	3340	2350	1690	1430
17	1020	1030	2520	28100	50400	29500	17800	5600	3310	2320	1660	1420
18	1020	1050	2670	29900	49900	28000	16600	5460	3310	2260	1650	1410
19	1040	1060	2770	31200	48900	28100	15300	5260	3280	2220	1650	1460
20	1010	1090	2810	32100	47700	28200	14000	5040	3280	2170	1660	1480
21	996	1090	2910	32800	46400	29200	13200	4920	3230	2110	1670	1420
22	996	1090	2940	32900	43400	31600	12700	4810	3110	2050	1650	1330
23	1020	1120	3110	32800	40300	34600	12200	4670	3000	2010	1630	1340
24	1020	1170	3080	32700	37700	36200	11500	4610	3000	1950	1640	1340
25	1010	1180	3170	32800	35400	34300	11000	4560	2970	1910	1720	1310
26	1010	1200	3280	32400	33800	31400	10400	4530	2890	1890	2000	1310

27	996	1270	3510	31800	32700	27300	9820	4470	2810	1870	2210	1320
28	996	1360	3450	31400	31800	24500	9340	4360	2800	1850	2230	1340
29	1010	1330	3370	31600	32300	22600	9000	4270	2800	1840		1360
30	990	1280	3230	32000	33100	21700	8770	4190	2760	1860		1390
31		1320		32900	35500		8430		2710	1860		1400

YEAR: 1978-79

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	1520	1900	3450	14700	35700	45400	36400	9450	4360	2610	1650	1510
2	1600	1940	3480	16700	36400	44700	33900	9140	4300	2550	1640	1470
3	1660	1950	3420	17800	37100	42800	30700	8860	4130	2460	1610	1450
4	1640	1940	3370	18300	38700	41100	28700	8690	3990	2370	1620	1440
5	1620	1970	3450	18700	40100	39000	26700	8550	3960	2310	1640	1450
6	1620	2030	3450	19400	41900	37600	27000	8320	3930	2290	1640	1480
7	1600	2080	3400	20100	43200	38700	28100	7950	3850	2270	1650	1510
8	1570	2110	3400	20600	45400	39900	29100	7810	3790	2210	1660	1500
9	1580	2090	3310	20100	46700	42000	28700	7470	3790	2050	1680	1480
10	1600	2090	3420	21100	48800	44700	28300	7390	3760	1940	1740	1520
11	1620	2130	3510	21800	49800	46700	26900	7240	3710	1880	1780	1600
12	1660	2130	3960	23200	51100	49000	25000	7080	3650	1870	1740	1620
13	1730	2070	4640	24000	52400	51700	23500	6820	3570	1850	1740	1530
14	1760	2050	5210	24500	54600	55700	21700	6650	3540	1810	1800	1510
15	1730	2110	5580	24800	56800	58100	20300	6570	3510	1750	1840	1530
16	1760	2180	5940	25000	57600	59700	19200	6400	3540	1740	1850	1510
17	1790	2190	5970	25500	58100	59700	18200	6230	3620	1710	1870	1460
18	1810	2160	6110	26700	60800	58600	17300	6140	3540	1710	1870	1420
19	1850	2230	6170	27500	63800	54900	16600	6030	3370	1680	1870	1410
20	1800	2340	6340	29100	65800	46900	16000	5890	3280	1680	1850	1400
21	1790	2430	6570	31400	67900	44200	15300	5740	3190	1680	1820	1390
22	1750	2660	7240	33300	65500	38700	14500	5540	3140	1710	1810	1340
23	1760	2790	7640	35000	66500	35400	13600	5410	3060	1660	1810	1300
24	1840	2890	7580	35500	64000	33500	13100	5260	3000	1620	1770	1280
25	1870	2970	8380	34900	62200	32200	12500	5120	2940	1610	1710	1270
26	1880	3110	9540	34500	60300	31300	12100	5010	2940	1600	1660	1260
27	1870	3250	9790	34500	56800	33800	11600	4870	2940	1560	1610	1250
28	1860	3250	10000	34500	52800	37400	11000	4730	2860	1540	1550	1240
29	1850	3230	10800	34800	49000	38500	10500	4640	2780	1520		1230
30	1870	3200	12500	34900	47100	38300	9900	4470	2740	1550		1230
31		3400		34900	46100		9900		2690	1600		1210

YEAR: 1979-80

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	1180	1370	1840	2620	36400	22500	7610	4050	2020	1600	1130	959
2	1190	1400	1740	3250	36900	21600	8290	3880	2050	1620	1130	962
3	1180	1460	1660	3790	36900	20700	8860	3740	2050	1620	1120	959
4	1190	1450	1570	4870	35400	19700	9370	3620	2110	1590	1110	934
5	1190	1430	1460	6000	33500	18700	9570	3450	2130	1540	1110	931
6	1180	1420	1340	6960	31800	18700	9650	3340	2220	1470	1100	931
7	1180	1410	1250	7870	30900	18700	9880	3250	2280	1460	1090	931
8	1160	1390	1130	8770	29900	19200	10000	3140	2240	1460	1070	940

9	1160	1340	1040	9200	27500	19800	10200	3080	2150	1440	1070	940
10	1160	1300	1170	9200	25600	20200	10400	2970	2100	1390	1070	931
11	1150	1300	1160	8770	23700	20100	10100	2860	2080	1430	1070	931
12	1140	1340	1090	8320	22300	19000	9820	2800	2080	1430	1060	928
13	1210	1370	1100	7900	22500	18200	9760	2760	2060	1390	1030	920
14	1290	1360	1130	7980	23300	17600	9680	2740	2050	1360	1000	911
15	1340	1340	1170	8200	24700	17000	9420	2710	2040	1340	993	908
16	1320	1360	1170	8800	26600	16300	9000	2660	2010	1310	990	908
17	1280	1370	1130	9620	26800	15300	8490	2570	1980	1300	999	908
18	1270	1360	1090	10300	28900	14300	8150	2510	1960	1310	999	900
19	1320	1410	1100	11500	30100	13300	7780	2480	1950	1310	1010	891
20	1360	1460	1180	12100	29900	12500	7360	2410	1930	1290	1000	891
21	1340	1450	1360	13800	29400	11800	6910	2320	1920	1250	993	891
22	1330	1440	1520	16000	29900	11000	6450	2270	1870	1190	990	891
23	1360	1500	1570	19700	31100	10300	6000	2280	1830	1180	971	891
24	1420	1570	1670	22700	31900	9710	5740	2270	1830	1170	959	883
25	1400	1580	1780	25400	32600	9000	5460	2200	1790	1160	951	883
26	1330	1660	1980	27100	33000	8350	5260	2120	1710	1140	951	883
27	1320	1780	2120	28700	32300	7870	4950	2070	1660	1130	954	883
28	1340	1950	2200	30800	31000	7470	4730	2030	1640	1130	959	883
29	1380	2030	2340	32500	28000	7360	4560	2010	1620	1130	954	880
30	1390	2010	2410	34000	25900	7300	4390	2020	1620	1130		874
31		1920		35300	24200		4190		1620	1130		874

YEAR: 1980-81

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	942	990	1500	5320	37600	49700	26700	7610	3510	2060	1430	1130
2	942	1020	1520	5320	37500	51300	25800	7300	3450	1990	1410	1150
3	940	1050	1410	5150	38100	53400	24900	6930	3450	1930	1420	1140
4	937	1080	1320	5380	39500	54200	23900	6760	3420	1870	1440	1110
5	934	1150	1390	6310	40000	55000	22900	6340	3310	1810	1450	1080
6	937	1250	1440	7470	40700	56200	21700	6000	3200	1770	1470	1030
7	940	1240	1440	9140	41600	57200	20300	5830	3170	1770	1500	1030
8	940	1240	1440	10800	42600	56800	18800	5660	3140	1760	1500	1060
9	940	1280	1540	12700	43200	55900	17700	5550	3080	1740	1500	1060
10	940	1260	1730	14500	44200	55200	17300	5380	3030	1730	1470	1060
11	940	1210	1880	16300	45500	54000	16500	5260	2970	1750	1430	1050
12	940	1170	2070	18000	46900	53300	15500	5210	2940	1740	1390	1010
13	940	1170	2240	20000	48600	52100	14500	5260	2910	1710	1370	979
14	940	1200	2450	22200	50100	50900	13700	5210	2890	1670	1360	954
15	940	1220	2670	24800	51300	49800	13000	5010	2810	1660	1360	934
16	940	1230	3280	26500	52600	47800	12300	4900	2690	1620	1350	940
17	940	1210	3880	28100	53100	45900	11600	4750	2600	1580	1320	959
18	940	1190	4410	29800	55300	42800	10900	4580	2540	1560	1290	971
19	940	1160	5070	31800	56800	39100	10700	4530	2520	1510	1270	971
20	942	1190	5240	35400	57300	35800	10400	4560	2490	1500	1260	971
21	948	1210	5090	37700	57800	32900	10500	4500	2400	1520	1260	962
22	945	1210	5010	39700	57800	31000	10200	4410	2320	1560	1260	928
23	945	1210	4950	41300	57300	30200	9790	4300	2270	1560	1240	903
24	945	1210	5010	42300	55500	31800	9680	4190	2240	1500	1200	877

25	945	1220	4980	43000	52500	33500	9540	4050	2230	1450	1130	889
26	948	1260	5070	43000	50200	34200	9110	4020	2190	1400	1090	934
27	951	1270	5040	42300	47500	34000	8800	3930	2180	1380	1090	928
28	957	1300	5150	41300	45600	32600	8350	3820	2180	1400	1100	925
29	957	1400	5240	40400	46000	30500	8180	3710	2160	1440		928
30	959	1430	5350	39400	47100	28400	8040	3620	2150	1450		928
31		1470		38100	48600		7810		2110	1430		934

YEAR: 1981-82

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	976	1400	2430	3220	42000	43600	15200	5100	3080	1680	1280	1270
2	999	1380	2580	5480	42200	41500	15100	5060	3000	1680	1240	1270
3	961	1410	2760	6320	43700	38700	16800	4960	3030	1680	1220	1290
4	930	1440	2680	7420	45000	37000	18900	4930	3040	1710	1210	1310
5	918	1450	2480	9370	45700	35400	21300	4770	3040	1740	1220	1300
6	910	1420	2360	12500	46400	33800	22700	4650	3080	1660	1310	1330
7	880	1430	2380	15800	47000	32200	23500	4580	2990	1540	1300	1360
8	877	1480	2430	19800	47500	30000	23300	4460	2880	1500	1310	1360
9	886	1460	2590	21400	46400	28800	21800	4300	2780	1490	1380	1300
10	894	1490	2610	22700	44600	27700	20100	4240	2710	1470	1470	1310
11	894	1500	2580	22100	43500	27500	18300	4280	2660	1490	1560	1280
12	910	1470	2390	21200	42800	28200	17100	4170	2550	1510	1510	1270
13	944	1480	2290	20200	42200	31300	15800	4100	2480	1530	1470	1280
14	983	1500	2170	19300	41800	33400	14700	4260	2550	1460	1470	1280
15	997	1500	2010	18400	41900	34700	13600	4180	2510	1410	1460	1290
16	995	1520	1930	17900	41200	34900	13200	4090	2390	1400	1450	1300
17	1090	1530	1910	17700	39800	33400	12700	4110	2380	1380	1440	1280
18	1150	1570	1910	18200	37900	31900	12200	4060	2390	1380	1430	1310
19	1210	1560	1930	19900	35600	30200	11700	3850	2390	1350	1450	1350
20	1250	1590	2190	24000	33700	27700	11200	3850	2360	1330	1430	1220
21	1290	1570	2590	28100	32800	25700	10700	3830	2320	1310	1430	1280
22	1330	1640	2830	30500	32600	24100	9590	3700	2310	1310	1450	1310
23	1410	1760	2720	32200	32600	22900	8600	3670	2320	1340	1450	1330
24	1430	1710	2490	33100	33300	22300	7540	3600	2240	1350	1380	1310
25	1420	1610	2440	33300	34800	21500	7120	3510	2180	1340	1410	1280
26	1290	1540	2430	33000	38000	20800	6560	3360	2100	1290	1320	1240
27	1220	1740	2400	34700	41500	19500	5890	3440	2040	1270	1350	1210
28	1310	1830	2360	36900	45300	18500	5440	3380	1970	1290	1310	1190
29	1390	1800	2470	39100	47000	17400	5280	3280	1920	1250		1170
30	1460	1940	2680	40600	47900	16100	5240	3190	1850	1270		1210
31		2190		41400	46900		5140		1770	1270		1220

YEAR: 1982-83

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	1250	1830	1920	7330	18600	50800	22600	5690	3880	1580	1120	989
2	1290	1870	1900	7030	20800	52200	20800	5460	4000	1550	1110	995
3	1270	1890	1870	7030	23200	53100	19100	5020	4070	1620	1130	946
4	1280	1880	1920	6680	24900	54700	17300	4970	4010	1630	1140	944
5	1290	1870	1970	6460	26200	55800	15900	4820	3760	1680	1150	941
6	1330	1900	1990	6350	26900	57300	14200	4710	3640	1690	1130	954

7	1370	1920	2010	6350	27200	58800	13100	4640	3540	1620	1150	1000
8	1400	1940	2130	6740	27700	59900	12300	4650	3360	1550	1140	984
9	1380	1940	2290	7060	28700	60900	11600	4750	3240	1490	1160	1010
10	1360	1930	2370	7330	30000	61600	10700	4740	3110	1440	1150	950
11	1410	1890	2670	7500	30900	60900	10200	4640	2990	1380	1170	928
12	1470	1830	2910	7840	32100	60000	9640	4610	2900	1380	1180	919
13	1540	1780	3180	9070	33000	57700	9180	4540	2810	1340	1170	884
14	1640	1730	3560	9940	33200	54500	8630	4430	2770	1350	1180	923
15	1640	1730	3810	10300	33200	51400	8250	4340	2750	1380	1210	867
16	1640	1720	4040	10600	33200	48800	7810	4320	2710	1410	1230	848
17	1630	1720	4130	10900	32900	47200	7370	4370	2650	1330	1210	852
18	1630	1760	4600	11300	32500	46600	7080	4350	2590	1360	1200	861
19	1660	1800	5110	11200	33100	46200	6740	4370	2520	1330	1200	865
20	1770	1850	5560	10800	33000	45700	6580	4340	2470	1250	1200	832
21	1810	1860	6100	10600	32700	44600	6290	4300	2380	1240	1180	857
22	1780	1840	6740	10500	33400	43500	6020	4210	2250	1250	1170	785
23	1750	1820	7490	10900	34900	41300	5900	4180	2190	1250	1020	807
24	1730	1800	8030	11900	37200	38500	5830	4180	2160	1240	1010	708
25	1750	1740	8210	12900	39600	36000	5820	4100	2120	1260	1010	699
26	1780	1690	8090	13200	41500	33300	5720	4040	2040	1300	1030	695
27	1890	1780	7840	13400	43200	30700	5710	3980	1960	1290	1030	703
28	1890	1890	7760	13900	44900	28800	5700	3950	1950	1210	1040	788
29	1860	1930	7830	15000	46600	27000	5730	3910	1900	1140		815
30	1810	1970	7750	16900	48100	24700	5710	3850	1770	1150		794
31		1940		17800	49500		5700		1670	1140		800

YEAR: 1983-84

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	803	900	1940	3040	21000	33200	40500	11200	4590	2390	2030	1400
2	809	944	1920	3260	22900	33200	39700	10600	4510	2420	1970	1410
3	814	1100	1890	3660	24300	32700	39400	10300	4420	2300	1930	1460
4	792	1230	1810	4030	25800	32100	38900	9850	4190	2310	1870	1490
5	795	1350	1720	4600	27100	31300	37900	9540	4090	2390	1820	1410
6	700	1350	1660	5380	27800	31500	36500	9340	4030	2360	1770	1390
7	743	1350	1700	7350	28100	31800	34800	9120	3900	2250	1720	1430
8	763	1370	1830	9900	29700	32600	32300	8890	3780	2210	1620	1390
9	795	1360	2120	12700	30400	34600	29700	8420	3670	2220	1590	1420
10	813	1360	2190	15100	30400	36600	29100	8170	3560	2260	1530	1410
11	809	1360	2100	16500	29900	38000	26100	7830	3500	2210	1490	1410
12	855	1380	2100	16900	29000	40400	24500	7450	3450	2140	1480	1390
13	863	1410	2160	16200	27200	43700	23200	7170	3340	2110	1500	1330
14	840	1470	2230	15000	25200	46000	21900	6890	3300	2090	1430	1340
15	816	1600	2240	13600	23600	48000	21500	6690	3290	2070	1410	1260
16	806	1620	2230	12900	22200	50200	22000	6440	3180	2080	1410	1210
17	803	1580	2300	12500	21300	52700	24500	6360	3110	2110	1420	1160
18	776	1650	2270	13100	20800	53800	26900	6330	3100	2110	1420	1190
19	778	1690	2170	13700	20700	56300	27100	6090	3080	2060	1360	1130
20	777	1720	2180	14000	20600	57800	25400	5960	3010	2040	1360	1100
21	765	1730	2150	14500	21100	58700	22500	5860	2960	1980	1370	1080
22	811	1760	2150	15000	22000	60000	20000	5670	2930	1870	1400	1080

23	867	1780	2230	15300	23000	59700	18000	5570	2900	1780	1420	1100
24	880	1760	2410	15200	23700	58700	16400	5490	2820	1830	1450	1130
25	892	1730	2550	14700	24600	55600	15600	5340	2760	1820	1450	1110
26	892	1730	2630	14700	25400	52400	14800	5210	2700	1890	1440	1090
27	885	1790	2710	15000	26500	49700	14000	5190	2660	1880	1450	1080
28	895	1860	3060	15900	27900	46300	13300	5190	2580	1890	1450	1070
29	881	1720	3240	16300	29700	43700	12700	4970	2550	2000	1410	997
30	887	1950	3150	17400	31400	41700	12200	4800	2570	2070		984
31		1960		19100	32400		11700		2470	2100		978

YEAR: 1984-85

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	923	1110	1550	14600	38700	45200	22800	6380	3000	1830	1310	905
2	908	1120	1560	13700	40300	46200	21300	6160	2930	1790	1340	905
3	901	1170	1700	13000	42200	46600	20300	6020	2890	1700	1300	940
4	889	1200	2140	12900	43800	45700	19300	5900	2800	1640	1330	1010
5	959	1220	2220	12900	45500	45900	17700	5790	2750	1630	1320	1020
6	975	1240	2200	13000	46600	47100	16600	5690	2730	1680	1350	987
7	977	1230	2260	13500	45000	48300	15700	5620	2740	1660	1280	989
8	1020	1240	2450	14100	43200	49400	14400	5480	2680	1520	1300	972
9	986	1270	2800	15200	39600	51900	13400	5170	2530	1590	1250	952
10	960	1310	3490	16400	36300	53200	12600	4970	2510	1630	1220	948
11	936	1320	4270	17400	33200	53900	11900	4930	2550	1610	1180	938
12	928	1320	4490	19800	31500	54400	11000	4680	2510	1580	1170	937
13	935	1350	4760	22600	31100	54900	10600	4570	2450	1570	1150	914
14	953	1430	5460	25700	30500	54900	10100	4410	2450	1660	1160	889
15	962	1460	6050	28100	29600	55500	9600	4260	2450	1530	1150	869
16	999	1450	6590	29200	28800	56500	9230	4170	2400	1510	1130	857
17	996	1440	7460	29600	27200	56300	8870	4100	2370	1490	1100	875
18	976	1440	9070	29500	25900	53300	8460	4040	2320	1550	1090	905
19	971	1430	10300	28600	24700	50800	8150	3810	2290	1470	1080	959
20	961	1470	10800	27800	23300	48000	7840	3780	2230	1470	1080	842
21	963	1480	11100	27100	22900	46100	7570	3690	2200	1480	1040	812
22	973	1500	11700	26100	22300	45200	7470	3620	2180	1550	1020	788
23	989	1450	12800	25300	23400	44400	7630	3480	2140	1480	1020	770
24	972	1440	13500	24900	25100	42800	7580	3440	2090	1400	1000	760
25	986	1500	13700	24900	26300	39400	7580	3440	2020	1380	944	774
26	1040	1560	14200	25200	28900	36000	7440	3350	1980	1410	951	771
27	1080	1650	16000	26400	32100	31700	7260	3250	1950	1370	933	768
28	1090	1620	17300	28400	35500	29400	7040	3220	1940	1340	911	750
29	1110	1670	17100	30900	38600	27200	6900	3150	1940	1300		758
30	1120	1550	15900	33700	42200	25000	6620	3090	1910	1360		758
31		1530		36100	43600		6510		1870	1310		742

YEAR: 1985-86

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	732	751	979	3130	37600	44200	40400	23600	6570	3220	1920	2150
2	726	830	1000	3600	41100	42800	42700	21800	6460	3270	1910	2230
3	738	903	1110	4360	43400	41000	43400	20900	6230	3370	1930	2240
4	701	934	1260	5670	45600	39200	42300	19600	5960	3280	1910	2210

5	689	952	1530	6390	46800	37700	38800	18400	5790	3270	1830	2180
6	687	958	1670	6600	45400	37100	34700	17100	5540	3200	1820	2160
7	729	968	1640	6640	41800	37200	31900	16200	5330	3100	1830	2110
8	732	918	1620	7050	37600	37100	29500	15100	5260	3110	1830	2040
9	720	783	1540	7660	35000	37000	27700	14400	5170	3070	1780	1920
10	740	838	1420	8530	33300	36500	26300	13500	4980	3090	1760	1930
11	739	922	1320	9890	32000	36100	25300	12800	4860	3170	1720	1880
12	728	893	1250	12000	31000	34800	24600	12100	4560	2940	1710	1790
13	717	874	1230	13800	31200	33100	25100	11600	4540	2920	1730	1760
14	754	879	1280	15000	32800	30800	30500	11200	4440	2860	1750	1760
15	821	861	1310	15900	35200	29300	35900	10800	4240	2860	1770	1750
16	819	832	1330	16900	36800	28800	39700	10300	4170	2810	1730	1700
17	824	810	1390	17800	38500	29500	42000	9930	4030	2690	1740	1660
18	814	787	1430	18700	38900	29200	44400	9560	3940	2610	1770	1640
19	815	804	1480	19500	37800	31500	47700	9280	3910	2590	1790	1590
20	803	792	1520	20500	33700	34300	49300	9080	3850	2590	1780	1450
21	793	765	1650	21600	30800	36200	50300	8750	3760	2590	1760	1420
22	800	784	1870	22900	30500	37400	49900	8570	3560	2460	1750	1420
23	805	808	2060	23400	32800	38100	48100	8400	3460	2380	1780	1450
24	813	823	2210	23500	36200	38400	46400	8240	3450	2330	1800	1340
25	824	852	2350	24200	39900	37600	43600	8060	3420	2280	1830	1350
26	829	901	2390	25800	43000	36700	39900	7880	3390	2240	1930	1330
27	829	935	2430	27500	45100	35600	36100	7520	3420	2190	2060	1330
28	852	977	2480	28400	47200	35300	33200	7250	3410	2090	2090	1300
29	810	1030	2650	29000	48000	34800	29600	7130	3320	2010		1290
30	756	1030	2840	31600	47900	37600	26800	6850	3350	2040		1250
31		995		34700	46000		24900		3300	1980		1240

YEAR: 1986-87

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	1210	1450	1740	9980	44600	43300	20200	8690	4270	3110	1660	1200
2	1210	1500	1700	14200	45100	39400	19700	8410	4170	3050	1620	1190
3	1220	1570	1620	17600	46600	35800	18900	8170	4060	2990	1620	1140
4	1200	1620	1540	19700	47300	33500	18800	7970	3980	2850	1610	1160
5	1180	1610	1500	21100	48700	31300	18600	7680	3890	2840	1600	1130
6	1150	1630	1490	22000	50000	30400	18900	7490	3840	2770	1610	1090
7	1230	1610	1460	22000	51000	29400	20100	7330	3740	2730	1620	1050
8	1210	1620	1450	22000	51300	28100	23400	7100	3640	2690	1630	1020
9	1240	1580	1410	21200	49800	27600	26100	7010	3500	2630	1550	996
10	1220	1560	1330	20500	46100	27100	26200	6660	3420	2540	1550	996
11	1220	1560	1320	20500	40800	26300	24500	6560	3340	2470	1540	980
12	1220	1620	1390	20100	35700	26000	22300	6300	3220	2460	1510	970
13	1210	1650	1490	19900	32500	26000	20300	6080	3150	2340	1490	948
14	1250	1640	1510	20300	29800	26600	19500	5870	3080	2320	1460	945
15	1270	1560	1570	21500	27600	26700	18600	5700	2990	2320	1410	901
16	1270	1530	1720	21900	26200	27300	18100	5600	2890	2250	1400	886
17	1260	1580	1750	22800	25100	29400	17300	5460	2810	2240	1370	871
18	1250	1660	1780	23800	24400	33200	16800	5390	2730	2170	1370	859
19	1280	1700	1880	25000	24100	36300	16100	5340	2670	2040	1380	861
20	1310	1660	2050	26000	24600	37400	15600	5240	2620	2020	1330	911

21	1340	1640	2250	27200	25200	37300	15300	5180	2620	1980	1300	983
22	1320	1740	2570	28900	30300	35800	14200	5080	2580	1750	1280	928
23	1330	1740	2940	29800	37300	32400	13600	4970	2560	1780	1250	1080
24	1370	1750	3410	30600	42700	29600	13000	4940	2570	1780	1210	981
25	1440	1780	3700	31600	47600	27300	12200	4780	2640	1780	1200	937
26	1410	1820	3990	33300	50300	26100	11600	4660	2680	1790	1190	940
27	1400	1790	4490	35500	52800	25100	11000	4570	2830	1750	1170	948
28	1420	1780	5110	38500	53500	23900	10500	4510	3010	1740	1160	958
29	1450	1770	6180	40000	53200	22900	10000	4440	3140	1720		964
30	1430	1760	7310	42100	51200	21200	9470	4330	3150	1690		1010
31		1740		43200	47700		9020		3190	1670		941

YEAR: 1987-88

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	964	1280	1140	4000	33300	37600	30000	11400	3540	1630	1150	971
2	979	1310	1140	4380	35200	39700	27500	11000	3420	1620	1080	968
3	951	1160	1120	4790	36000	42600	25300	10400	3320	1620	1110	970
4	924	1230	1060	5210	37300	47200	23600	9660	3270	1570	1070	983
5	925	1300	1020	5960	38100	51200	22100	9140	3190	1570	1110	993
6	912	1370	1070	7010	38200	54100	20900	8490	3070	1560	1150	1010
7	920	1280	1160	7780	37700	56500	19200	8070	2970	1490	1160	998
8	980	1300	1240	7990	36600	58100	17400	7620	2930	1470	1160	1000
9	984	1360	1230	9160	35000	58300	16100	7170	2860	1460	1160	998
10	1020	1400	1230	9930	33300	57600	14900	6740	2780	1430	1160	973
11	996	1490	1350	10600	31600	56100	13900	6400	2710	1400	1140	969
12	995	1420	1570	11300	32400	54300	12900	6170	2680	1350	1130	971
13	971	1320	1730	12200	35100	57200	11900	5910	2640	1370	1130	971
14	988	1280	1780	13200	39100	62100	11200	5650	2570	1360	1120	976
15	1030	1280	1810	14200	42700	67400	10600	5490	2520	1360	1110	1010
16	1180	1290	1790	15200	45700	71400	9950	5360	2490	1340	1090	1020
17	1230	1290	1800	16300	57900	74100	9270	5190	2470	1320	1040	1060
18	1210	1280	1850	17000	60400	75300	8830	5000	2460	1360	1070	1080
19	1170	1250	1970	17100	61500	75800	8370	4860	2400	1300	1080	1090
20	1140	1300	2110	17100	61400	74300	7750	4750	2330	1290	1070	1100
21	1100	1300	2350	16500	60100	72300	7410	4650	2240	1290	1070	1070
22	1160	1310	2370	15900	58300	68400	7660	4540	2190	1310	1070	1030
23	1200	1340	2480	16100	56700	62700	9560	4490	2130	1300	1070	1010
24	1160	1280	2580	17200	56000	57600	10800	4380	2080	1310	1040	991
25	1110	1320	2840	19200	54700	52800	12600	4240	2030	1300	1020	980
26	1090	1290	3440	21400	52900	49100	13000	4080	1970	1250	996	961
27	1120	1290	3880	24600	47600	45600	13100	3950	1880	1210	977	942
28	1150	1280	3820	26400	45300	42500	12800	3810	1820	1190	973	924
29	1200	1270	3820	29100	43300	37900	12400	3720	1820	1190	972	901
30	1220	1220	3820	30400	41500	33700	12100	3670	1780	1200		927
31		1180		31900	38600		11700		1690	1200		957

YEAR: 1988-89

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	912	1320	2130	4560	28400	70000	15600	4760	2560	1510	1120	616
2	889	1330	2130	4510	30600	70400	15100	4650	2460	1450	1120	580

3	958	1330	2130	4500	33700	71800	14800	4520	2330	1430	1120	542
4	1030	1340	2020	4590	35100	70700	14100	4420	2320	1360	1110	506
5	1010	1340	1820	5290	36800	67900	14000	4370	2320	1330	1110	513
6	1010	1340	1650	6640	38800	63200	13800	4210	2290	1340	1100	509
7	942	1320	1570	8660	40200	57800	14200	4200	2210	1340	1100	541
8	961	1280	1540	11900	41400	54000	14300	4170	2160	1310	1090	546
9	982	1320	1660	15100	42900	52000	14200	3970	2150	1310	995	568
10	940	1390	1660	19700	44600	48900	13300	3950	2200	1270	950	560
11	936	1410	1680	24200	46200	47600	12900	3940	2170	1240	913	549
12	932	1420	1750	26600	48400	46900	12600	3810	2150	1220	894	557
13	892	1420	1850	28900	51400	44400	12500	3690	2140	1240	812	580
14	910	1400	2000	29500	54000	42900	12200	3700	2150	1240	820	553
15	944	1420	2230	29100	57300	40800	11000	3610	2130	1220	802	550
16	992	1400	2470	28000	58400	37100	10700	3520	2110	1220	783	509
17	929	1550	2610	26900	59100	35200	10400	3470	2100	1240	774	516
18	1050	1640	2790	26700	59600	33300	10000	3390	2080	1250	773	537
19	958	1690	3110	26400	59700	31300	9470	3300	2050	1250	761	470
20	1000	1630	3560	26300	58600	29400	9000	3250	1990	1240	696	554
21	1060	1570	4000	26000	58700	27100	8760	3180	1940	1240	686	511
22	1060	1510	4570	25300	58600	25000	8300	3080	1900	1260	688	477
23	1090	1490	4860	25300	58700	23700	7990	3020	1810	1290	655	466
24	1170	1480	4920	25600	58300	22100	7720	3010	1740	1290	649	451
25	1200	1460	5000	26000	57600	20800	7160	2930	1740	1270	639	441
26	1210	1430	4670	26100	60000	19700	6830	2930	1740	1240	612	436
27	1230	1420	4520	25400	62200	17900	6250	2740	1690	1250	605	438
28	1180	1500	4530	25100	64300	17200	5950	2690	1640	1290	597	444
29	1230	1670	4630	25500	66800	16000	5650	2650	1600	1190		440
30	1280	1870	4650	26100	68200	16000	5220	2620	1580	1180		451
31		2030		26900	69200		4910		1550	1180		446

YEAR: 1989-90

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	449	784	4630	7370	20500	26000	27800	6450	2960	1490	838	698
2	451	798	4580	7980	23700	25900	28000	6240	2910	1460	751	710
3	455	758	4050	8840	27400	26700	27100	5950	2880	1500	715	727
4	454	718	3820	9390	29700	28300	25800	5600	2790	1500	689	712
5	473	699	3680	10700	30600	28800	24900	5430	2710	1540	659	772
6	466	710	3660	11600	31000	29700	23800	5330	2650	1560	700	774
7	476	725	3700	11900	30100	30300	23000	5150	2590	1560	679	834
8	482	738	4080	12300	28700	31500	21700	4880	2530	1570	647	852
9	486	681	4210	13400	27500	31300	20900	4780	2520	1530	639	841
10	496	640	3870	14500	26500	31200	20100	4700	2500	1550	635	829
11	534	741	3990	15000	25200	29900	19400	4640	2420	1600	627	880
12	562	737	4040	15400	24300	29200	18900	4500	2380	1610	607	872
13	549	755	4020	15600	23000	28200	17900	4400	2310	1550	574	820
14	619	786	3860	15600	22700	27200	16900	4300	2190	1490	560	751
15	599	903	3640	15800	23000	25800	16300	4170	2120	1420	570	718
16	599	929	3610	16600	23400	24400	15600	4050	2090	1390	619	737
17	615	1020	4140	19500	24000	23200	14700	4010	2010	1360	658	779
18	619	990	5790	23200	24500	22100	13700	3920	1950	1300	692	817

19	634	983	6960	25600	25100	22200	12600	3770	1910	1280	699	832
20	649	988	7330	26600	26000	23600	12100	3650	1890	1260	694	808
21	666	956	7600	27900	27600	25600	11100	3630	1870	1240	673	802
22	680	886	7880	29200	28500	26600	10500	3540	1830	1180	679	792
23	750	811	7270	28700	28600	27100	9800	3450	1790	1080	689	801
24	770	736	6710	27500	28600	26900	9250	3340	1750	991	691	812
25	742	865	6230	25000	28100	26600	8880	3240	1700	984	699	796
26	758	1010	5870	22700	27200	26500	8350	3220	1680	990	718	785
27	763	1220	5740	20600	26600	25800	7960	3250	1650	995	715	778
28	799	1200	5870	19600	26200	25100	7660	3220	1580	909	711	774
29	816	1330	6470	19000	26400	25100	7330	3110	1540	842		767
30	786	2080	6860	18800	25900	26200	7030	3040	1530	842		771
31		3770		18700	25900		6690		1520	851		777

YEAR: 1990-91

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	783	973	2610	8640	43100	32000	36300	8420	2940	1590	1250	607
2	781	989	2610	8810	44500	32700	33900	7970	2820	1570	1230	602
3	766	1010	2620	9330	45200	31800	33500	7530	2780	1540	1180	591
4	770	988	2700	10000	45500	29800	32400	7270	2740	1490	1180	585
5	788	981	2610	11800	45900	27100	31100	6880	2660	1450	1080	592
6	814	949	2770	13300	47100	25000	29500	6630	2610	1470	957	579
7	837	1010	2880	14900	47900	22900	28000	6320	2570	1470	902	584
8	834	1090	3160	17500	48300	22000	27100	6020	2520	1460	857	582
9	804	1100	3510	20200	48000	23100	25300	5630	2410	1450	827	583
10	798	1080	3660	25200	46700	26400	23700	5490	2410	1460	799	581
11	794	1090	3820	28900	44700	29800	22100	5260	2460	1480	788	547
12	815	1090	3960	30900	43100	32200	20300	5000	2410	1480	759	550
13	830	1080	4360	32700	42200	33900	19400	4920	2390	1500	725	575
14	839	1120	4750	33800	42900	34900	18000	4890	2380	1470	703	554
15	850	1140	4900	35500	44100	35000	16500	4860	2310	1460	708	558
16	862	1190	4460	36400	45500	33900	16300	4760	2240	1530	697	561
17	872	1220	4120	36300	46600	32300	16200	4650	2190	1540	631	586
18	886	1350	3830	35900	47800	29900	15500	4630	2210	1550	570	601
19	889	1450	3730	36800	48800	28000	14800	4560	2180	1550	565	602
20	887	1460	3720	37500	49900	28000	13800	4490	2090	1550	558	603
21	884	1490	3870	38900	51000	28800	12800	4340	2060	1480	583	598
22	872	1600	4340	40400	50200	30600	12100	4190	2040	1420	601	587
23	874	2090	4920	41400	47600	34400	11800	3920	2030	1410	597	579
24	912	2360	5750	42200	45100	37100	11100	3750	1990	1410	567	579
25	981	2620	6640	42100	43300	39400	10900	3630	1950	1390	565	573
26	1010	2620	6970	42700	40300	40900	10300	3540	1880	1380	602	564
27	1020	2660	7650	43300	37300	40900	9980	3400	1860	1360	606	554
28	1020	2570	7740	43500	35600	40700	9590	3240	1790	1350	607	570
29	1030	2530	7900	43600	34400	39800	9340	3120	1730	1340		571
30	992	2490	8340	42800	33100	37400	9120	3010	1640	1320		573
31		2570		42800	32000		9000		1610	1300		527

YEAR: 1991-92

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	528	830	1510	6410	20500	40000	19800	4800	3080	1730	932	656
2	532	823	1600	6570	20800	42500	18600	4820	3050	1720	910	635
3	547	838	1800	6890	21500	44100	17400	4640	3020	1690	865	625
4	567	873	2050	6920	22100	45100	16400	4520	2960	1660	936	612
5	558	861	2270	6970	22400	46100	15400	4400	2920	1740	912	606
6	547	859	2640	7360	23000	48000	14500	4280	2890	1760	840	599
7	551	861	2740	8530	23200	49400	13300	4150	2840	1750	828	600
8	588	878	2790	9510	23500	49000	12200	4110	2780	1810	846	607
9	594	896	3140	10600	24500	49600	11600	4020	2650	1760	838	616
10	603	951	3300	11000	25800	51000	10800	3930	2540	1690	842	587
11	623	1070	3430	11200	27100	52500	10400	3820	2460	1660	830	577
12	666	1150	3520	11500	28400	54200	9990	3750	2380	1660	821	504
13	725	1250	3750	12300	29300	55600	9530	3800	2300	1600	803	477
14	784	1320	3990	13300	29000	55100	9110	3750	2230	1560	793	455
15	809	1420	4240	13700	28400	54400	8740	3680	2160	1520	789	419
16	843	1330	4710	13800	28600	52300	8470	3620	2090	1470	795	431
17	870	1350	5740	13800	28900	48300	8370	3630	2020	1460	801	436
18	887	1390	6580	14000	28600	43900	8220	3630	1910	1450	837	439
19	893	1410	7330	14100	28200	39900	8090	3570	1910	1420	829	435
20	883	1420	8520	14000	27600	36200	8020	3550	1820	1430	823	457
21	871	1350	9210	13800	28200	32700	7800	3480	1740	1430	821	484
22	861	1260	9470	13700	29000	29700	7430	3410	1760	1420	843	475
23	807	1210	9470	12800	29900	27200	7090	3400	1630	1370	779	441
24	801	1180	9130	12200	29900	24400	6610	3360	1620	1330	676	437
25	752	1200	8570	11900	30500	24600	6370	3330	1710	1280	721	423
26	792	1180	8040	11700	30600	24000	6060	3300	1670	1180	721	409
27	863	1180	7980	11900	31500	23100	5870	3240	1760	1130	701	396
28	846	1220	7630	12400	33400	22600	5490	3230	1850	1060	685	383
29	870	1330	7090	14400	35000	22000	5270	3210	1770	1010	675	410
30	841	1370	6720	16800	36100	21400	5300	3150	1790	1020		415
31		1420		18400	38000		4990		1760	965		423

YEAR: 1992-93

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	424	393	701	3200	11600	38000	14100	7090	3100	1510	839	366
2	423	395	702	3330	11700	37600	13100	6740	3040	1480	816	359
3	412	402	706	3270	12100	37800	12700	6390	2950	1470	787	361
4	406	503	723	3130	13000	37000	12200	5990	2850	1460	767	359
5	416	509	715	3000	14500	33100	12000	5550	2760	1430	760	355
6	423	471	705	2970	16300	28800	11100	5330	2720	1350	744	356
7	430	435	694	2910	18100	26500	10800	5140	2680	1340	699	355
8	406	446	674	3080	19300	24600	10200	4910	2290	1340	677	358
9	407	467	657	3170	20000	23600	9820	4930	2480	1350	659	349
10	408	522	646	3270	19500	23300	9470	4670	2510	1390	643	325
11	410	525	678	3390	19700	22800	8550	4580	2430	1360	627	318
12	411	519	706	3580	20900	22400	7990	4480	2320	1360	608	315
13	413	528	703	3680	22300	22300	7800	4420	2260	1290	574	304
14	416	531	696	4230	22900	22600	7810	4390	2250	1310	519	309
15	421	547	688	4810	23600	24900	7480	4310	2210	1320	453	316

16	421	554	677	5120	23700	28300	7310	4330	2180	1310	395	316
17	426	564	672	5300	23300	33000	7140	4270	2160	1220	394	315
18	431	563	707	5530	22500	36900	7510	4020	2140	1170	383	309
19	430	563	715	5950	21400	39500	7610	3800	2120	1140	388	309
20	431	599	686	7230	21000	41000	8450	3740	2050	1130	397	311
21	438	597	672	7450	20600	41800	8970	3690	1980	1120	400	307
22	438	601	682	7120	20400	38900	9770	3660	1960	1080	403	300
23	470	624	692	6900	20300	33600	9990	3560	1950	1050	394	292
24	490	631	724	7230	20400	24800	10100	3530	1910	964	388	289
25	502	637	772	7800	22300	17800	10200	3410	1870	936	381	288
26	488	657	907	8950	27100	14000	9930	3380	1820	923	381	287
27	474	684	1300	10300	31100	12600	9730	3300	1720	909	375	287
28	419	690	1960	11100	33500	13500	9190	3230	1650	905	374	275
29	419	674	2550	11200	35100	14000	8660	3170	1620	859		262
30	398	675	2950	11500	35600	14100	8060	3120	1560	844		261
31		684		11600	36300		7490		1530	849		269

YEAR: 1993-94

DAY	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
1	379	543	1070	4050	16500	28900	41600	6330	3840	1570	1210	1010
2	331	552	1100	4370	16900	29000	38900	6160	3750	1540	1220	999
3	285	566	1070	5030	17300	29200	36300	5990	3640	1520	1240	997
4	277	633	1100	6220	17400	29100	33500	5970	3540	1540	1260	985
5	275	668	1110	7390	17300	28900	32600	5930	3520	1480	1220	972
6	267	636	1100	8150	17600	28700	30200	5830	3490	1450	1190	948
7	270	678	1180	8830	18400	29200	27600	5670	3430	1410	1170	896
8	273	697	1270	9330	19300	29600	25300	5450	3340	1380	1170	841
9	274	687	1410	9340	19900	30000	23000	5420	3270	1370	1160	824
10	271	715	1670	9060	20500	31000	22200	5580	3210	1330	1110	754
11	323	738	2080	8710	21200	31800	20100	5500	3150	1300	1100	722
12	432	765	2160	8260	22000	32600	18900	5390	3040	1310	1100	694
13	432	845	2260	7960	22900	33700	16900	5240	3000	1280	1100	654
14	385	998	2180	7770	25400	34600	15900	5220	2850	1220	1080	610
15	341	1090	2240	8070	27400	35100	15200	5120	2850	1240	1070	560
16	339	1180	2350	8230	28700	36200	14500	5030	2730	1220	1050	497
17	372	1310	2450	8710	29300	37400	14100	5080	2590	1210	1050	456
18	462	1400	2420	9360	29300	38600	12900	4980	2480	1190	1080	457
19	512	1440	2280	9680	27900	39600	12500	4980	2400	1200	1080	458
20	497	1460	2180	9940	26300	40500	11600	4970	2280	1180	1070	462
21	488	1490	2040	10500	24700	42700	10700	4960	2150	1160	1050	460
22	493	1510	2110	11600	23700	44700	10300	4890	2080	1180	1060	456
23	500	1580	2180	13400	22900	44400	9980	4850	2040	1170	1050	453
24	484	1570	2400	15000	23700	44000	9400	4760	2010	1150	1050	444
25	483	1490	2760	16800	25400	43400	8660	4660	1960	1150	1040	443
26	490	1660	2830	17900	27700	43200	8280	4460	1960	1170	1050	443
27	509	1560	2790	18200	29500	43000	7550	4310	1840	1180	1050	449
28	518	1430	2860	17900	30800	43700	7320	4130	1770	1180	1030	450
29	546	1380	3220	17500	31500	43800	7260	4070	1680	1190		430
30	547	1200	3700	16900	29300	43300	6930	3920	1600	1200		442
31		1030		16600	29000		6530		1560	1210		449

