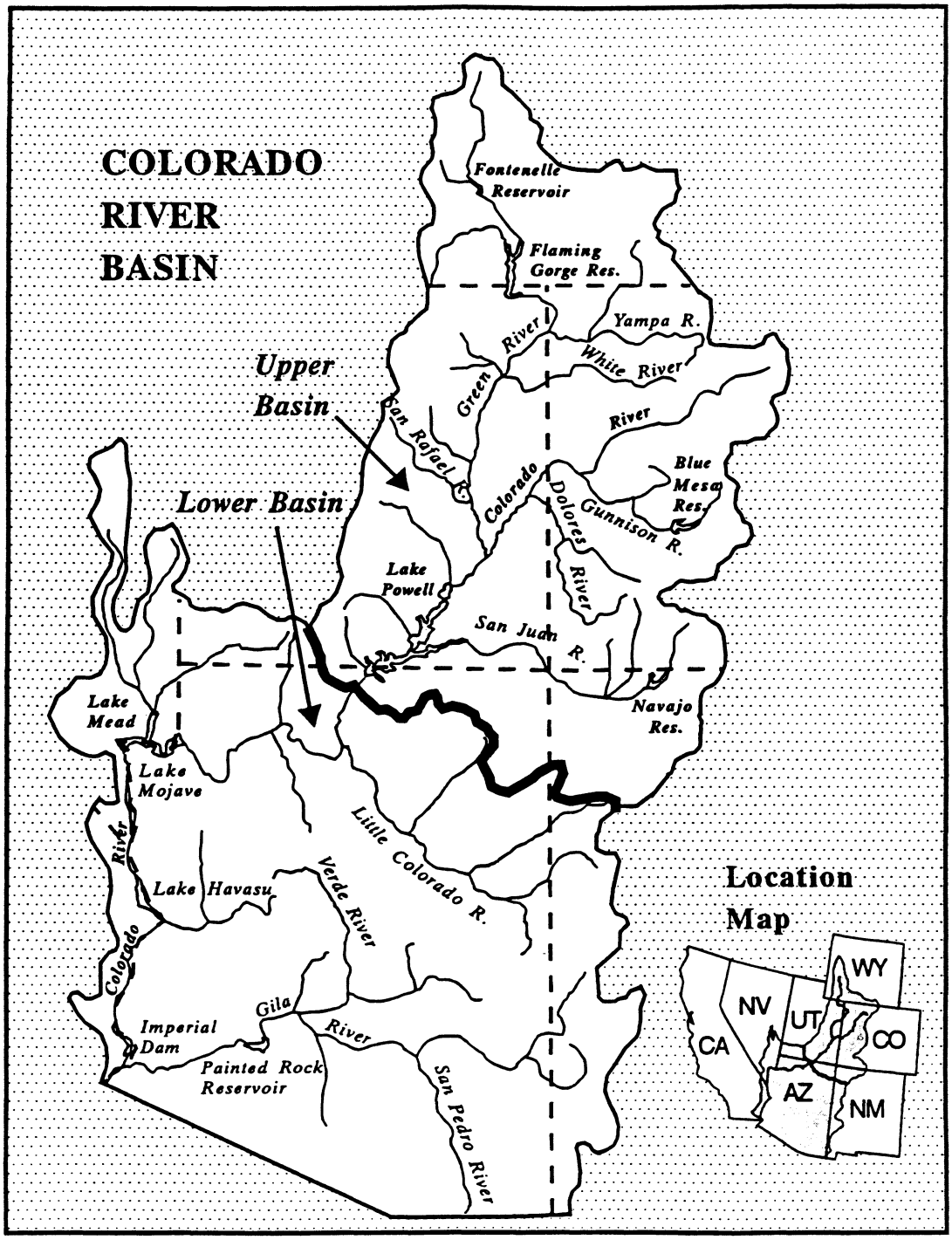
ANNUAL OPERATING PLAN
FOR
COLORADO RIVER RESERVOIRS
1996



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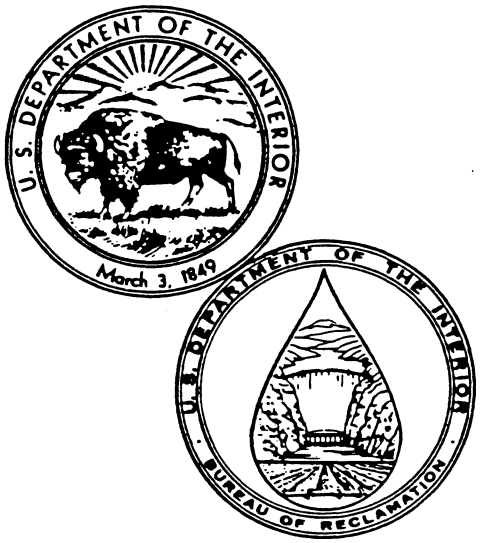


UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

ANNUAL OPERATING PLAN FOR

COLORADO RIVER RESERVOIRS

1996

INTRODUCTION

Authority

This 1996 annual operating plan (AOP) was developed in accordance with Section 602 of *The Colorado River Basin Project Act* (Public Law 90-537), and the *Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968* (Operating Criteria), promulgated by the Secretary of the Interior pursuant thereto and other applicable statutes. In accordance with *The Colorado River Basin Project Act* and the Operating Criteria, the AOP must be developed and administered consistent with applicable Federal laws, *The Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, Treaty Between the United States of America and Mexico*, signed February 3, 1944 (1944 Mexican Water Treaty), interstate compacts, court decrees, and other documents relating to the use of the waters of the Colorado River, which are commonly and collectively known as "The Law of the River."

The Operating Criteria and Section 602 of *The Colorado River Basin Project Act* mandate consultation with representatives of the Governors of the seven Basin States and the Upper Colorado River Commission in preparing the annual plan for operation of the Colorado River reservoirs. In addition, *The Grand Canyon Protection Act of 1992* (Title XVIII of Public Law 102-575) requires consultation to include the general public and others. Accordingly, the 1996 AOP was prepared by the Bureau of Reclamation (Reclamation) in consultation with the seven Basin States Governors' representatives; the Upper Colorado River Commission; appropriate Federal agencies; representatives of the academic and scientific communities, environmental organizations, and the recreation industry; contractors for the purchase of Federal power; others interested in Colorado River operations; and the general public through the Colorado River Management Work Group.

Purpose

The purposes of the AOP are to determine: (1) the projected operation of the Colorado River reservoirs to satisfy project purposes under varying hydrologic and climatic conditions; (2) the quantity of water considered necessary as of September 30, 1996 to be in storage in the Upper Basin reservoirs as required by Section 602(a) of *The Colorado River Basin Project Act*; (3) water available for delivery pursuant to the 1944 Mexican

Water Treaty and Minute No. 242 of the International Boundary and Water Commission, United States and Mexico (IBWC); (4) whether the reasonable consumptive use requirements of mainstream users in the Lower Division States will be met under a "normal", "surplus", or "shortage" condition as outlined in Article III of the Operating Criteria; and (5) whether water apportioned to, but unused by one or more Lower Division States exists and can be used to satisfy beneficial consumptive use requests of mainstream users in other Lower Division States as provided in the 1964 U.S. Supreme Court decree in *Arizona v. California*.

Consistent with the above determinations and in accordance with other provisions of "The Law of the River," the AOP was developed with "appropriate consideration of the uses of the reservoirs for all purposes, including flood control, river regulation, beneficial consumptive uses, power production, water quality control, recreation, enhancement of fish and wildlife, and other environmental factors" (Operating Criteria, Article I(2)).

Since the hydrologic conditions of the Colorado River Basin can never be completely known in advance, the AOP addresses the operations resulting from three different hydrologic scenarios: the probable maximum, most probable, and probable minimum reservoir inflow conditions. River operations under the plan are modified during the year as runoff predictions are adjusted to reflect existing snowpack, basin storage, and flow conditions.

Summary

Upper Basin Delivery. Storage equalization will control the annual releases from Glen Canyon Dam in accordance with Article II(3) of the Operating Criteria unless the minimum objective release criterion in Article II(2) is controlling.

Lower Basin Uses. Taking into account the existing and predicted water supply conditions in the basin and that the reasonable beneficial consumptive use requirements of mainstream users in the Lower Division States are expected to be less than 9,252 million cubic meters (MCM) [or 7.500 million acre-feet (MAF)], the normal condition is the criterion governing the operation of Lake Mead for calendar year 1996 in accordance with Article III(3)(a) of the Operating Criteria and Article II(B)(1) of the decree in *Arizona v. California*. All reasonable beneficial consumptive needs of Colorado River mainstream users will be met in calendar year 1996.

Any Lower Division State will be allowed to utilize water apportioned to, but unused by, another Lower Division State, in accordance with Article II(B)(6) of the decree in *Arizona v. California*.

1944 Mexican Water Treaty Delivery. The guaranteed annual quantity of 1,850 MCM (1.500 MAF) of water will be delivered to Mexico during calendar year 1996 in accordance with Article 15 of the 1944 Mexican Water Treaty and Minute No. 242 of the IBWC.

1995 OPERATIONS SUMMARY AND RESERVOIR STATUS

Water year 1995 signalled the end of dry hydrological conditions in the basin. Basinwide precipitation during 1995 was above average and translated into an above average snowpack. At the beginning of the runoff season the basinwide runoff forecast was 107 percent of average, varying between 89% of normal in the Green River basin to 140 percent of normal in the San Juan Basin. However, very cold, wet weather dominated late April and May resulting in very deep snowpacks above 10,000 feet elevation. Hot weather in mid-June produced high runoff peaks and boosted the runoff volume significantly. This produced a well above average runoff throughout the basin. Annual runoff in the Green River was 110 percent of average, the Gunnison was 210 percent of average, the San Juan basin was 155 percent of average and Lake Powell was 139 percent of average.

With the high runoff during 1995 there were numerous reports of local flooding, but most damage was minimal.

Unregulated inflow into Lake Powell is expected to be 20,127 MCM (16.315 MAF) in water year 1995, approximately 139 percent of the 30 year average. This inflow resulted in the gain of approximately 6,008 MCM (4.871 MAF) of storage in Lake Powell. Approximately 1,198 MCM (0.971 MAF) of storage was gained in upstream reservoirs. With an additional gain of approximately 976 MCM (0.791 MAF) within the Lower Basin reservoirs, the total Colorado storage system gained approximately 8,182 MCM (6.633 MAF) during water year 1995. It is now estimated that it would take two years of average inflow to completely fill the storage system. During 1995, all deliveries of water to meet obligations pursuant to "The Law of the River" were maintained. Tables 1(a) and 1(b) list the expected October 1, 1995 reservoir vacant space, live storage, water elevation, percent of capacity, change in storage, and change in elevation during water year 1995.

Table 1(a). Expected Reservoir Conditions on October 1, 1995 (Metric Units)

Reservoir	Vacant Space (MCM)	Live Storage (MCM)	Water Elevation (meters)	Percent of Capacity (percent)	Change in Storage* (MCM)	Change in Elevation* (meters)
Fontenelle	506	375	1981.5	88	+ 88	+ 3.0
Flaming Gorge	331	4,294	1838.9	93	+ 733	+ 4.9
Blue Mesa	937	929	2289.3	91	+ 170	+ 5.1
Navajo	157	1,935	1852.3	93	+ 207	+ 3.7
Lake Powell	2,070	27,931	1124.4	93	+ 6,008	+ 10.6
Lake Mead	6,493	25,426	360.9	80	+ 842	+ 1.5
Lake Mohave	278	1,954	194.8	88	+ 141	+ 1.3
Lake Havasu	67	697	136.5	91	- 7.4	- 0.11
Totals	10,839	63,541	--	86	+ 8,182	--

Table 1(b). Expected Reservoir Conditions on October 1, 1995 (English Units)

Reservoir	Vacant Space (MAF)	Live Storage (MAF)	Water Elevation (feet)	Percent of Capacity (percent)	Change in Storage* (MAF)	Change in Elevation* (feet)
Fontenelle	.41	.304	6501	88	+ .071	+ 9.9
Flaming Gorge	.268	3.481	6033	93	+ .594	+ 16.0
Blue Mesa	.76	.753	7511	91	+ .138	+ 16.6
Navajo	.127	1.569	6077	93	+ .168	+ 12.2
Lake Powell	1.678	22.644	3689	93	+ 4.871	+ 34.9
Lake Mead	5.264	20.613	1184	80	+ .683	+ 5.1
Lake Mohave	.225	1.584	639	88	+ .114	+ 4.4
Lake Havasu	.054	.565	447	91	- .006	- .37
Totals	8.786	51.513	--	86	+ 6.633	--

* from October 1, 1994 to September 30, 1995

1996 WATER SUPPLY ASSUMPTIONS

For 1996 operations, three reservoir unregulated inflow scenarios were developed and analyzed and are labeled as probable maximum, most probable, and probable minimum. The attached graphs show these inflow scenarios and associated release patterns, end of month contents, and end of month elevations for each reservoir.

The National Weather Service Extended Streamflow Prediction (ESP) computer model was employed to develop each of these inflow scenarios. This model uses current basin conditions as well as historical data to predict the range of possible future streamflows. Although there is a wide confidence band associated with streamflow forecasts made a year in advance, the data are valuable in analyzing possible impacts on project uses and purposes. Soil moisture deficit conditions within the basin were eliminated by the above normal snowpack that was experienced in 1995. This is expected to return the magnitude of inflows in water year 1996 to normal conditions. Therefore the magnitude of inflows in each of the three inflow scenarios are near the historical upper decile, mean, and lower decile (10 percent exceedance, 50 percent exceedance, and 90 percent exceedance, respectively) for each reservoir for water year 1996. The three inflow scenarios for Lake Powell are shown in Tables 2(a) and 2(b).

The volume of inflow resulting from these assumptions was used as input into Reclamation's monthly reservoir simulation model. This model is used to plan reservoir operations for the upcoming 24-month period. Projected water year 1996 inflow and July 31, 1995, reservoir storage conditions were used as input to this model and monthly releases were adjusted until release and storage levels accomplished project purposes and priorities.

Table 2(a). Projected Unregulated Inflow
Into Lake Powell for Water Year 1996
(Metric Units: MCM)

Time Period		Probable Maximum	Most Probable	Probable Minimum
10/95 -	12/95	2,214	1,853	1,788
1/96 -	3/96	2,362	1,729	1,400
4/96 -	7/96	15,548	9,541	5,329
8/96 -	9/96	2,461	1,342	919
10/96 -	12/96	1,850	1,850	1,850
WY	1996	22,585	14,465	9,436
CY	1996	22,221	14,463	9,498

Table 2(b). Projected Unregulated Inflow
Into Lake Powell for Water Year 1996
(English Units: MAF)

Time Period		Probable Maximum	Most Probable	Probable Minimum
10/95 -	12/95	1.795	1.502	1.450
1/96 -	3/96	1.915	1.402	1.135
4/96 -	7/96	12.605	7.735	4.320
8/96 -	9/96	1.995	1.088	.745
10/96 -	12/96	1.500	1.500	1.500
WY	1996	18.310	11.727	7.650
CY	1996	18.015	11.725	7.700

1996 RESERVOIR OPERATIONS

Minimum instream flow levels have been established at several locations in the Upper and Lower Basins which are intended to preserve the present aquatic resources downstream of specific dams. The regulation of the Colorado River has had both positive and negative effects on aquatic resources. Controlled cool water releases from dams have provided for increased productivity of some aquatic resources and the development of significant sport fisheries. However, the same releases may be detrimental to endangered and other native species of fishes.

Consultations with the Fish and Wildlife Service in compliance with Section 7 of the Endangered Species Act (Section 7 consultations) on the operation of the Aspinall Unit on the Gunnison River, Navajo Dam on the San Juan River, and on Flaming Gorge on the Green River will continue in 1996. Studies associated with these consultations will be used to better understand the flow related needs of endangered and other native species of fish. Additionally, interim flow restrictions on releases from Lake Powell will continue in water year 1996 and until the corresponding Record of Decision on the Glen Canyon Dam Environmental Impact Statement (GCDEIS) is completed.

Modifications to planned operations may be made based on changes in forecast conditions. However, due to the Recovery Implementation Programs for Endangered Fish Species in the Upper Colorado River Basin, Section 7 consultations, and other downstream concerns, modification to the monthly operation plans may not be based solely on changes in streamflow forecasts. Decisions on spring peak releases and downstream habitat target flows may be made midway through the runoff season. Reclamation and the Fish and Wildlife Service will initiate meetings with interested parties, including representatives of the Basin States, to facilitate the decisions necessary to finalize site specific operations plans. All operations will be undertaken subject to the primary water storage and delivery requirements established by "The Law of the River" and other applicable statutes, including water quality control, recreation, enhancement of fish and wildlife, and other environmental factors.

The following paragraphs discuss the operation of each of the reservoirs with respect to compact, decree and statutory water delivery obligations, and instream flow needs for maintaining or improving aquatic resources, where appropriate.

Fontenelle Reservoir

The Upper Green River Basin after 8 consecutive years of below normal flows experienced an above average year. The April through July runoff into the reservoir during water year 1995 was 1,157 MCM (0.938 MAF) or 115 percent of the long term average and Fontenelle easily filled in 1995.

Because the mean annual inflow of 1,480 MCM (1.200 MAF) far exceeds the storage capacity of 426 MCM (.345 MAF), significant powerplant bypasses are expected under the most probable and maximum probable inflow scenarios. Additionally, there is little chance that the reservoir will not fill during water year 1996. In order to minimize spring high releases and to maximize downstream fishery resources and power production, the reservoir will probably be drawn down to minimum pool elevation 1970.0 meters (6463 feet) which corresponds to a volume of 111 MCM (.090 MAF) of live storage.

To meet the above-stated operational objectives, a constant release of approximately 31.2 to 34.0 cubic meters per second (cms) [or 1,100 to 1,200 cubic feet per second (cfs)] will be made through the fall and winter months. Releases at this level will provide an appropriate level of reservoir drawdown for the 1996 runoff season, while ensuring that downstream water rights and municipal and industrial needs are met.

Flaming Gorge Reservoir

Water year 1995 unregulated inflow into Flaming Gorge Reservoir is expected to be 2,304 MCM (1.87 MAF) or 110 percent of average. The April through July runoff was 1,705 MCM (1.38 MAF) or 109 percent of the long term average. With this inflow, Flaming Gorge is expected to gain approximately 733 MCM (0.59 MAF) of storage in water year 1995.

In 1995, Flaming Gorge was operated in accordance with the Final Draft Biological Opinion on the Operation of Flaming Gorge (FDBOFG), issued in November 1992. The FDBOFG outlines the reservoir operations during the spring, summer, and early fall months which may provide an improved habitat for endangered endemic species of fish. To accommodate the FDBOFG a special release was made from Flaming Gorge during May and June. The goal of the special release in 1995 was to maintain flows on the Green River at Jensen, Utah, between 481 cms to 510 cms (17,000 to 18,000 cfs). This target range was established because flooding begins to occur at Jensen when flows exceed 524 cms (18,500 cfs). Jensen is below the confluence of the Green and Yampa Rivers, and flows from the Yampa River alone in 1995 exceeded 510 cms (18,000 cfs). Releases from Flaming Gorge were adjusted during this special release between minimum levels of 22.7 cms (800 cfs) and maximum power levels of 122 cms (4300 cfs). During the period when the Yampa River reached its peak, flows from Flaming Gorge were at minimum levels, producing a flow at Jensen of 546 cms (19,300 cfs).

In 1996, Flaming Gorge will again be operated in accordance with the FDBOFG. If water year 1996 runoff is similar to the probable minimum, most probable, or probable maximum inflow scenarios; then high spring releases for three, eight, or in excess of eight weeks duration will likely be made, respectively. Under all inflow scenarios, low stable flows between 31.2 and 51.0 cms (1,100 and 1,800 cfs) will likely be maintained

on the Green River near the Jensen, Utah, gaging station during the summer and fall months by adjusting Flaming Gorge releases.

Water year 1996 will be the final year of the five year study called for in the FDBOFG to further determine the flow needs of the endangered fish during the spring and winter months.

Blue Mesa, Morrow Point, and Crystal Reservoirs (Aspinall Unit)

In water year 1995 the April through July runoff into the Aspinall Unit was 1,980 MCM (1.61 MAF) or 230 percent of average. Water year 1995 unregulated inflow is expected to be 2,523 MCM (2.045 MAF) or 210 percent of average. Water year 1995 powerplant bypasses were approximately 1,165 MCM (0.944 MAF) at Crystal, 348 MCM (0.282 MAF) at Blue Mesa, and 230 MCM (0.187 MAF) at Morrow Point. Releases and spills up to 173 cms (6,100 cfs) occurred at Crystal with flows in the river below the tunnel in excess of 161 cms (5,700 cfs). Even with the large amount of inflow, daily fluctuations greater than 15 percent were avoided. Blue Mesa filled easily during water year 1995.

Section 7 consultation with the Fish and Wildlife Service on the operation of the Aspinall Unit continued in 1995. As part of this consultation, a five year effort to study the effect of various release patterns on habitat, reproductive success, and reintroduction of endangered fish in the Gunnison River is underway. Water year 1995 was the fourth year of this five year study and was considered a high flow scenerio.

Additionally, the Aspinall Unit was operated as if the draft contract between Reclamation, the National Park Service, and the State of Colorado to deliver water from the Aspinall Unit to the Black Canyon of the Gunnison National Monument were in place. The operation was also coordinated with the Fish and Wildlife Service and others interested in the operation of the Aspinall Unit.

For water year 1996 operations, Blue Mesa Reservoir will be drawn down to at least an elevation of 2283 meters (7490 feet) by December 31, 1995 in order to minimize icing problems in the Gunnison River. Blue Mesa will continue to be drawn down through April 1996 to a level that will accommodate the current most probable inflow scenario and accomplish the release objectives with minimal powerplant bypasses at Crystal.

The minimum release objective of the Aspinall Unit is to meet the delivery requirements of the Uncompahgre Valley Project and to keep a minimum of 8.5 cms (300 cfs) flowing through the Black Canyon of the Gunnison National Monument. Under all three inflow scenarios, Blue Mesa is expected to fill in the summer of 1996 and flows through the Black Canyon of the Gunnison National Monument are expected to be above the minimum release objective during the summer months. Filling of the reservoir in water year 1996 will ensure that reasonable specific releases required to study the protection and improvement of habitat for endangered fish can be accommodated. The forecasted runoff for the spring of 1996 will be closely monitored to achieve these objectives. To

protect the blue ribbon trout fishery in the Black Canyon and maximize recreation potential, releases during 1996 will be planned to minimize large fluctuations in the daily and monthly flows in the Gunnison River below the Uncompahgre Tunnel Diversion.

Navajo Reservoir

The April through July unregulated inflow into Navajo Reservoir in water year 1995 was 1,437 MCM (1.165 MAF) or 150 percent of average. Water year 1995 unregulated inflow is expected to be 1,870 MCM (1.516 MAF) or 155 percent of average. Navajo Reservoir filled in July 1995.

Section 7 consultation with the Fish and Wildlife Service on the operation of Navajo Dam continued in 1995. Water year 1995 was the fifth year of a seven year study to evaluate alternative operations of Navajo Reservoir to benefit endangered fish. In accordance with this seven year study, spring operations of Navajo were modified in 1995 and large releases of up to 141.6 cms (5,000 cfs) were made during much of May and June to coincide with the peak flows of the Animas River to study the effect of large spring flows on the habitat improvement and spawning success of endangered endemic species of fish. This resulted in flows of over 339.8 cms (12,000 cfs) at Bluff, Utah. After the completion of the large spring releases, flows were slowly reduced to approximately 22.7 cms (800 cfs) for the remainder of the year.

In 1996, Navajo Reservoir is expected to nearly fill except under the probable minimum inflow scenario. Releases from the reservoir will be held near 17 cms (600 cfs) through the fall and winter months and large releases will likely be made in May and June in order to improve the habitat and provide better spawning conditions for endangered fish in the San Juan River.

Lake Powell

The April through July unregulated inflow into Lake Powell in water year 1995 was 14,491 MCM (11.747 MAF) or 152 percent of average. Water year 1995 unregulated inflow is expected to be 20,127 MCM (16.315 MAF) or 139 percent of average. Lake Powell rose to about 6 feet from full in August 1995.

During water year 1996, releases greater than the minimum release objective of 10,152 MCM (8.230 MAF) will be made if required to equalize the storage between Lakes Powell and Mead or to avoid anticipated spills. Under the most probable inflow conditions, releases of 14,378 MCM (11.655 MAF) would be made and the reservoir would lose 492 MCM (0.399 MAF) of storage. Under the probable maximum inflow scenario, approximately 20,027 MCM (16.234 MAF) will be released during the water year and Lake Powell would gain 703 MCM (0.570 MAF) of storage. This maximum probable inflow would require releases of greater than 566.4 cms (20,000 cfs) for a lengthy period of time. It is estimated that it will take two years of average inflow to refill Lake Powell.

The interim flow restrictions on the daily and hourly releases from Glen Canyon Dam implemented in August, 1991 (shown in Table 3) will continue during water year 1996. A Record of Decision on the GCDEIS will be completed following the audit specified in the 1992 Grand Canyon Protection Act. A monitoring program has been implemented and will continue to measure the effect of interim flow restrictions on downstream resources.

Table 3. Glen Canyon Dam interim flow restrictions

Parameter	(cms)	(cfs)	conditions
Maximum flow [1]	566.4	20,000	
Minimum flow	141.6	5,000	nighttime
	226.6	8,000	7:00 am to 7:00 pm
Ramp rates			
ascending	70.8	2,500	per hour
descending	42.5	1,500	per hour
Daily fluctuations [2]	141.6 / 226.6	5,000 / 8,000	

[1] to be evaluated and potentially increased as necessary and in years when delivery to the Lower Basin exceeds 10,152 MCM (8.23 MAF)

[2] Daily fluctuations limit is 141.6 cms (5,000 cfs) for months with release volumes less than 740 MCM (.600 MAF); 169.9 cms (6,000 cfs) for monthly release volumes of 740 to 987 MCM (.600 to .800 MAF); and 226.6 cms (8,000 cfs) for monthly volumes over 990 MCM (.800 MAF)

Based on a request from the Transition Work Group of the GCDEIS, one week of high steady flows for research purposes is planned from Glen Canyon Dam in April 1996. These flows would test the effectiveness of the Beach/Habitat Building flow recommendation in the GCDEIS and would require bypassing the powerplant.

The Colorado River Management Work Group and Transition Work Group, involved with the AOP and the GCDEIS respectively, support the elimination of the provision for Beach/Habitat Building Flows during low reservoir storage conditions as contained in the preferred alternative of the GCDEIS. These work groups also support accomplishing this action through the Record of Decision process. This approach would attempt to accomplish the objectives of the Beach/Habitat Building Flow recommendation of the GCDEIS utilizing reservoir releases in excess of powerplant capacity required for dam safety purposes during high reservoir conditions at Glen Canyon Dam. Such releases would be consistent with the 1956 Colorado River Storage Project Act, the 1968 Colorado River Basin Project Act and the 1992 Grand Canyon Protection Act. Such releases would be managed to the maximum extent possible to (1) protect river sediment storage downstream or (2) be released in such a way as to reshape river topography, redeposit sediment and enhance aquatic habitat. In addition, installation of permanent extensions to spillway gates as provided in the preferred alternative of the GCDEIS will provide infrequent, short-term control of floods for the environmental protection of the Grand Canyon and for dam safety purposes. These concepts, along with habitat maintenance flows up to powerplant capacity during lower reservoir conditions, would be carefully monitored to ensure that the goals of environmental and endangered species protection are met. Additional NEPA compliance will be completed on the permanent installation of the spillway gate extensions.

With this proposal in place, a test of a Beach/Habitat Building flow from Glen Canyon Dam could be accomplished in the spring of 1996. This test would allow scientific verification of the sediment deposition mechanisms believed to be key to the long-term maintenance of habitats in the Grand Canyon. NEPA and ESA compliance will be completed on this research test prior to its occurrence in 1996.

This test in 1996 may have economic impacts due to foregone power generation and its associated revenue impact to the Treasury from the water that would bypass the powerplant, about 345 MCM (0.280 MAF). Such a test release, if performed for other than hydrologic reasons, could result in modified monthly release volumes throughout water year 1996, and may cause additional purchase power expenses during the other months of the year and low value "dump energy" during the month of the test release.

Representative monthly releases from Glen Canyon Dam in 1996 are shown in Tables 4(a) and 4(b) for the most probable inflow scenario, in which a release of 14,378 MCM (11.655 MAF) is required.

Table 4(a). Representative monthly Lake Powell releases with and without the research release (Metric units)

MONTH	MOST PROBABLE RELEASE YEAR (MCM)	
	withOUT research release	with research release
Oct	1110	1110
Nov	1110	1110
Dec	1172	1172
Jan	1357	1172
Feb	1234	1110
Mar	1172	1049
Apr	1049	1666
SUB-TOTAL	8204	8389
May	1049	1110
Jun	1234	1234
Jul	1357	1234
Aug	1357	1234
Sep	1177	1177
WY TOTAL	14378	14378

Table 4(b). Representative monthly Lake Powell releases with and without the research release (English units)

MONTH	MOST PROBABLE RELEASE YEAR (MAF)	
	withOUT research release	with research release
Oct	.900	.900
Nov	.900	.900
Dec	.950	.950
Jan	1.100	.950
Feb	1.000	.900
Mar	.950	.850
Apr	.850	1.350
SUB-TOTAL	6.650	6.800
May	.850	.900
Jun	1.000	1.000
Jul	1.100	1.000
Aug	1.100	1.000
Sep	.955	.955
WY TOTAL	11.655	11.655

Lake Mead

With the increased releases out of Lake Powell during the late summer and fall of calendar year 1995, Lake Mead is expected to finish out the year with 25,426 MCM (20.613 MAF) in storage at elevation 360.7 meters (1183 feet), which is 80 percent of conservation capacity. Full conservation pool at 371.9 meters (1220 feet) has a capacity of 31,919 MCM (25.877 MAF).

The normal condition will govern the operation of Lake Mead and all reasonable beneficial consumptive needs of Colorado River mainstream users will be met in calendar year 1996. The outlook for lowest and highest monthly releases under the most probable inflow conditions for calendar year 1996 will be 682 MCM (.553 MAF) and 1421 MCM (1.152 MAF) respectively.

Lake Mead water surface elevation is expected to rise to 363.6 meters (1193 feet) in February 1996, with 27,131 MCM (21.995 MAF) in storage, which is 85 percent of conservation capacity. Storage is projected to decline to elevation 362.3 meters (1191 feet) by June 1996, or 84 percent of conservation capacity with 26,836 MCM (21.756 MAF) in storage. By the end of calendar year 1996, Lake Mead storage is projected to be at elevation 364.6 meters (1196 feet) with 27,711 MCM (22.465 MAF) in storage, which is 87 percent of conservation capacity. No flood control releases are anticipated under the most probable and minimum inflow conditions. Flood control releases are anticipated under maximum inflow conditions.

Drawdown during the peak largemouth bass spawning period in April and May is planned to be near the limits of decline recommended in the July 1982 final report of a five year study by the Arizona Game and Fish Department and the Nevada Department of Wildlife. In future years, as Lake Mead refills and flood control releases are again required by the Hoover Dam Flood Control Regulations, consideration will be given to making these releases over the fall and winter months to avoid high flow releases during the January through July runoff season. This distribution of water reduces the chance of bypassing hydroelectric powerplants below Hoover Dam and avoids the adverse impacts of higher flood control releases on fish and wildlife, recreation, water quality, and river stabilization.

Lakes Mohave and Havasu

Mohave and Havasu Reservoirs are scheduled to be drawn down in the late summer and winter months to provide storage space for local storm runoff and will be filled in the spring to meet higher summer water needs. This drawdown will also correspond with maintenance at both Davis and Parker Powerplants which is scheduled for September through February. The normal filling pattern of these two reservoirs coincides well with the fishery spawning period. Since lake elevations will be typical of previous years, normal conditions are expected for boating and other recreational uses.

Reclamation is the lead agency in the Native Fish Work Group, a multi-agency group of scientists attempting to replace the aging stock of endangered razorback suckers in Lake Mohave. Larval suckers are captured by hand in and around spawning areas during the spring and placed into predator-free, lake-side backwaters for rearing through the spring and summer. When the lake is normally drawn down during the fall, these fish are harvested from these rearing areas and then released to the lake. The suckers grow very quickly, usually exceeding eight inches in length by September.

Central Arizona Project
Information on New Waddell Dam Operations

A key feature of the Central Arizona Project (CAP) is New Waddell Dam and Reservoir. This reservoir is located just northwest of the Phoenix metropolitan area and serves as the primary regulatory storage facility for the CAP. Colorado River water is pumped into and released from the reservoir via the Waddell Pumping-Generating Plant (P-G Plant). New Waddell Dam and P-G Plant will allow most of CAP's Colorado River water entitlement to be pumped into the Phoenix area and stored during the winter months when energy and water needs are low, and then released for delivery in the summer months when energy and water needs are high. Revenues associated with marketing of power available due to this operating plan are an important part of Central Arizona Water Conservation District's financial plan. The Salt River Project markets all of the available energy and capacity in excess of that needed for CAP.

The dam and P-G Plant became fully operational in 1994. During the months of October through January, in addition to normal CAP water deliveries, Colorado River water was pumped through the CAP system for storage in the reservoir. During February and March, all CAP demands were met with water pumped directly from the Colorado River and there was little or no Colorado River water pumped into New Waddell Reservoir for storage during these two months. The lake filling was completed in April and May. From June through September most CAP water needs downstream from the New Waddell turnout are satisfied with CAP water stored in New Waddell Reservoir. Beginning in October 1995, Colorado River water will be pumped through the CAP system into New Waddell Reservoir for use during the summer of 1996.

Senator Wash and Laguna Reservoirs

Operations at Senator Wash Reservoir allow regulation of water deliveries to United States water users and Mexico downstream at Imperial Dam. The reservoir is operated to meet water user demands when necessary and to prevent Colorado River flows from exceeding Mexican Treaty requirements at Morelos Dam. This includes excess flows in the river caused by water user cutbacks and sidewash inflows. Operational objectives at and below Imperial Dam are to meet water user demands, to conserve water, to control sediment, and to maintain the river channel.

Releases from Imperial Dam are regulated by Laguna Reservoir to conserve water, to meet all or part of Mexico's water demands, and to maintain river flows downstream near Yuma. Laguna releases combined with agricultural seepage and drainage provide a continuous live stream serving recreational and fish and wildlife purposes from Laguna Dam to Morelos Dam. Occasionally higher than normal releases are required from Laguna Dam due to excess water from rain flooding upstream, or from rejected water orders due to rain. These higher releases serve to maintain the river channel capacity. This occasional practice reduces channel maintenance expense without impairment of water conservation or power production.

Yuma Desalting Plant

The Yuma Desalting Plant will not be operated in 1996. Funding is currently not available for full-scale operation. Most of the damage to the Main Outlet Drain (MOD) and the Main Outlet Drain Extension (MODE) from the 1993 Gila River flood has been repaired. Some damage near the MODE will be repaired in a later year. The Wellton-Mohawk Main Conveyance Canal was repaired in 1994. All Wellton-Mohawk Irrigation and Drainage District drainage flows should be diverted into the MODE in 1996.

The test train, used for research and the building's water service, will be run throughout 1996. The test train uses about one million gallons per day of drainage water taken from the MODE or pumped from an on-site well.

1996 DETERMINATIONS

The AOP provides guidance regarding reservoir storage and release conditions during the upcoming year, based upon congressionally mandated storage, release, and delivery criteria and determinations. After meeting these requirements, specific reservoir releases may be modified as forecast inflows change in response to climatic variability and to provide additional benefits to the projects' multiple purposes.

Upper Basin Reservoirs

The Operating Criteria provide that the annual plan of operation shall include a determination of the quantity of water considered necessary to be in Upper Basin storage at the end of the water year. Taking into consideration all relevant factors required by the Operating Criteria, it has been determined that the active storage in Upper Basin reservoirs forecast for September 30, 1996 exceeds the storage required under Section 602(a) of the *Colorado River Basin Project Act* under any reasonable range of assumptions which might be applied. Therefore, "602(a) Storage" is not the criterion controlling the release of water from Glen Canyon Dam during water year 1996.

Section 602(a)(3) of the *Colorado River Basin Project Act* provides for the storage of Colorado River water in Upper Basin reservoirs that the Secretary of the Interior finds necessary to assure deliveries to comply with Articles III(c) and III(d) of the 1922 *Colorado River Compact*, without impairment to the annual consumptive use in the Upper Basin. The Secretary is required to make this determination after consultation with the Upper Colorado River Commission and representatives from the three Lower Division States, and after taking into consideration all relevant factors including, historic stream flows, the most critical period of record, the probabilities of water supply, and estimated future depletions. Water not required to be so stored will be released from Lake Powell:

- to the extent it can be reasonably applied in the States of the Lower Division to the uses specified in Article III(e) of the 1922 *Colorado River Compact*, but these releases will not be made when the active storage in Lake Powell is less than the active storage in Lake Mead,

- to maintain, as nearly as practicable, active storage in Lake Mead equal to the active storage in Lake Powell, and

- to avoid anticipated spills from Lake Powell.

Storage equalization or spill avoidance criterion in accordance with Article II(3) of the Operating Criteria will control the releases from Glen Canyon Dam during water year 1996 unless the minimum objective release criterion in Article II(2) is controlling. Under the most probable inflow scenario Glen Canyon Dam will release 14,378 MCM (11.655 MAF).

Lower Basin Reservoirs

Water shall be released or pumped from Lake Mead to meet the following requirements:

(a) 1944 Mexican Water Treaty obligations;
(b) Reasonable beneficial consumptive use requirements of mainstream users in the Lower Division States;
(c) Net river losses;
(d) Net reservoir losses;
(e) Regulatory wastes.

The Operating Criteria provide that after the commencement of delivery of mainstream water by means of the CAP, the Secretary of the Interior will determine the extent to which the reasonable beneficial consumptive use requirement of mainstream users in the Lower Division States is met. The reasonable beneficial consumptive use requirements are met depending on whether a normal, surplus, or shortage condition has been determined. The normal condition is defined as annual pumping and release from Lake Mead sufficient to satisfy 9,251 MCM (7.500 MAF) of consumptive use in accordance

with Article III(3)(a) of the Operating Criteria and Article II(B)(1) of the in *Arizona v. California.*

Taking into account the existing and predicted water supply conditions in the basin and that the reasonable beneficial consumptive use requirements of mainstream users in the Lower Division States are expected to be less than 9,251 MCM (7.500 MAF), the normal condition is the criterion governing the operation of Lake Mead for calendar year 1996 in accordance with Article III(3)(a) of the Operating Criteria and Article II(B)(1) of the decree in *Arizona v. California.* All reasonable beneficial consumptive needs of Colorado River mainstream users will be met in calendar year 1996.

Nothing in the decree in *Arizona v. California* prohibits the Secretary of the Interior from releasing water apportioned, but unused, in any Lower Division State for that year for consumptive use in any other Lower Division State. No rights to the recurrent use of such water accrue by reason of the use of such water. In light of this provision and in accordance with Article II(B)(6) of the decree, any Lower Division State will be allowed to utilize water apportioned to, but unused by, another Lower Division State in calendar year 1996.

If the final Supreme Court decree accounting data for calendar year 1996 indicate that more than 9,251 MCM (7.500 MAF) were consumed in the Lower Division States, compensation for overuse of such water will be required from any State exceeding its apportionment during the first year of determined shortage unless a surplus/shortage strategy which provides otherwise is agreed to by July 1996. The need for compensation will be eliminated if either of the following occur prior to a shortage determination: 1) a surplus determination, or 2) a flood control release. Compensation will be in the form of an adjustment to that State's consumptive use apportionment.

1944 Mexican Water Treaty

Pursuant to the 1944 Mexican Water Treaty it has been determined that the guaranteed quantity of 1,850 MCM (1.500 MAF) of water will be delivered to Mexico during calendar year 1996. The delivery of 1,850 MCM (1.500 MAF) of water to Mexico will be in accordance with Article 15 of the 1944 Mexican Water Treaty and Minute No. 242 of the IBWC. Minute No. 242 provides that the United States may deliver up to 173 MCM (.140 MAF) of water across the land boundary at San Luis, Sonora, and in the limitrophe section of the Colorado River downstream of Morelos Dam, in partial satisfaction of the 1944 Mexican Water Treaty. Calendar year schedules of monthly deliveries of Colorado River water are formulated by the Mexican Section of the IBWC and presented to the United States Section before the beginning of each calendar year. Additional scheduled deliveries to Mexico can be made only if there exists Colorado River water in excess of the amount necessary to supply all uses within the United States and the guaranteed quantity of 1,850 MCM (1.500 MAF) annually to Mexico.

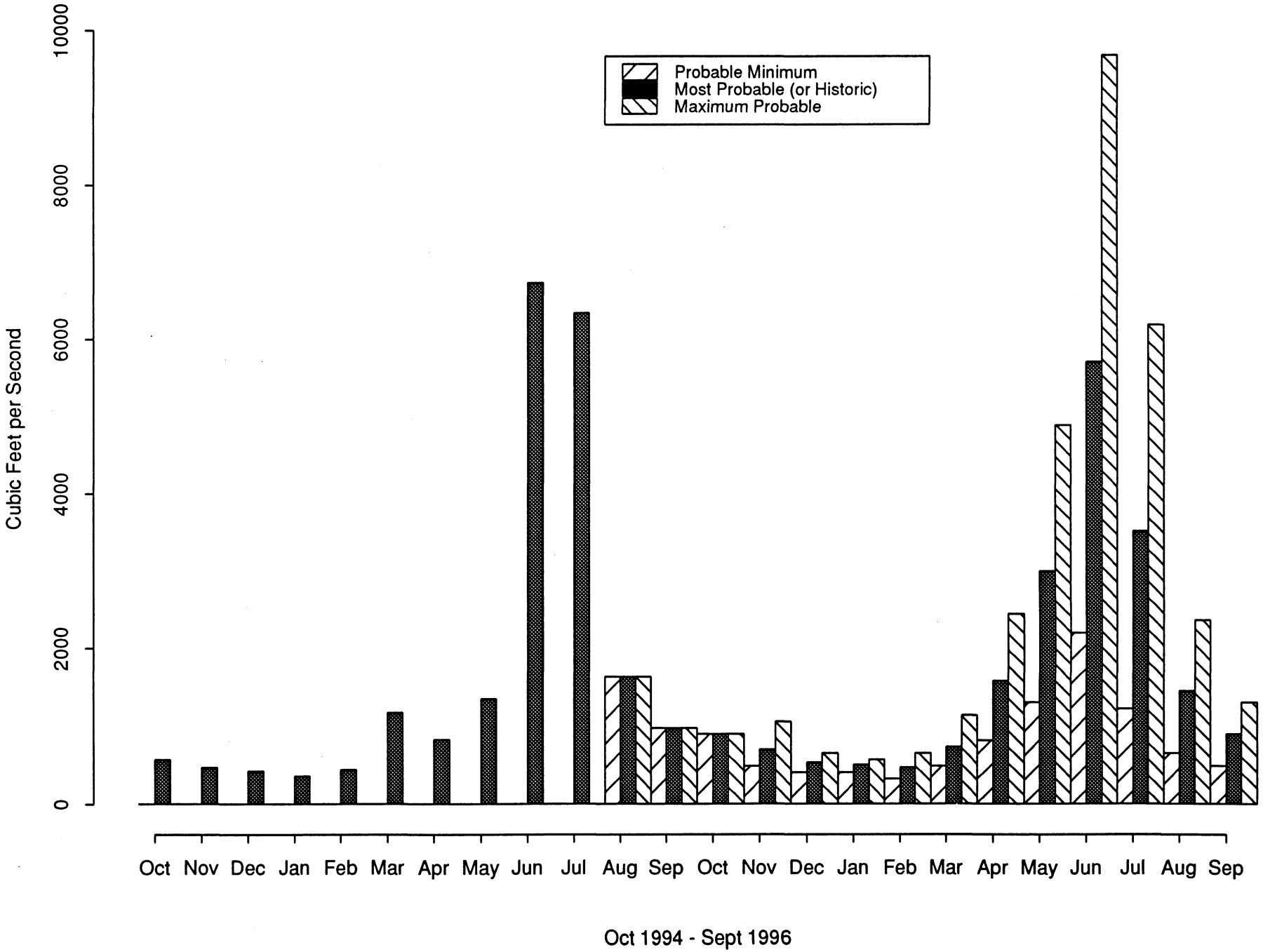
DISCLAIMER

Nothing in this Annual Operating Plan is intended to interpret the provisions of *The Colorado River Compact* (45 Stat. 1057), *The Upper Colorado River Basin Compact* (63 Stat. 31), *The Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, Treaty Between the United States of America and Mexico* (Treaty Series 994, 59 Stat. 1219), the United States/Mexico agreement in Minute No. 242 of August 30, 1973, (Treaty Series 7708; 24 UST 1968), the Decree entered by the Supreme Court of the United States in *Arizona v. California* et al. (376 U.S. 340), *The Boulder Canyon Project Act* (45 Stat. 1057), *The Boulder Canyon Project Adjustment Act* (54 Stat. 774; 43 U.S.C. 618a), *The Colorado River Storage Project Act* (70 Stat. 105; 43 U.S.C. 620), *The Colorado River Basin Project Act* (82 Stat. 885; 43 U.S.C. 1501), *The Colorado River Basin Salinity Control Act* (88 Stat. 266; 43 U.S.C. 1951), *The Hoover Power Plant Act of 1984* (98 Stat. 1333), *The Colorado River Floodway Protection Act* (100 Stat. 1129; 43 U.S.C. 1600), or *The Reclamation Projects Authorization and Adjustment Act of 1992* (106 Stat. 4669).

Attachment. Monthly inflow, monthly release, end of month contents, and end of month elevations for Colorado River reservoirs (October 1994 through September 1996) under the probable maximum, most probable, and the probable minimum inflow scenarios.

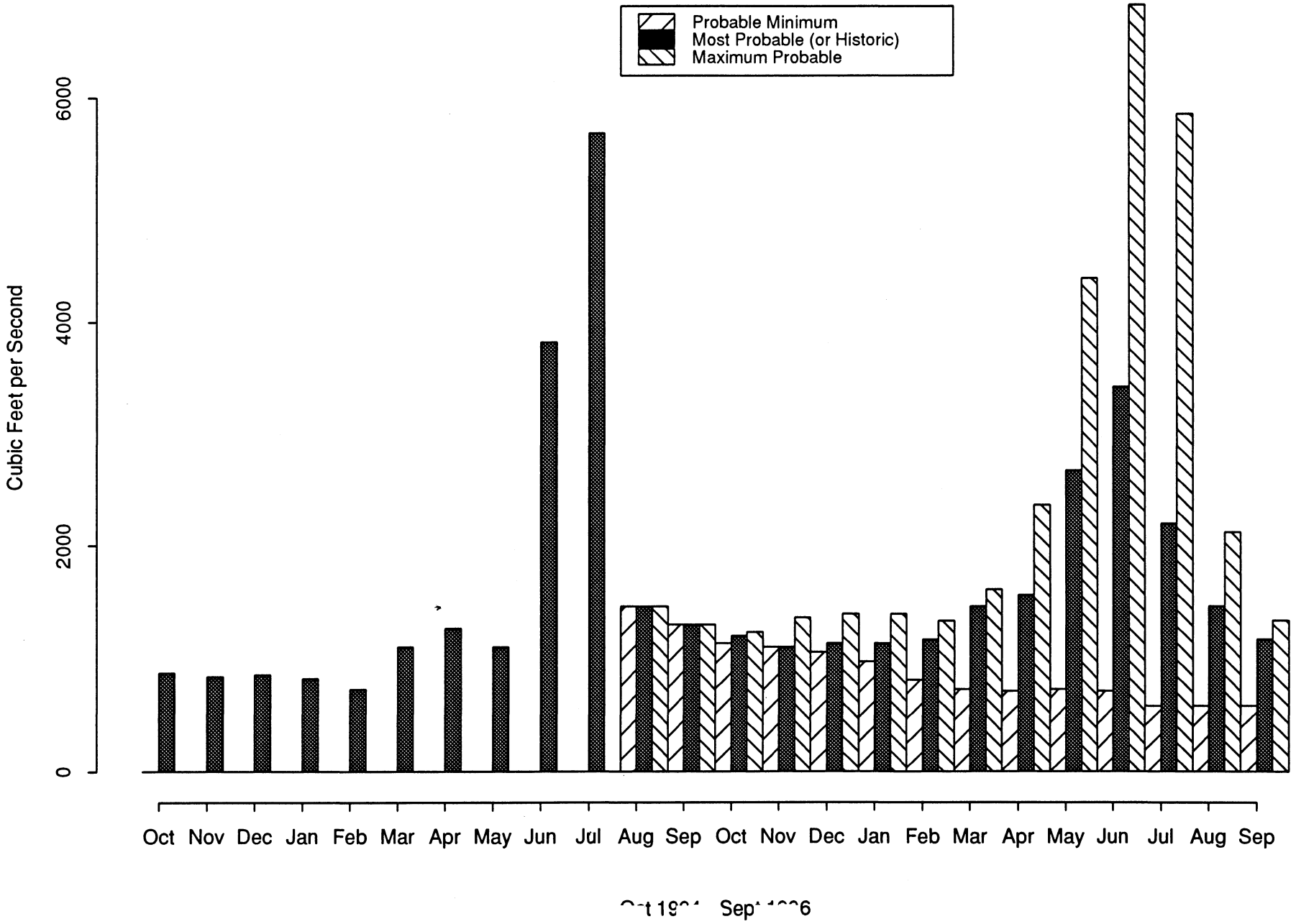
Fontenelle

1996 Colorado River AOP Fontenelle Monthly Inflow



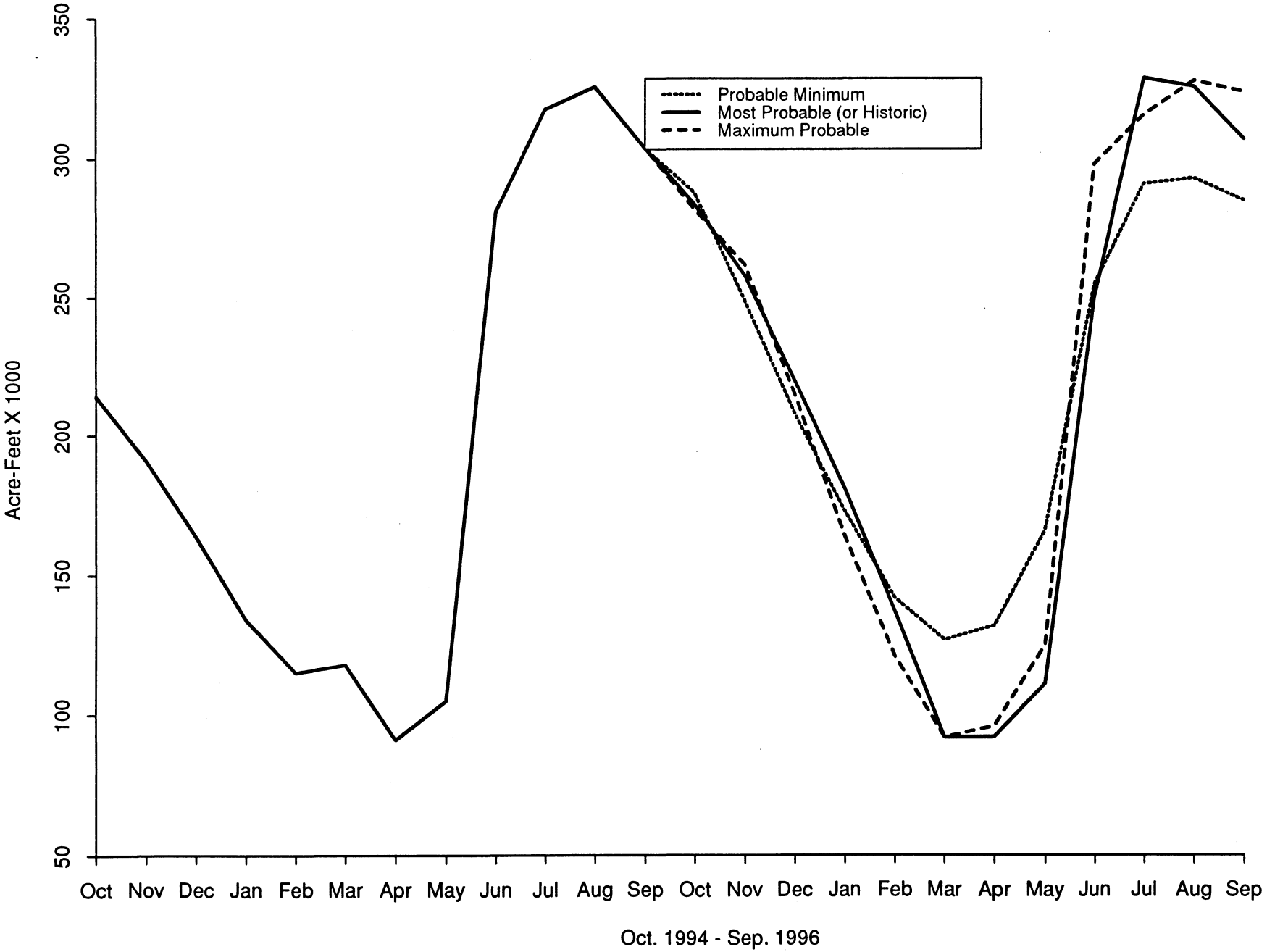
Fontenelle

Fontenelle Monthly Release

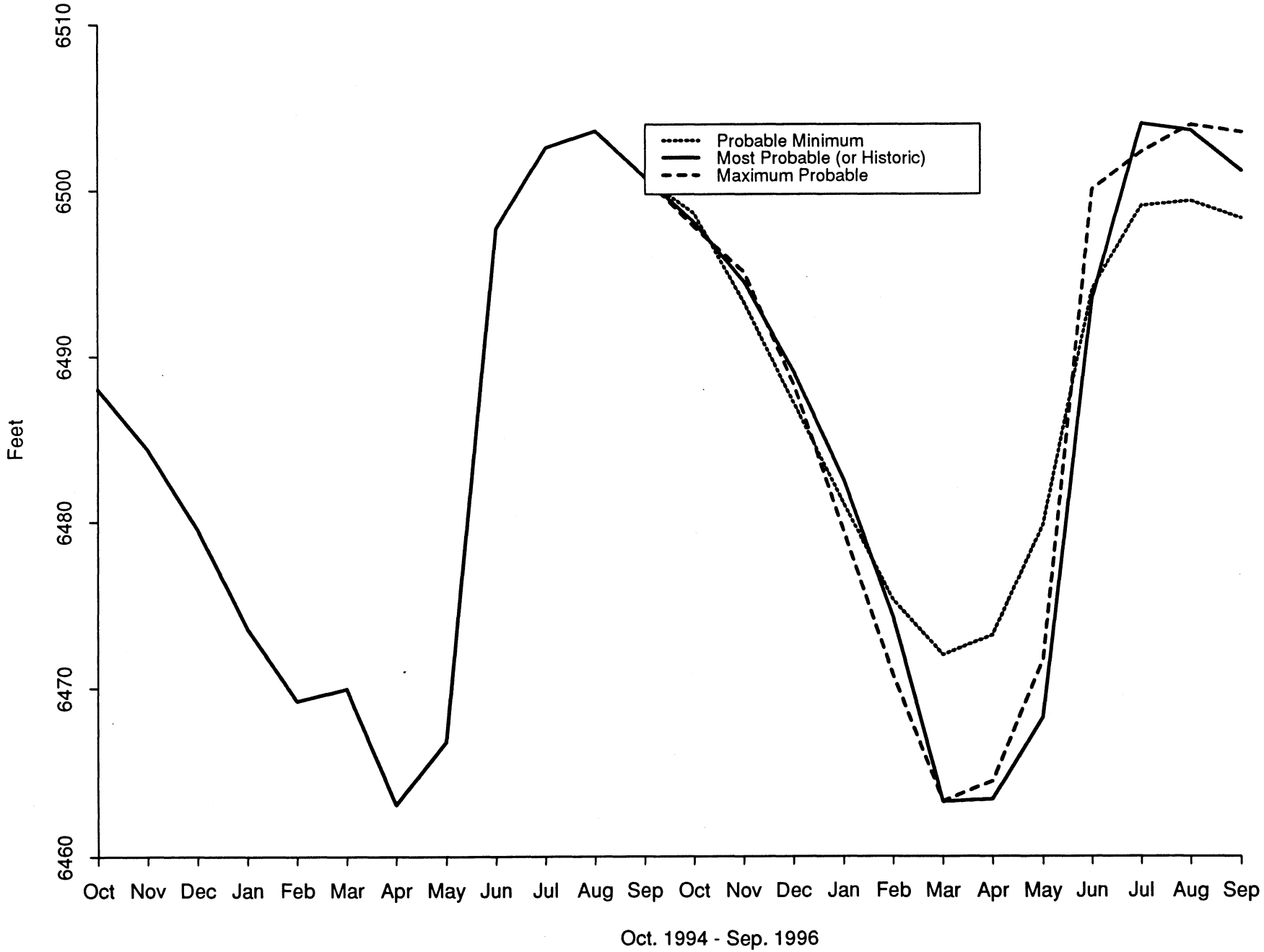


Fontenelle

1996 Colorado River AOP Fontenelle EOM Content

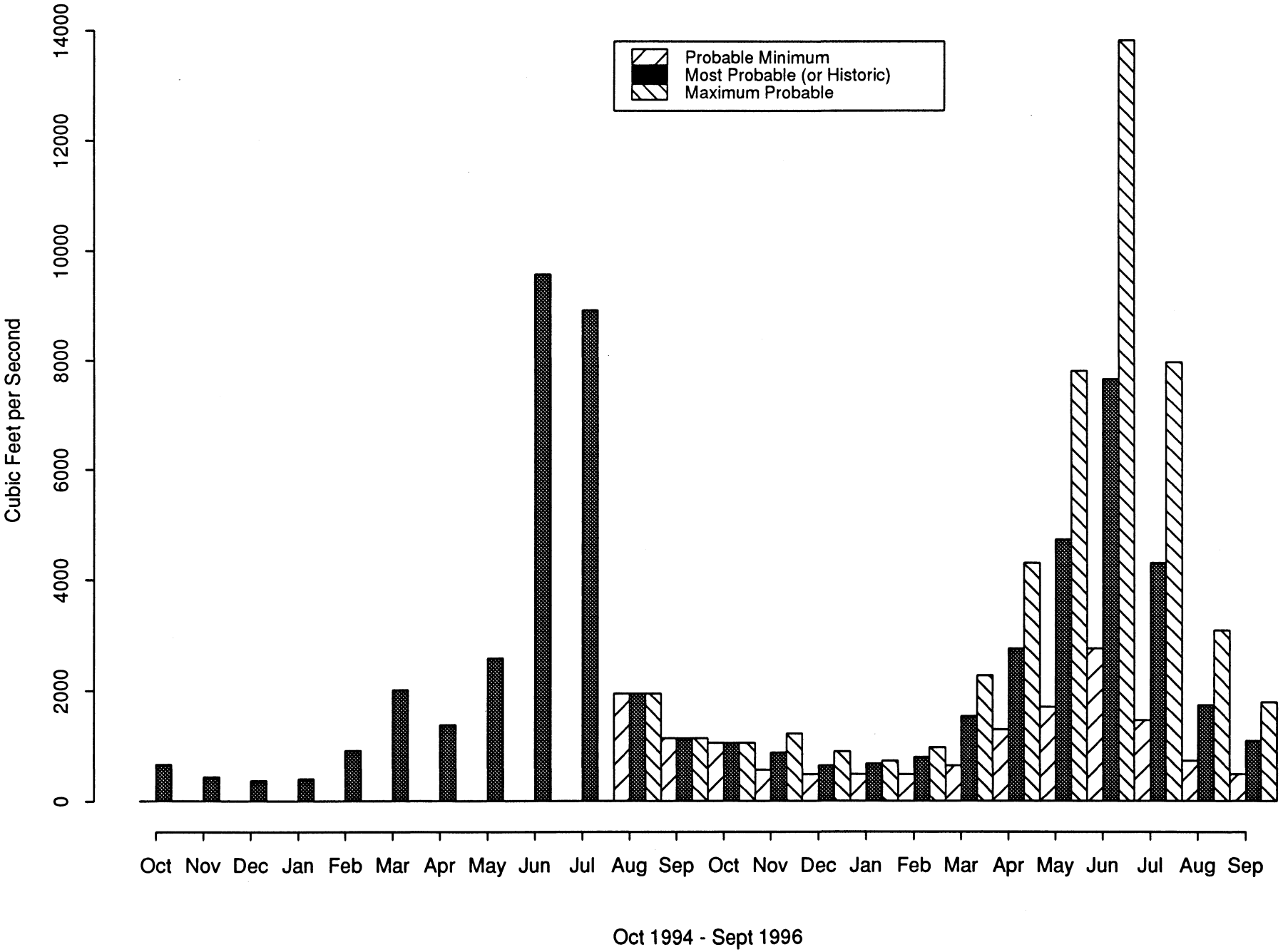


Fontenelle


Fontenelle EOM Elevation
Probable Minimum
Most Probable (or Historic)
Maximum Probable
Feet
6460
6470
6480
6490
6500
6510
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Oct. 1994 - Sep. 1996

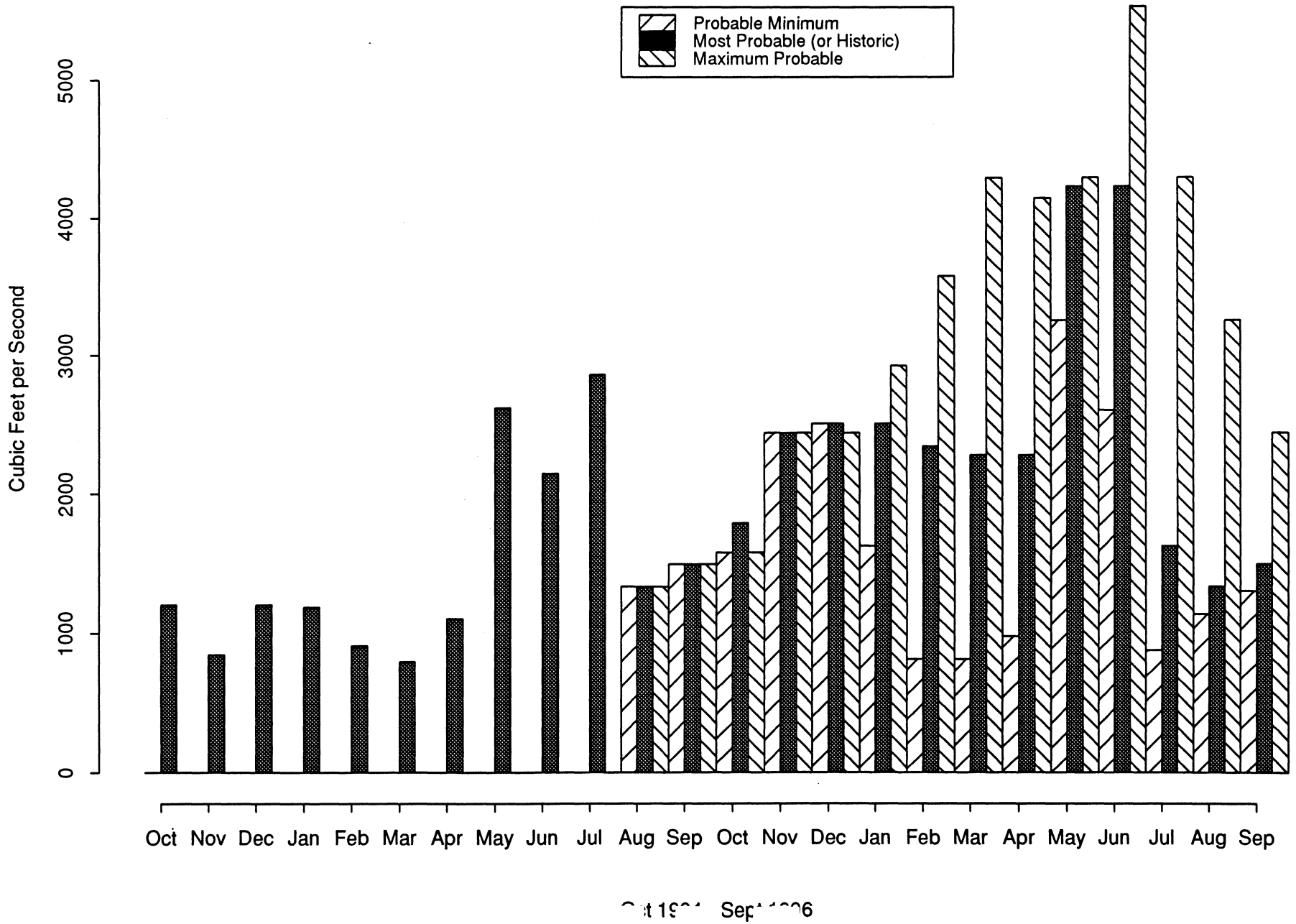
Flaming Gorge

1996 Colorado River AOP Flaming Gorge Monthly Inflow



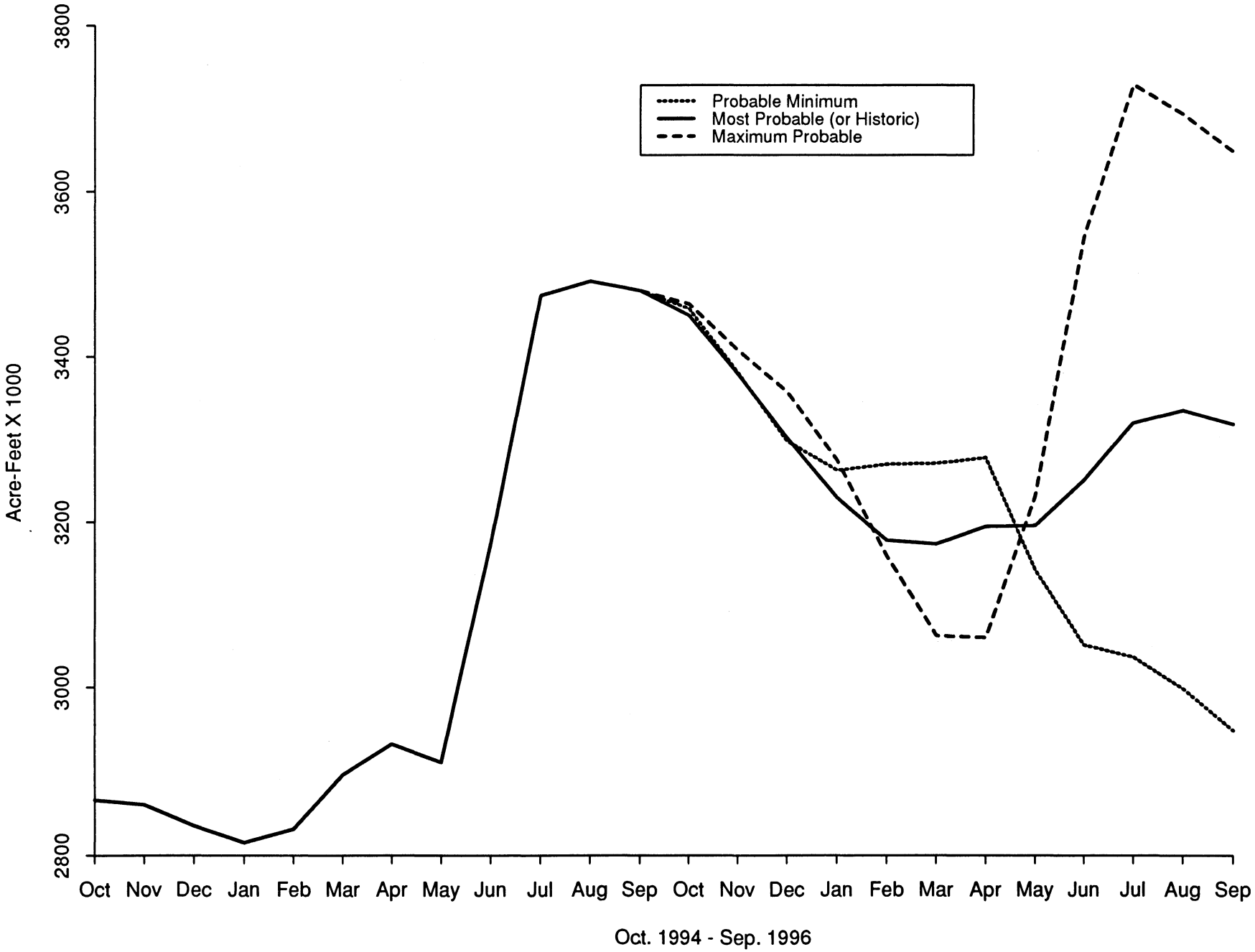
Flaming Gorge

Flaming Gorge Monthly Release



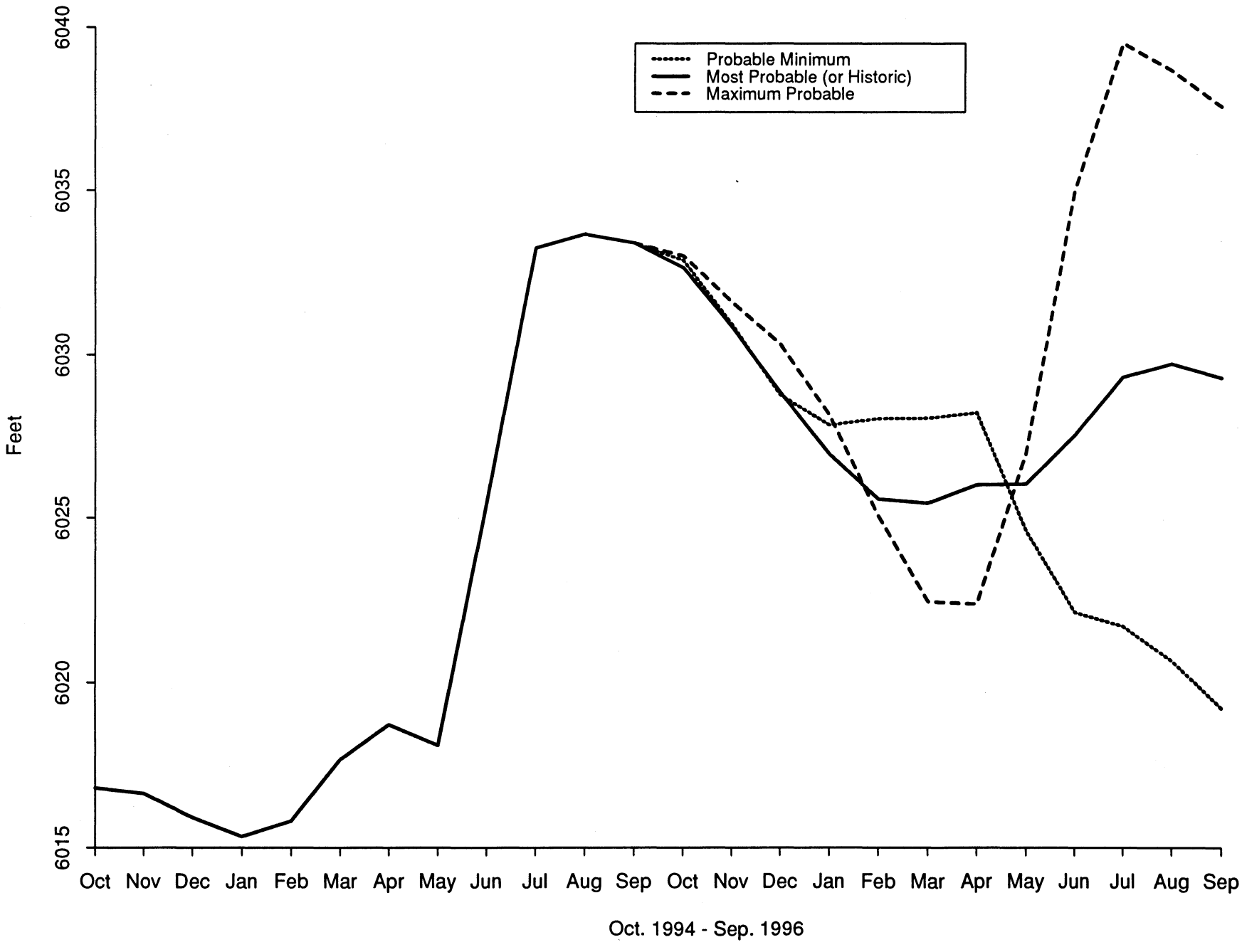
Flaming Gorge

1996 Colorado River AOP Flaming Gorge EOM Content



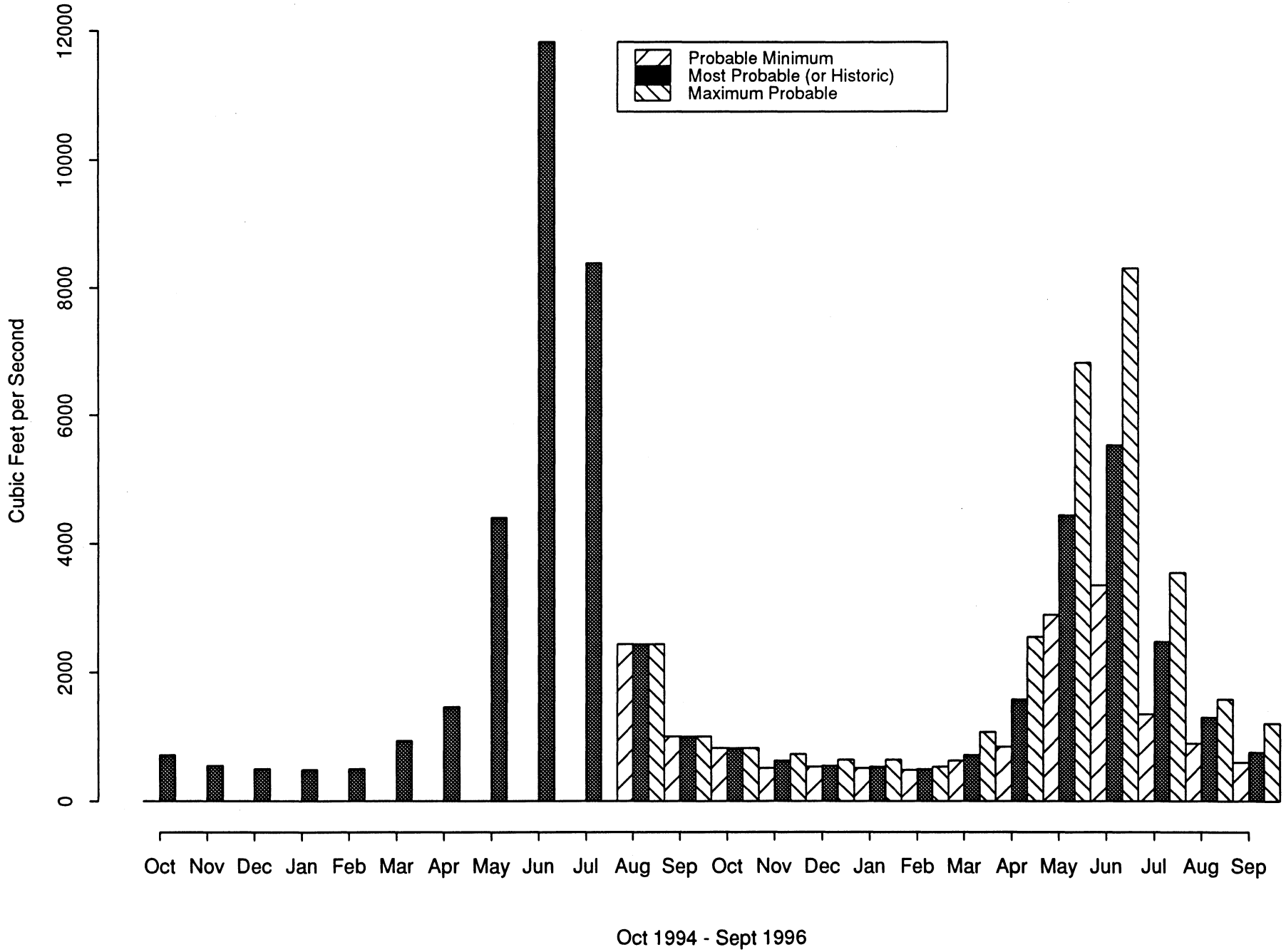
Flaming Gorge

Flaming Gorge EOM Elevation



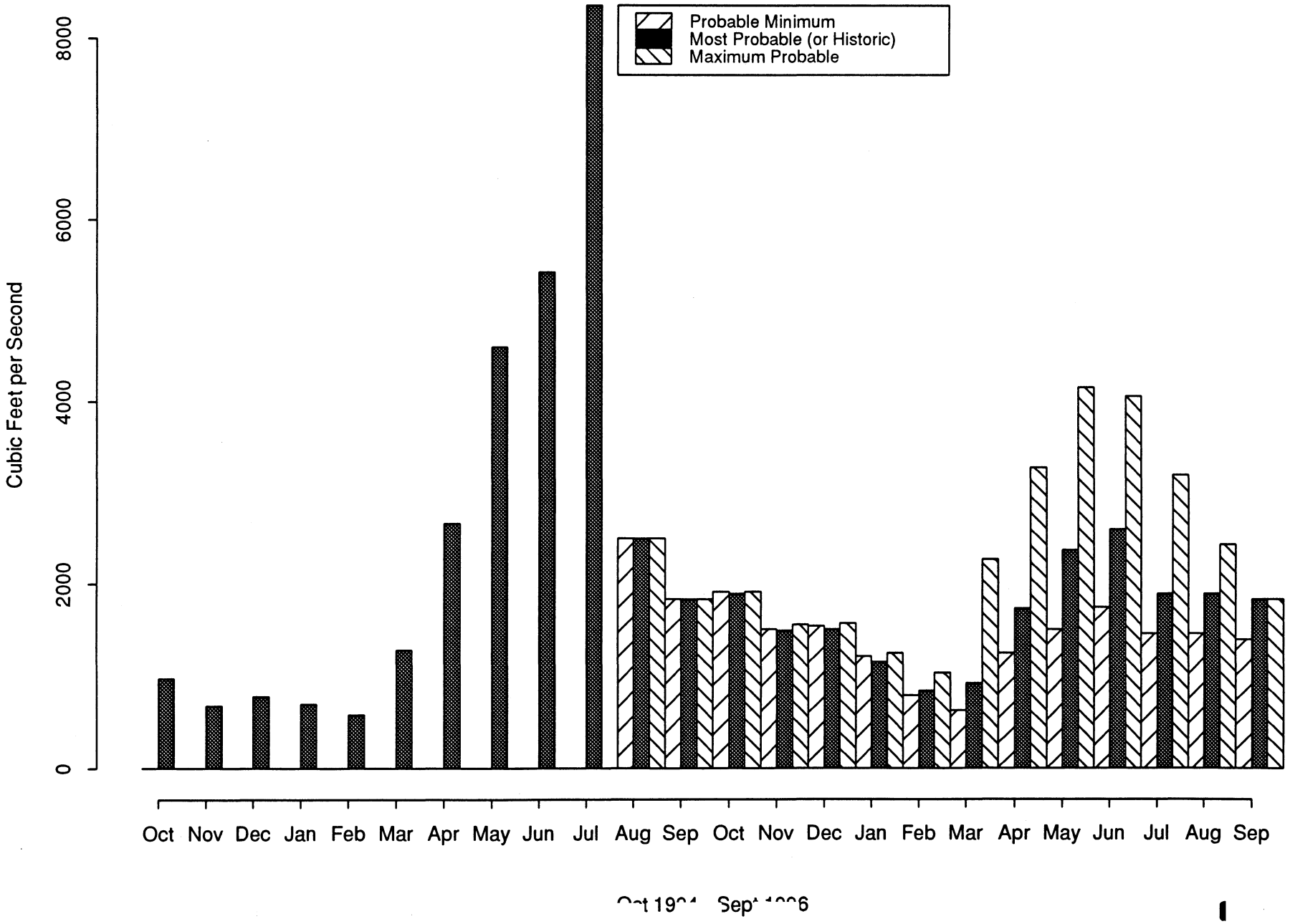
Aspinall Unit

1996 Colorado River AOP Aspinall Unit Monthly Inflow



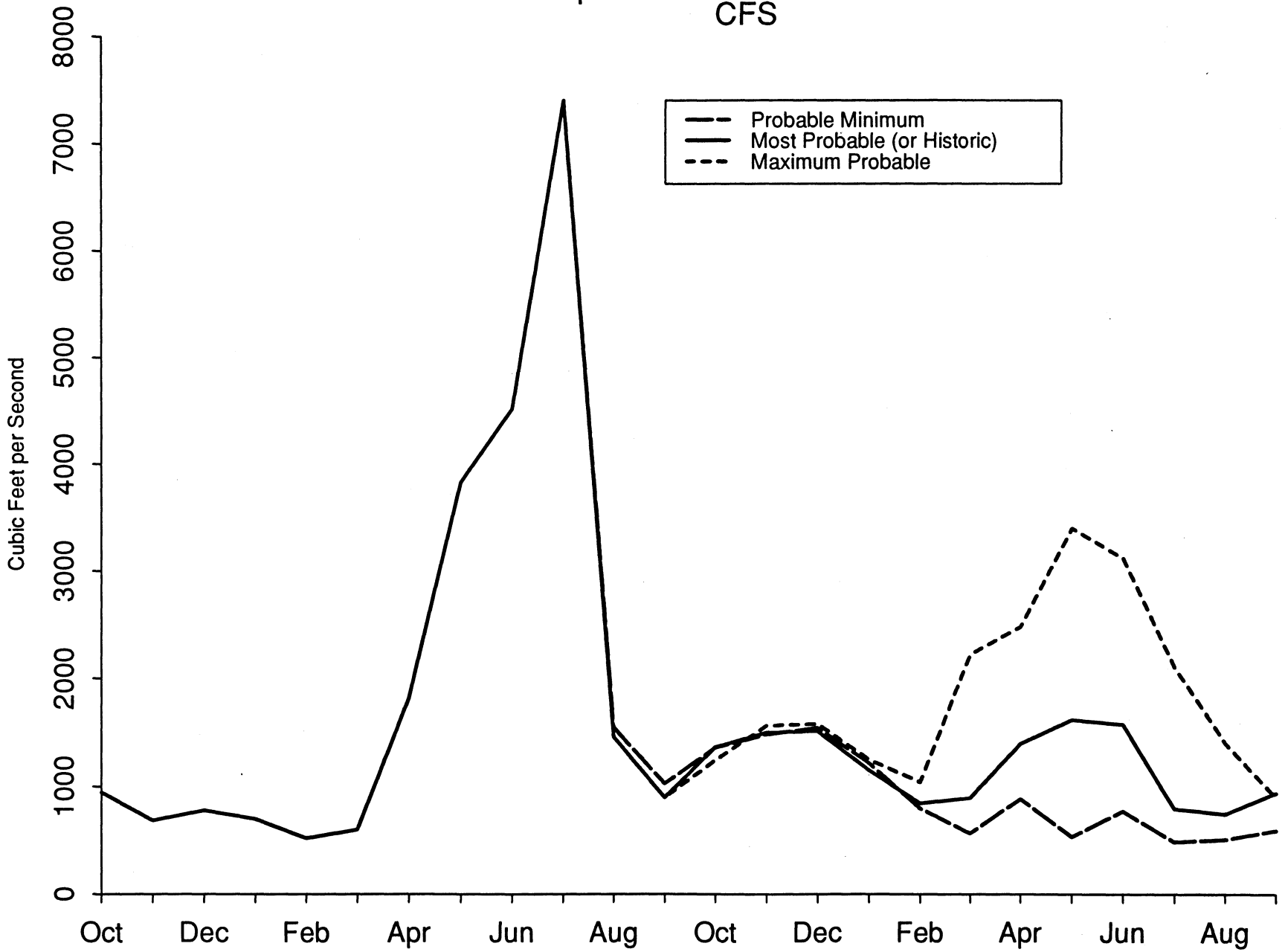
Aspinall Unit

Aspinall Unit Monthly Release



Aspinall Unit

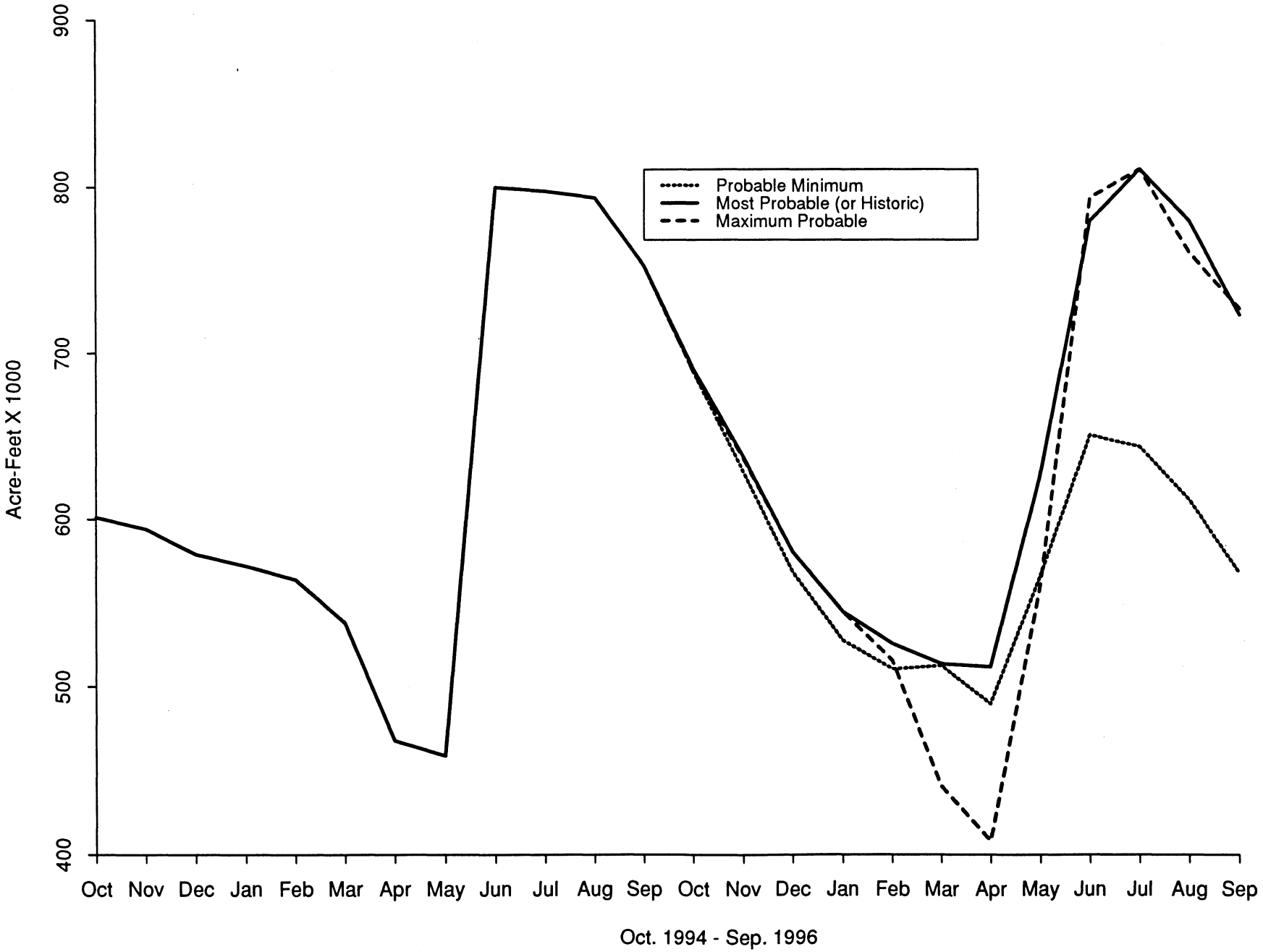
Expected Flow Below Tunnel
CFS



Oct. 1994 - Sept 1996
Tunnel Diversions based on 1992 1991 1987 respectively for min most max

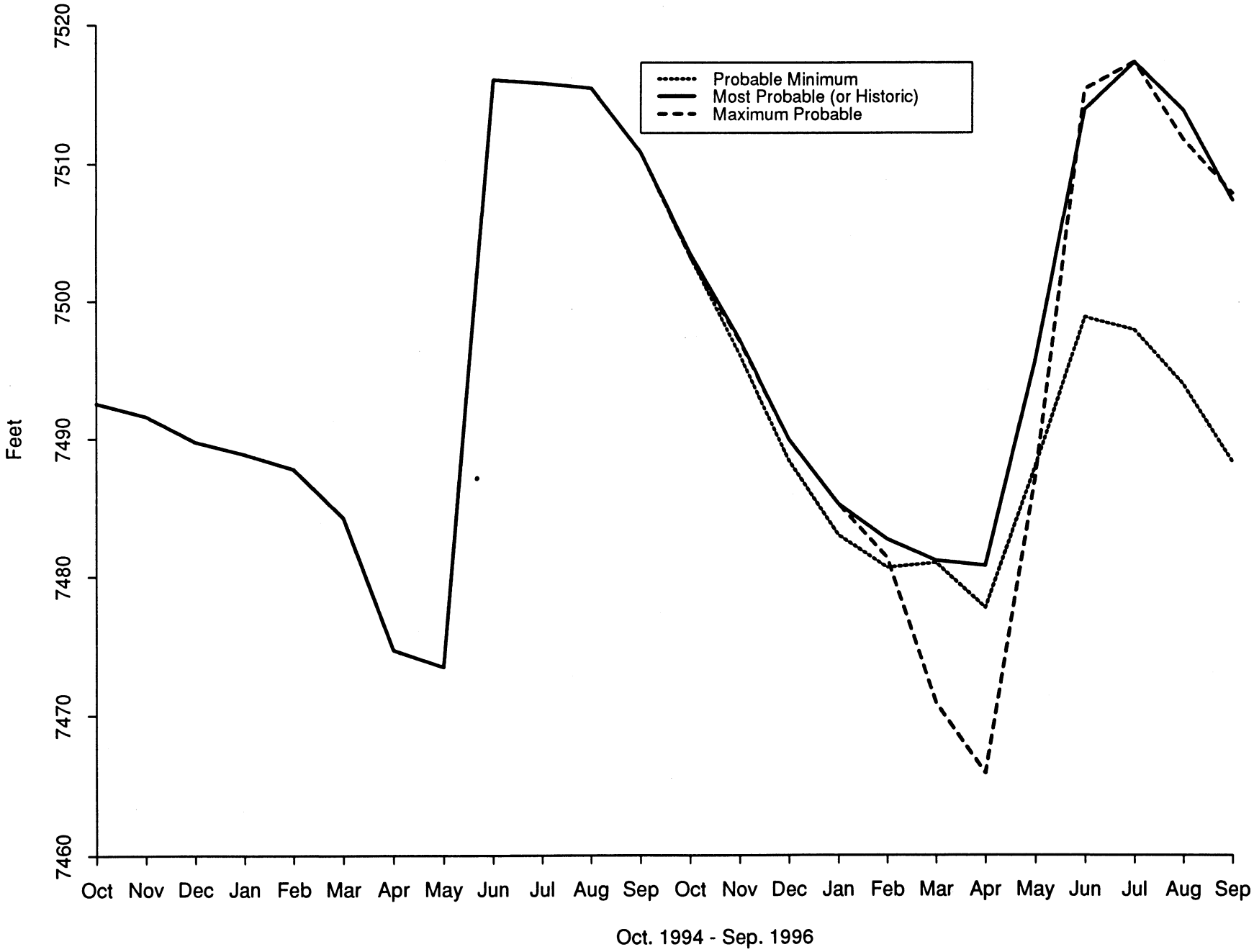
Blue Mesa

1996 Colorado River AOP Blue Mesa EOM Content



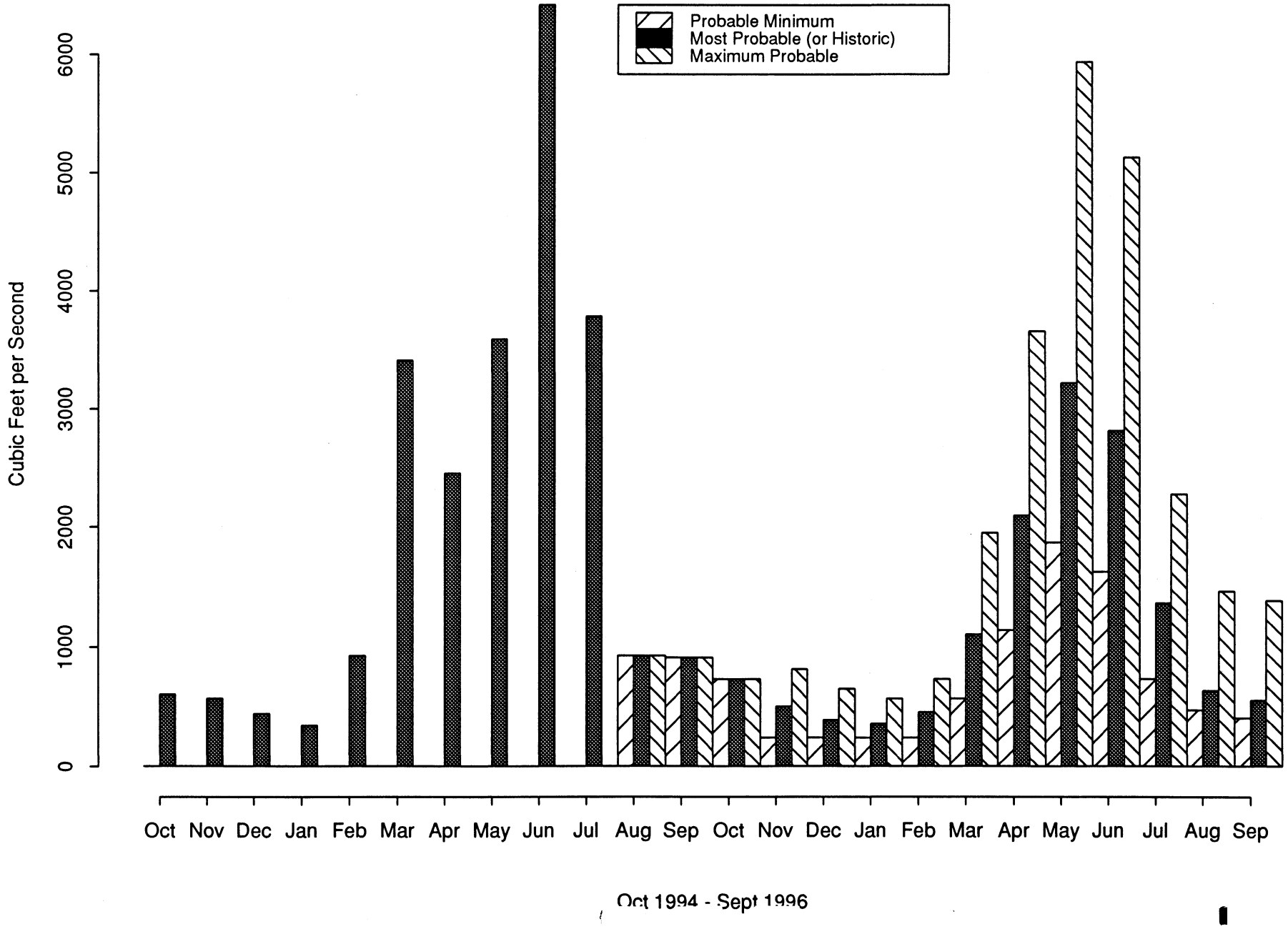
Blue Mesa

Blue Mesa EOM Elevation



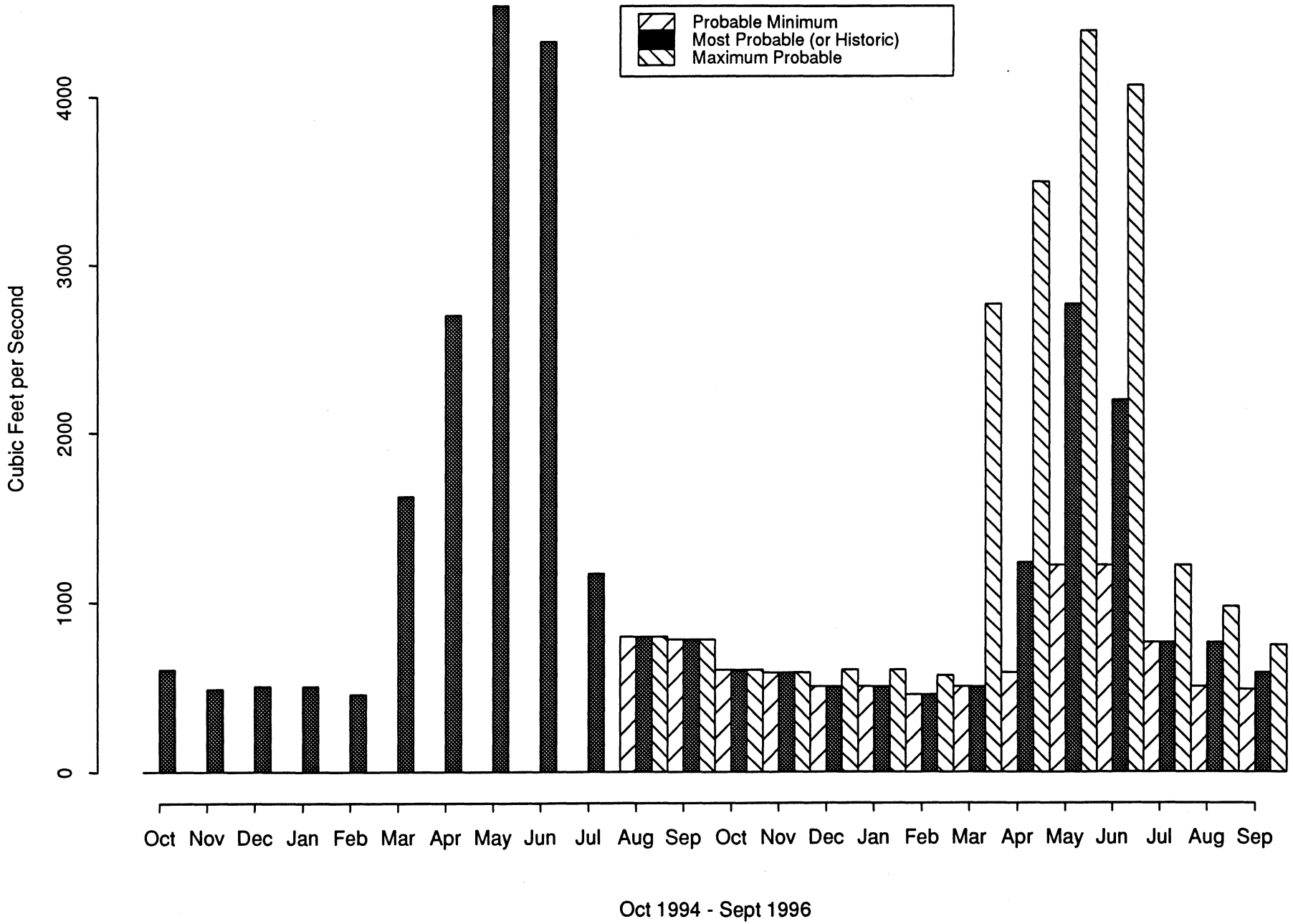
Navajo

1996 Colorado River AOP Navajo Monthly Inflow



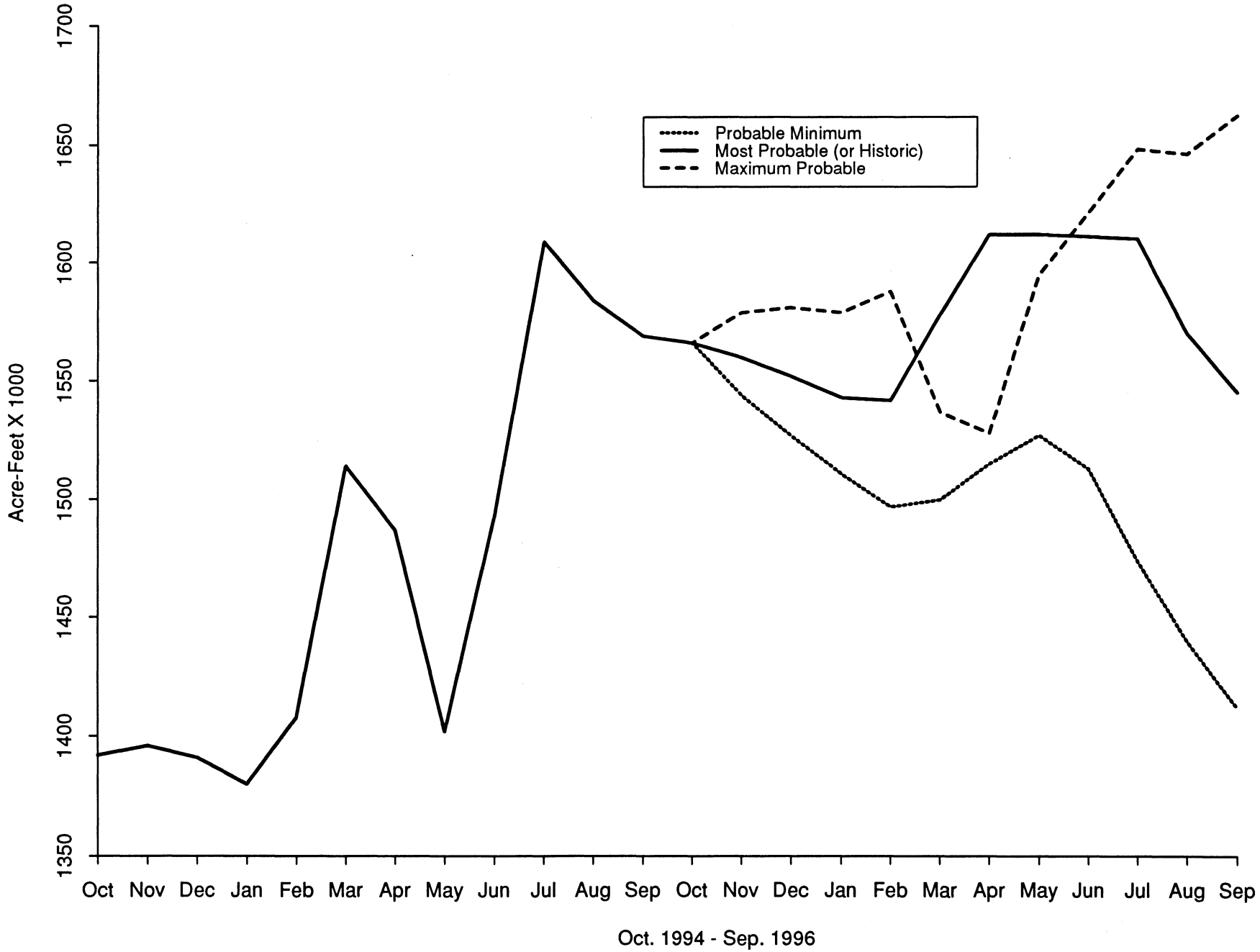
Navajo

Navajo Monthly Release



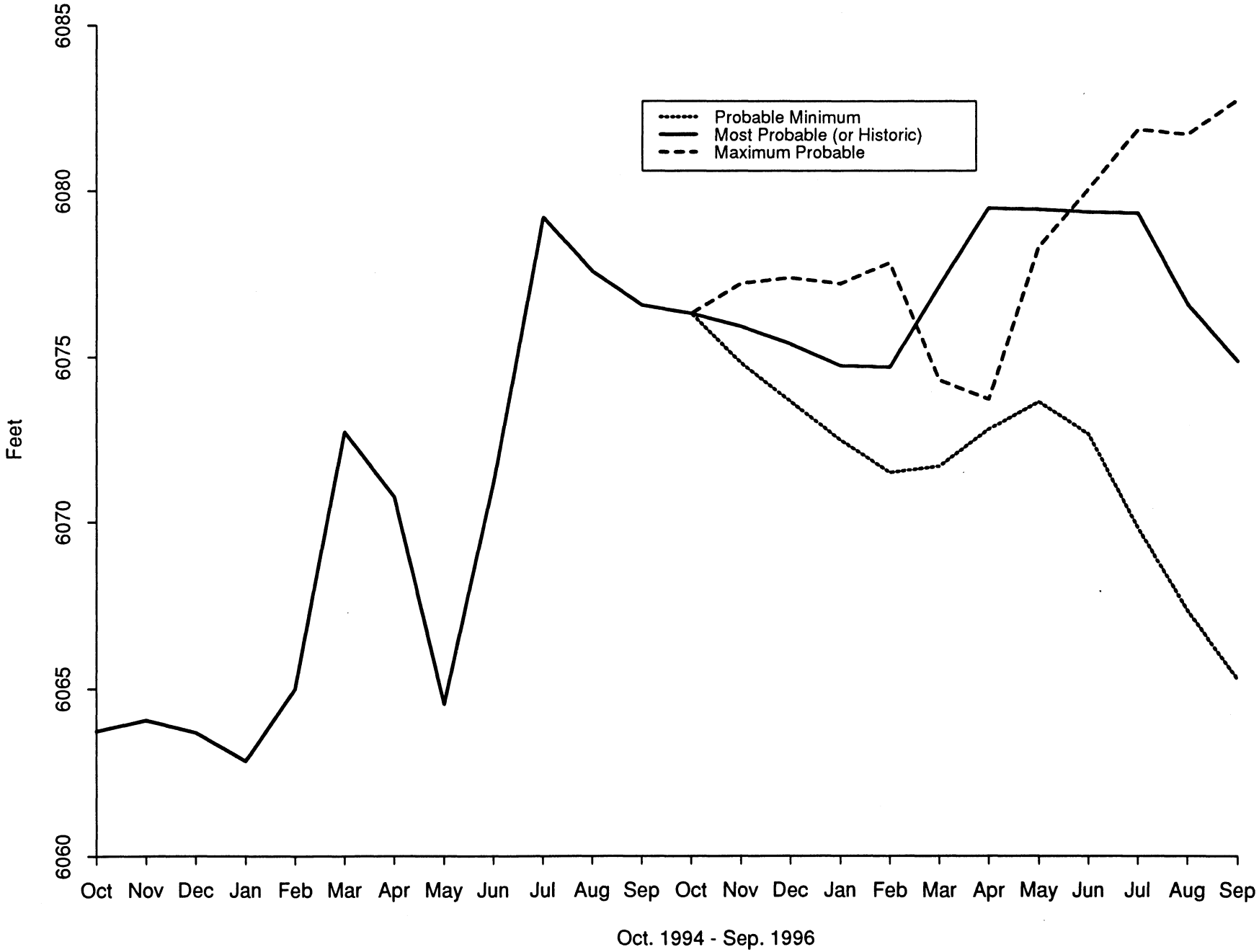
Navajo

1996 Colorado River AOP Navajo EOM Content



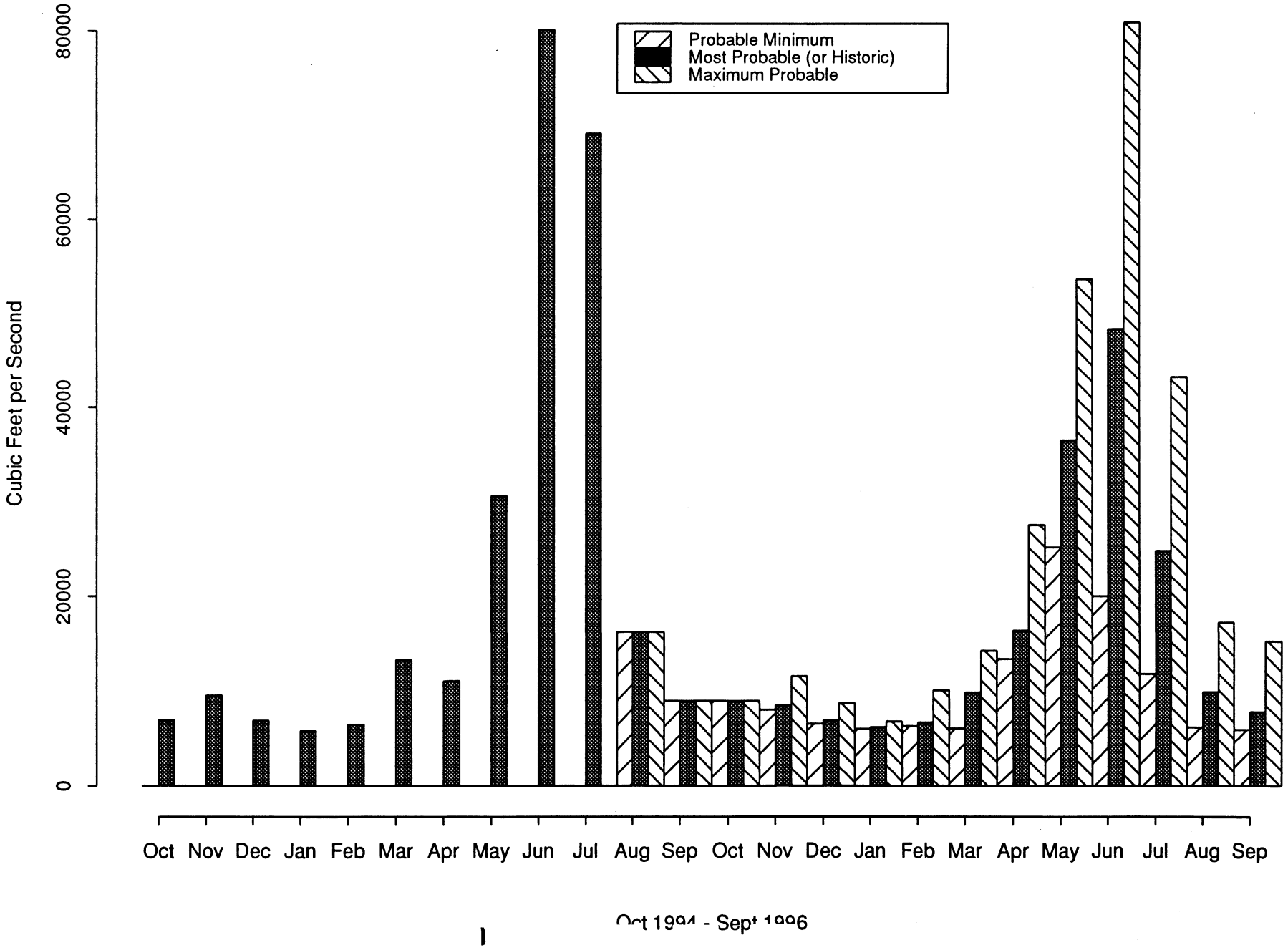
Navajo

Navajo EOM Elevation



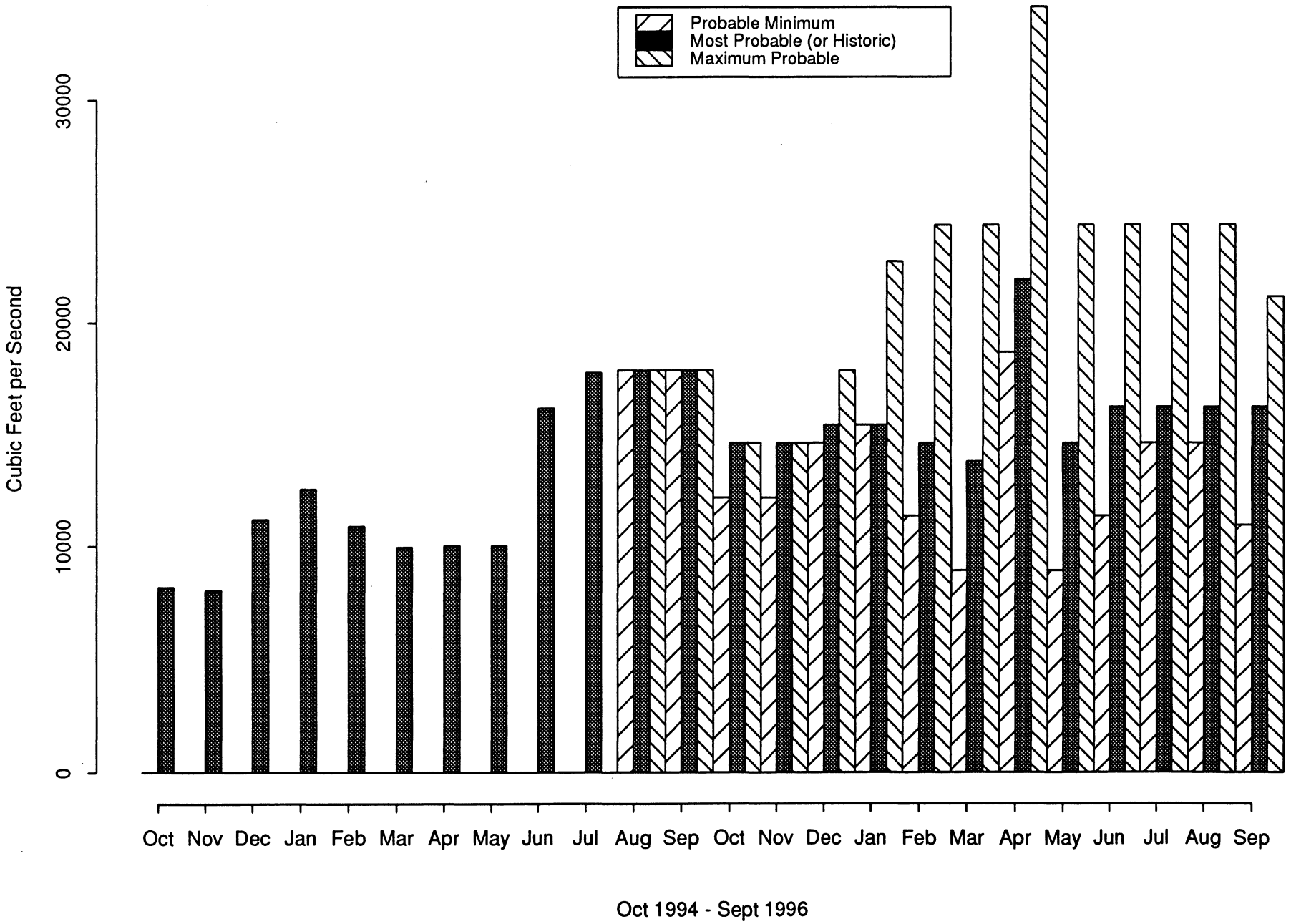
Lake Powell

1996 Colorado River AOP Lake Powell Monthly Inflow



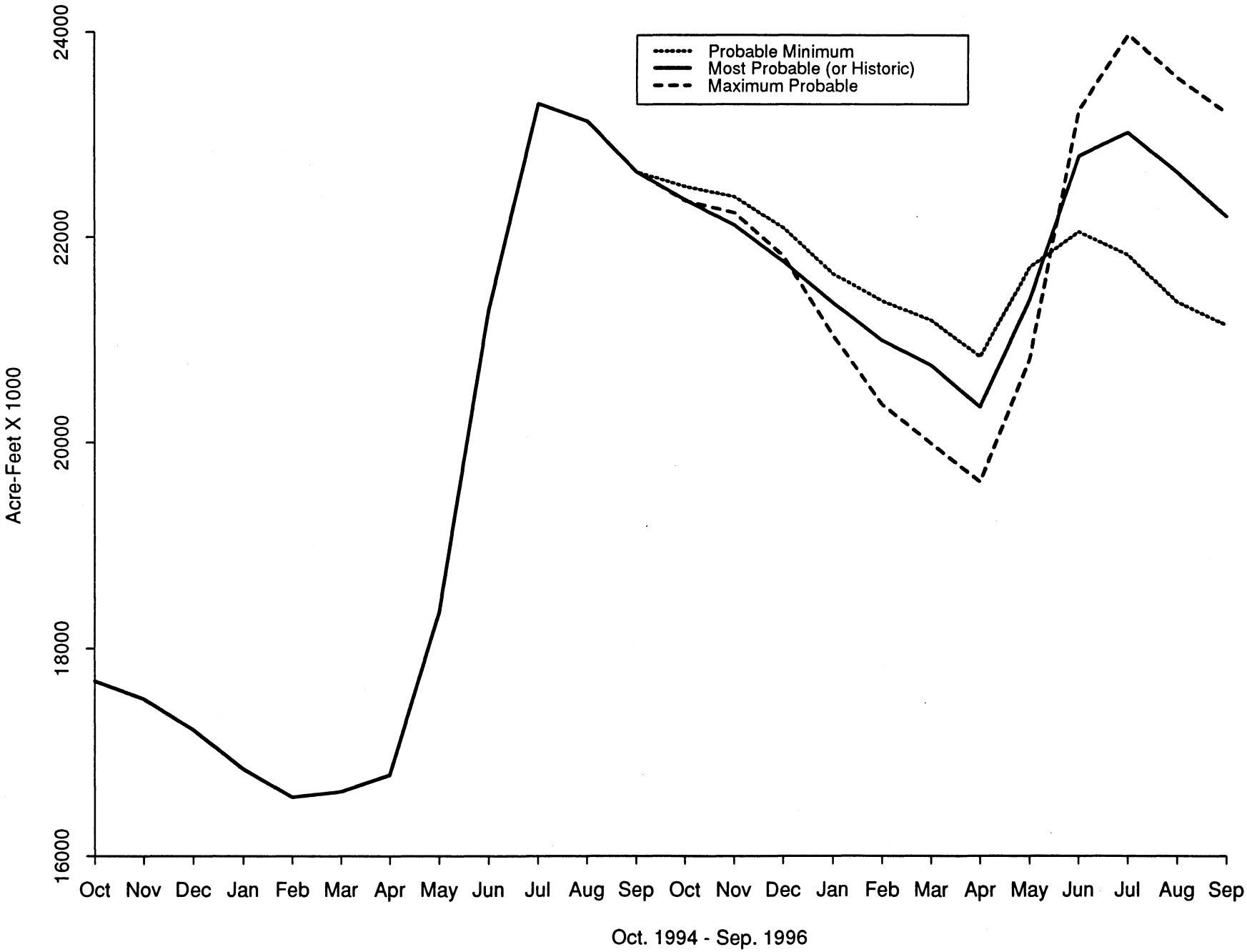
Lake Powell

Lake Powell Monthly Release

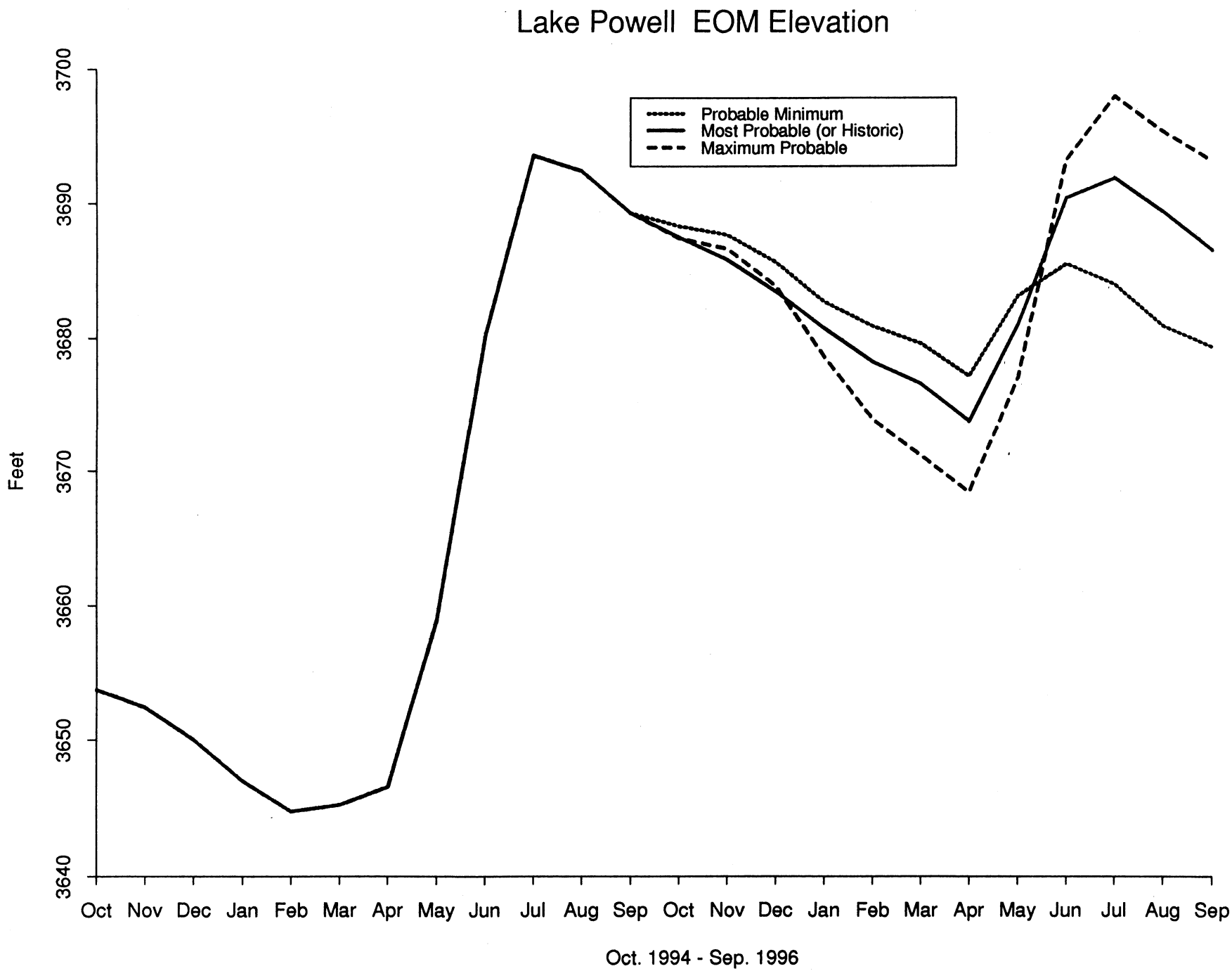


Lake Powell

1996 Colorado River AOP Lake Powell EOM Content

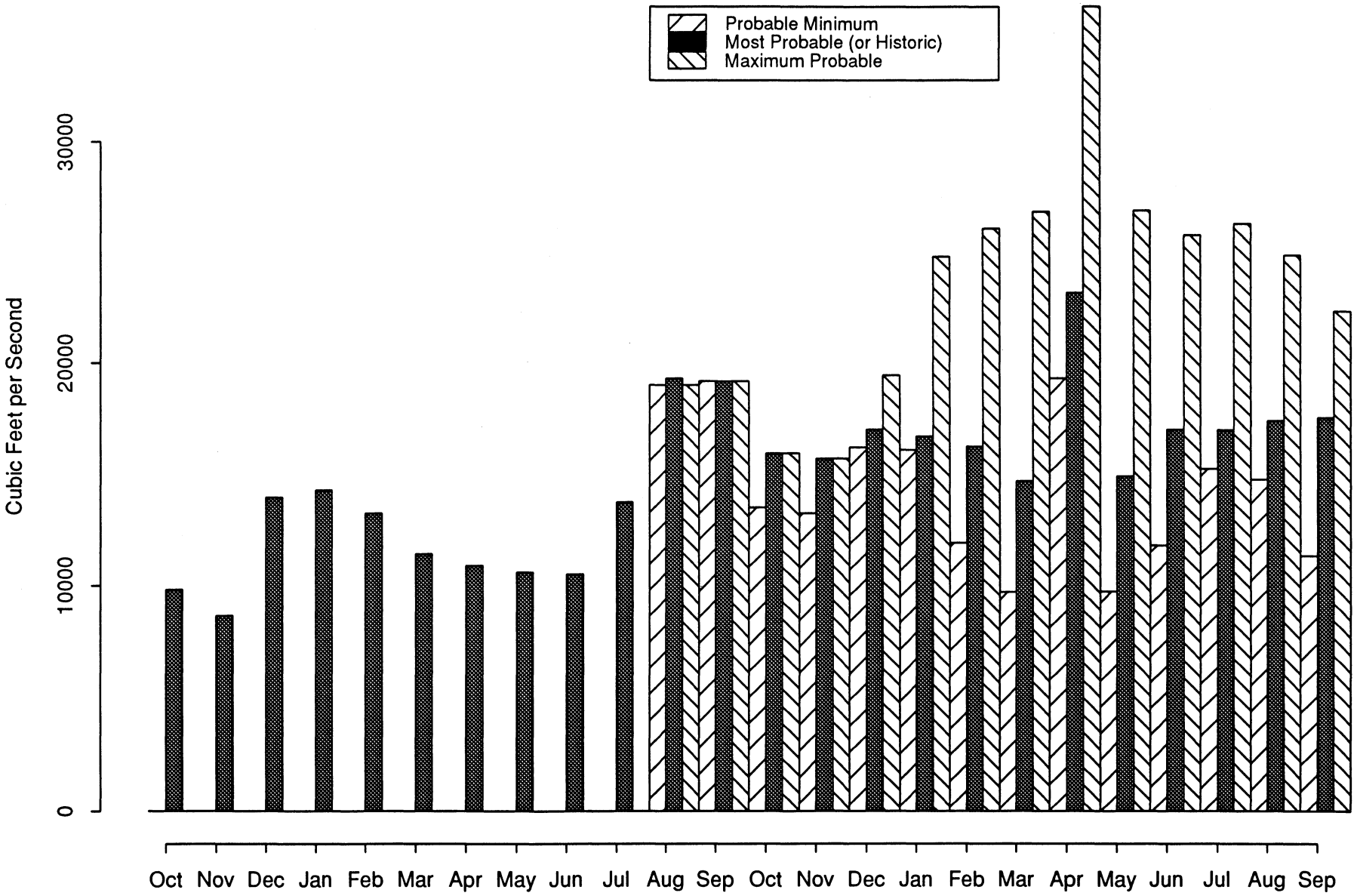


Lake Powell


Lake Powell EOM Elevation
Probable Minimum
Most Probable (or Historic)
Maximum Probable
Feet
3700
3690
3680
3670
3660
3650
3640
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Oct. 1994 - Sep. 1996

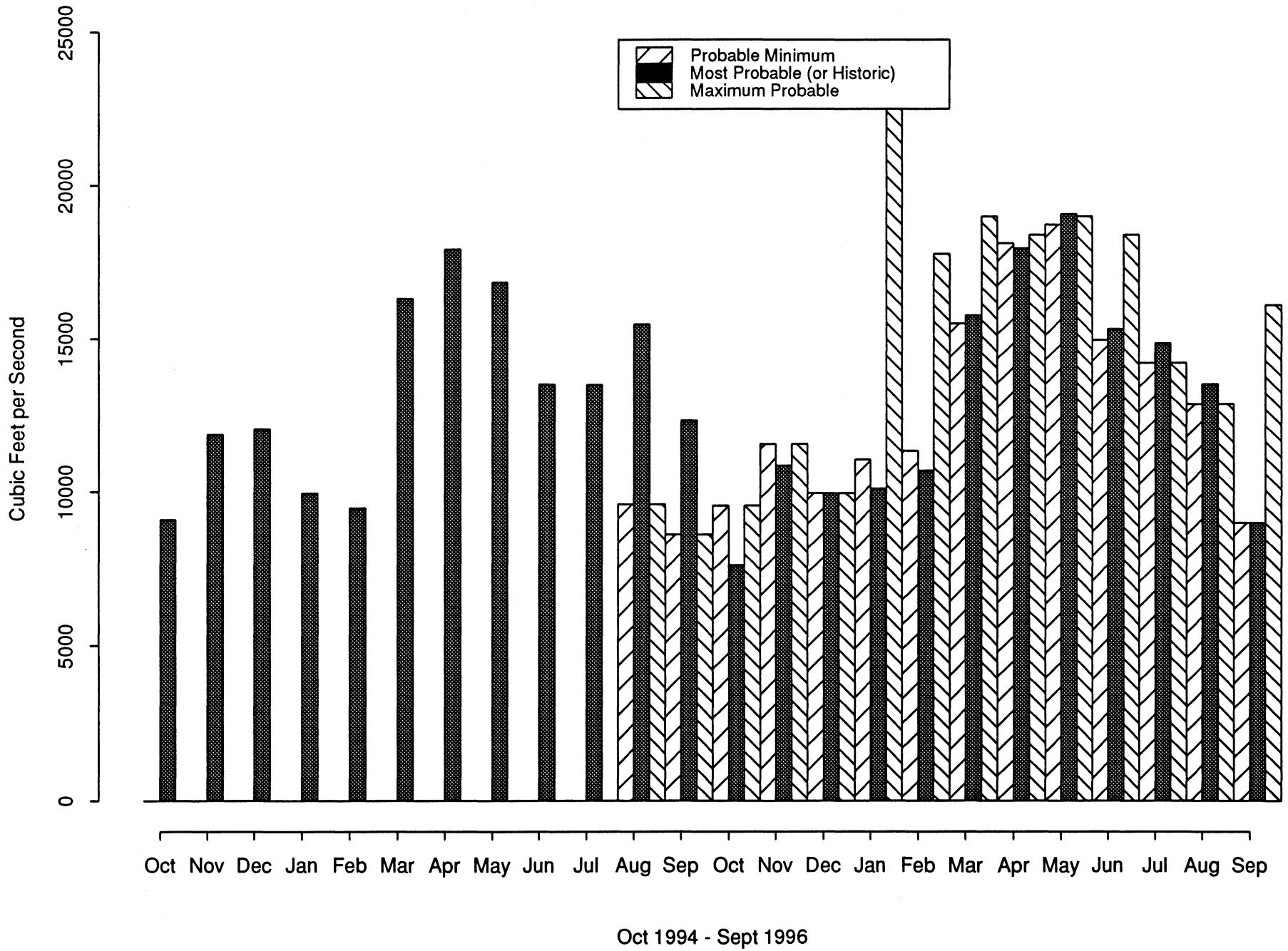
Lake Mead

1996 Colorado River AOP Lake Mead Monthly Inflow



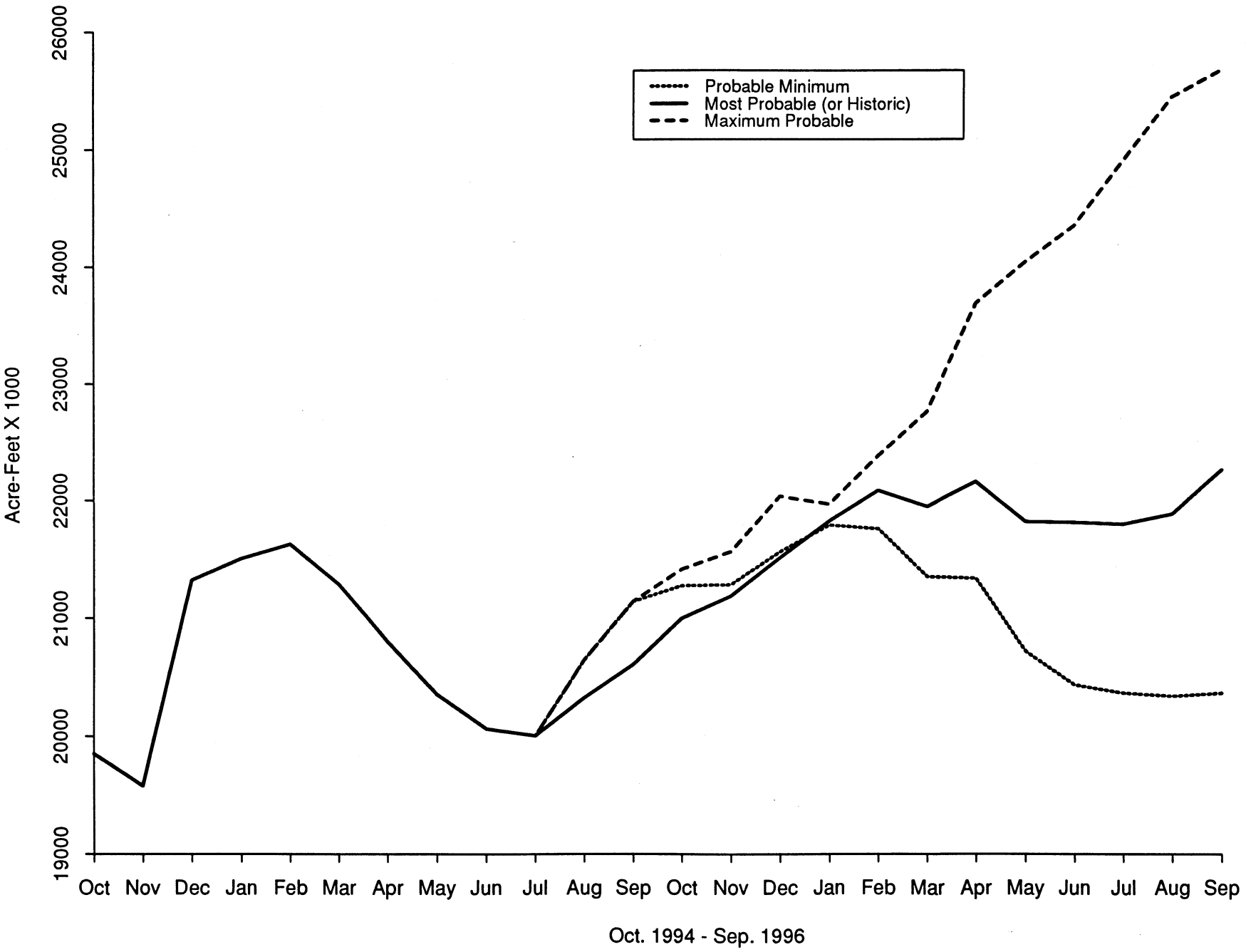
Lake Mead

Lake Mead Monthly Release



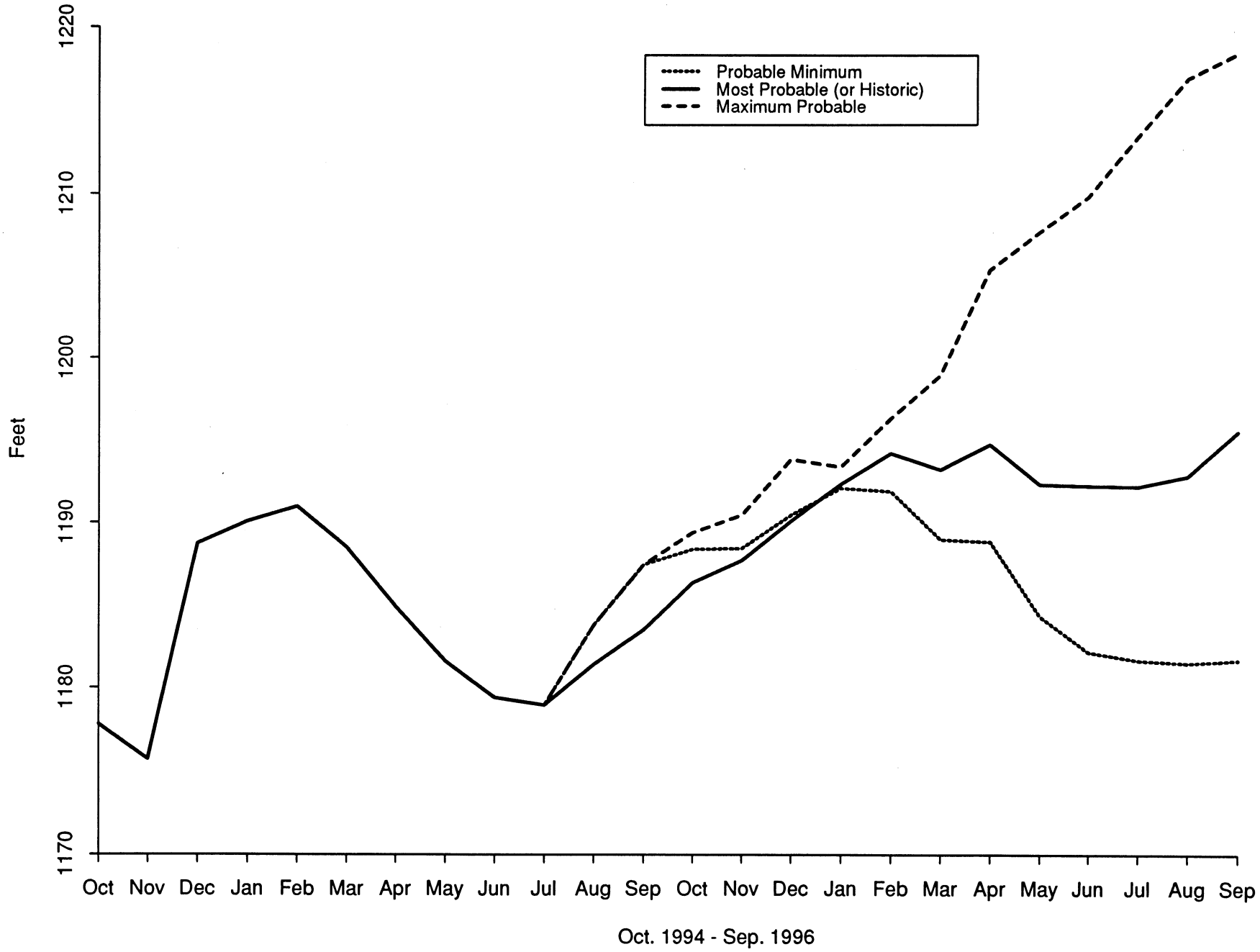
Lake Mead

1996 Colorado River AOP Lake Mead EOM Content



Lake Mead

Lake Mead EOM Elevation



The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.