Lake Mead Inflow

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Description

This is an R Markdown document. This document shows/estimates Lake Mead inflow using 4 different methods. Each method gives different values. The 4 methods are:

1. Add U.S. Geological Service data from stream gages A. Colorado River nr Peach Springs [9404200; https://waterdata.usgs.gov/monitoring-location/09404200/#parameterCode=00065& timeSeriesId=6324&period=P7D] (1990 to present) B. Virgin River at Littlefield [9415000; https://waterdata.usgs.gov/monitoring-location/09415000/#parameterCode=00065&period=P7D] (1930 to present) C. Las Vegas Wash Below LAKE LAS VEGAS NR BOULDER CITY, NV [09419800; https://waterdata.usgs.gov/monitoring-location/09419800/] (2002 to present) D. Mead Inflow = A + B + C

2. Inflow data provided from the USBR Application Programming Interface (USBR API). Note this inflow data only goes from January 2015 to present. This data is retrieved from https: //www.usbr.gov/lc/region/g4000/riverops/_HdbWebQuery.html. In order to use this, you will need to know the region and Site Datatype ID (SDID). The lake Mead data will be with the Lower Colorado Regional Offices HDB. For the different values you mentioned, the SDID's you will need are as follows: Evaporation (SDID=1776), Inflow (SDID=2091), Storage (SDID=1721), and Release (SDID=1874). From there you can select the timestep you want, Instantaneous, Hourly, Daily, Monthly, as well as for what time span you want. A query looks like: https://www.usbr.gov/pn-bin/hdb/hdb.pl?svr=lchdb&sdi=1776%2C2091%2C1721%2C1874&tstp=MN&t1=2022-01-01T00: 00&t2=2024-05-01T00:00&table=R&mrid=0&format=html. This query dynamically builds the end date as most recent month with full data.'

3. Back calculate from Lake Mead storage, release, Nevada Diversion, and Lake Mead evaporation data retrieved from the same API as Method #2 (1990 to present). Lake Mead Inflow = [Change in Storage] + [Release] +[Nevada Diversion] + [Evaporation]

4. Back calculate from Lake Mead storage, release, Nevada Diversion, and Lake Mead evaporation (1990 to present). Here we use evaporation data from elevation-storag-area relationship from Colorado River Simulation System (CRSS) model

Figures

1. Lake Mead Inflow, Evaporation, Available Water, and water conservation credits
2. Inflow timeseries by the first four inflow methods.
3. Inflow box-and-whiskers for the first four inflow methods.
4. Inflow histograms for the first four inflow methods.
5. Correlation between USGS Gaged flow, Reclamation Inflow, and Inflow estimated by back calculation of inflow. Includes linear regressions.

6. Difference in Lake Mead Inflow USGS Gages and Reclamation API
7. Correlation between evaporation reported by USBR API and Evaporation estimated by table
8. Time series of USGS gaged inflow
9. ICS account balances
10. ICS deposits.

Data Sources

1. U.S.G.S. Application Program Interface (https://waterdata.usgs.gov/monitoring-location/)
2. Lake Mead Inflow, Evaporation, and Storage read in from USBR Application Programming Interface (API). https://www.usbr.gov/lc/region/g4000/riverops/_HdbWebQuery.html API query - https://www.usbr.gov/pn-bin/hdb/hdb.pl?svr=lchdb&sdi=1776%2C2091%2C1721%2C1874&tstp=MN&t1=2022-01-01T00:00&t2=2024-05-01T00:00&table=R&mrid=0&format=html
3. Lake Mead conservation account balances: USBR (2024). "Boulder Canyon Operations Office - Program and Activities: Water Accounting Reports". https://www.usbr.gov/lc/region/g4000/wtracct.html. These annual reports are aggregated in the Excel file IntentionallyCreatedSurplus-Summary.xlsx.

Requested Citation

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```
##      tidyverse        readxl  RColorBrewer         dplyr         expss
##           TRUE          TRUE          TRUE          TRUE          TRUE
##       reshape2        pracma     lubridate  directlabels          plyr
##           TRUE          TRUE          TRUE          TRUE          TRUE
##        stringr       ggplot2        ggpubr         rvest         tidyr
##           TRUE          TRUE          TRUE          TRUE          TRUE
## dataRetrieval
##           TRUE
```

Figure 1. Lake Mead Inflow, Evaporation, Available Water, and Conservation Credits

```
## [1] "Total conservation credits all years: 4.1 maf"
```