# CONVERSION FACTORS

| Quantity | To Convert from Metric Unit | To Customary Unit | Multiply Metric Unit By | To Convert to Metric Unit Multiply Customary Unit By |
|---|---|---|---|---|
| Length | millimetres (mm) | inches (in) | 0.03937 | 25.4 |
| | centimetres (cm) for snow depth | inches (in) | 0.3937 | 2.54 |
| | metres (m) | feet (ft) | 3.2808 | 0.3048 |
| | kilometres (km) | miles (mi) | 0.62139 | 1.6093 |
| Area | square millimetres ($mm^2$) | square inches ($in^2$) | 0.00155 | 645.16 |
| | square metres ($m^2$) | square feet ($ft^2$) | 10.764 | 0.092903 |
| | hectares (ha) | acres (ac) | 2.4710 | 0.40469 |
| | square kilometres ($km^2$) | square miles ($mi^2$) | 0.3861 | 2.590 |
| Volume | litres (L) | gallons (gal) | 0.26417 | 3.7854 |
| | megalitres | million gallons ($10^6$ gal) | 0.26417 | 3.7854 |
| | cubic metres ($m^3$) | cubic feet ($ft^3$) | 35.315 | 0.028317 |
| | cubic metres ($m^3$) | cubic yards ($yd^3$) | 1.308 | 0.76455 |
| | cubic dekametres ($dam^3$) | acre-feet (ac-ft) | 0.8107 | 1.2335 |
| Flow | cubic metres per second ($m^3/s$) | cubic feet per second ($ft^3/s$) | 35.315 | 0.028317 |
| | litres per minute (L/min) | gallons per minute (gal/min) | 0.26417 | 3.7854 |
| | litres per day (L/day) | gallons per day (gal/day) | 0.26417 | 3.7854 |
| | megalitres per day (ML/day) | million gallons per day (mgd) | 0.26417 | 3.7854 |
| | cubic dekametres per day ($dam^3$/day) | acre-feet per day (ac-ft/day) | 0.8107 | 1.2335 |
| Mass | kilograms (kg) | pounds (lb) | 2.2046 | 0.45359 |
| | megagrams (Mg) | tons (short, 2,000 lb) | 1.1023 | 0.90718 |
| Velocity | metres per second (m/s) | feet per second (ft/s) | 3.2808 | 0.3048 |
| Power | kilowatts (kW) | horsepower (hp) | 1.3405 | 0.746 |
| Pressure | kilopascals (kPa) | pounds per square inch (psi) | 0.14505 | 6.8948 |
| | kilopascals (kPa) | feet head of water | 0.33456 | 2.989 |
| Specific Capacity | litres per minute per metre drawdown | gallons per minute per foot drawdown | 0.08052 | 12.419 |
| Concentration | milligrams per litre (mg/L) | parts per million (ppm) | 1.0 | 1.0 |
| Electrical Conductivity | microsiemens per centimetre (uS/cm) | micromhos per centimetre | 1.0 | 1.0 |
| Temperature | degrees Celsius (°C) | degrees Fahrenheit (°F) | (1.8 × °C)+32 | (°F−32)/1.8 |

# INTRODUCTION

Since 1940, two of the three major streams tributary to Mono Lake, a terminal lake in east-central California, have been diverted as a water and power supply for the City of Los Angeles. By November 1984 the lake volume had shrunk by 45%, the lake's salinity had nearly doubled, the lake area was reduced by almost 25%, and the lake level had dropped 37 ft below its 1940 elevation of 6417 ft. With continued trans-basin diversions, the lake will shrink until the reduced evaporative loss from the smaller lake surface balances the reduced inflow.

Conservationists, governmental agencies, and local residents have expressed concern about the environmental consequences of the artificial lowering of Mono Lake (CADWR 1979). With these concerns comes a need to assess the effect of diversions on the size and salinity of the lake, The best method of determining these effects is with a model based on a water balance. Previous water balance models are inadequate for the purpose of lake level projections because:

(1) they calculate water balance components as residual values, a procedure to be avoided according to Winter (1981), Ferguson _et al._ (1981) and Sokolov and Chapman (1974);

(2) they depend on basic data derivations that can be made more accurate with current data;

(3) their reliability is insufficiently and improperly evaluated; specifically, there are no quantitative error analyses and no model verification;

(4) projections of future lake levels use mean values and thus do not incorporate climactic and hydrologic variability.

The water balance model presented in this report attempts to rectify these inadequacies. Specifically, the new model:

(1) is a reproducible, systematic construct that follows the accepted modeling procedure of formulation, calibration, verification, and application, as outlined by McCuen (1976);

(2) specifies a fixed free-body (the Mono Groundwater Basin), the inflows and outflows of which are easier to estimate that those of the free-body that only includes the fluctuating lake;

(3) makes independent determinations of all the quantifiable water balance components with the most currently available (through water year 1983) data base;

(4) estimates the error of the components and analyzes the

overall error of the water balance; and

(5) is applied to (a) determine the historic lake fluctuations that would have occurred had there been no EADWP diverions, (b) project future lake levels using historic sequences of hydrologic and climatic variables and diversion scenarios that include the possible LADWP operational responses to a variable water supply, (c) project the future salinities of Mono Lake and (d) evaluate the effect of component error on lake level fluctuations.