OXYREF--A Data File of Test Results
Reported in the Published Literature on
the Respiratory Oxygen Requirements of Fishes

by

Robert V. Thurston & Peter C. Gehrke
Fisheries Bioassay Laboratory
Montana State University
Bozeman, Montana 59717

PROCEDURES

OXYREF (Oxygen Requirements of Fishes) is a file based on results of a computerized literature search, over the time period 1969-1986, of three separate journal referencing services: Biological Sciences Information Service (BIOSIS PREVIEWS), Aquatic Sciences and Fisheries Abstracts (ASFA), and Canadian Water Resources References (AQUAREF). Key words used in the search included that for fishes as a group, and any combination with oxygen, respiration, ventilation, and gases. Over 5,000 hits were obtained, and after reviewing the print-out for each hit it was decided that 676 publications should be reviewed in their entirety. A systematic library search for them was conducted and all but 13 were located. An additional 94 publications were reviewed from the authors' libraries. Of all the publications considered, 61 were not in English and were not reviewed because translations were not immediately available. In all, 696 publications were eventually reviewed. Of these, 404 were rejected because they were not relevant in spite of title or abstract, did not contain primary data, or did not contain sufficient documentation of test conditions to meet our criteria for inclusion in the data file. The remaining 292 publications each contained one or more tests that qualified for the file.

The minimum information needed for a test to qualify for OXYREF was identification of the test fish species, number of fish per test, fish weight, test temperature, indication of fish activity (which we classified according to the conventional metabolic activity categories: standard, routine, active, and burst), and oxygen consumption per unit of time. If there was more than one fish in a test, the weight recorded in the file is the mean weight. If test salinity was not reported, it was recorded as 35 o/oo for a marine species and as 0 o/oo for a freshwater species. Partial pressure of oxygen in the test water (in mm Hg) was recorded as reported, or if not reported it was possible to make certain assumptions for most tests from the description of the test methods. When assumptions about partial pressure were made, these included corrections for test temperature and water salinity. Oxygen consumption was reported in a variety of ways, but all were converted to mg O_2 per kg of fish per hour (mg/kg/h). Additional information recorded for each test, if available, included fish length, age (in years), sex (female, male, both, or unknown), and swimming speed, either reported as, or converted to, body lengths

per second (bl/s). OXYREF also includes the literature reference for each test, and, where appropriate, explanatory comments that sometimes describe the purpose of the test.

Although OXYREF contains information only from publications reporting primary data, the operating definition of primary data included coordinate measurements of data points read from graphs if that was the only way the data were presented. If data were presented in both tabulated and pictorial form, tabulation was chosen. Frequently, however, an author would present data only as a plot of oxygen consumption vs. some variable such as temperature, body weight, or partial pressure of oxygen, along with an equation derived therefrom. If all other minimum criteria for inclusion of data in the file were met, data were read from the plot. If necessary, the plot was enlarged by photocopy to improve linear measurement precision, and the X, Y coordinate measurements for each data point in the plot were then measured and tabulated. A microcomputer program was used to convert the linear X, Y coordinate measurements into the values reported on the axes of the plot. At the same time the scale of the X, Y axes was inserted into the program, the reported oxygen consumption was converted to standard file units if it had been reported in other units.

Separate from the data file, a bibliography of all publications cited has been compiled. A hard copy record for each publication has been maintained that includes work sheets for all conversions, and provides any additionally available information on test water pH, alkalinity, hardness, and turbidity. Records have also been kept of all publications reviewed but rejected, stating reasons for rejection.

SUMMARY OF DATA FILE ENTRIES

OXYREF currently contains 6,840 separate test entries from a total of 292 publications (mean - 23 tests per publication; range - 1 to 355). There are 1,753 entries with fish tested under standard metabolic conditions, 3,573 under routine conditions, 1,514 under active conditions, and none under burst conditions. Each test is identified by a publication and test number, e.g., 241.012 (bibliography publication number 241, test 12), along with a listing of authors' surnames and year of publication. The file contains data on fishes from 101 families and at least 237 species; 17 tests are included where authors did not identify fishes beyond family or genus.

To obtain an estimate of numbers of freshwater and marine fish species in the file, the following divisions were chosen for test water salinity: freshwater, <5 o/oo; estuarine, 5-25 o/oo; and marine, >25 o/oo. Using these divisions, the file contains 4,427 tests on 123 "freshwater" species, 579 tests on 30 "estuarine" species, and 1,834 tests on 137 "marine" species, totaling 290 species. This number is greater than the actual number of species in the file, showing that tests for some species are reported in more than one of the salinity divisions.

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