

by those studies. Sources of estimates included Lyke (1993), Jakus *et al.* (1997), Montgomery and Needleman (1997), Paneuf *et al.* (1998), Desvousges *et al.* (1987), Lant and Roberts (1990), Farber and Griner (2000), and Tudor *et al.* (2000) (see section 8.5.2.4 of the rulemaking record). EPA's reasoning for selecting each study is discussed in detail in Chapter 15 of the EEBA report. EPA took a simple mean of point estimates from all applicable studies to derive a central tendency value for percentage change in the water resource values due to water quality improvements. These studies yielded estimates of increased recreational value from water quality improvements expected from reduced MP&M discharges of 12, 9, and 18 percent for fishing, boating, and wildlife-viewing respectively. Using all possible applicable valuation studies in developing a benefit transfer approach to valuing changes in the recreational value of water resources from reduced MP&M discharges, makes unit values more likely to be nationally representative, and avoids the potential bias inherent in using a single study to make estimates at the national level.

Table IX-4 presents the estimated national recreational benefits of the final rule (2001\$). See EEBA Chapter 15 for estimated recreational benefits for alternative regulatory options. The estimated increased value of recreational activities to users of water-based recreation is \$537,197, \$202,691, and \$259,949 annually for fishing, boating, and wildlife viewing respectively. The recreational activities considered in this analysis are stochastically independent; EPA calculated the total user value of enhanced water-based recreation opportunities by summing over the three recreation categories. The estimated increase in the total user value is \$999,838 annually.

EPA also estimated non-market non-user benefits. These non-market non-user benefits are not associated with current use of the affected ecosystem or habitat; instead, they arise from the value society places on improved water quality independent of planned uses or based on expected future use. Past studies have shown that non-user values are a sizable component of the total economic value of water resources. EPA estimated average changes in non-user value to equal one-half of the recreational use benefits (see Fisher, A. and R. Raucher, 1984; DCN 20431, section 8.5.2.4). The estimated increase in non-use value is \$499,919 (2001\$).

A recent literature review finds that non-use benefits are, on average, 1.9 to

2.5 times *all* use values, rather than 0.5 times *recreational benefits alone* as EPA has traditionally assumed for its non-use benefit estimates (see T. Brown, 1993; DCN 20426, section 8.5.2.4). EPA's method for estimating non-use benefits from water quality improvements resulting from reduced MP&M dischargers is therefore likely to understate the true value of non-use benefits.

TABLE IX-4.—ESTIMATED RECREATIONAL AND NON-USE BENEFITS FROM REDUCED MP&M DISCHARGES

[Thousands of 2001\$]

Benefit type	Traditional extrapolation	Post-stratification extrapolation
Recreational Fishing	\$537.20	\$349.98
Recreational Boating	\$202.69	\$132.05
Recreational Wildlife Viewing	\$259.95	\$169.36
Non-Use Benefits (½ Recreational Benefits)	\$499.92	\$325.70
Total Recreational Benefits	\$1,499.76	\$977.09

Note: Categories may not sum to totals due to rounding of individual estimates for presentation purposes.

EPA calculated the total value of enhanced water-based recreation opportunities by summing over the three recreation categories and non-user value. The resulting increase in value of water resources to consumers of water-based recreation and non-users is \$1,449,756 (2001\$) annually.

Findings from the Ohio-case study analysis suggest that the benefits to consumers of water-based recreation may be substantially underestimated at the national level. EPA estimates recreational and non-use benefits to Ohio residents alone are \$376,400 (2001\$) annually. See section IX.H of today's final rule and Chapter 21 of the EEBA for a detailed discussion of the case study of recreational benefits in Ohio. Given that the in-scope MP&M facilities located in the State of Ohio account only for six percent of the total number of in-scope facilities, it is reasonable to expect that the benefits to Ohio residents do not account for such a large proportion of recreational benefits from the final rule nationwide. In addition to more accurately account for the presence and effect of MP&M and non-MP&M dischargers in Ohio, the

following factors are likely to result in more comprehensive estimates of recreational benefits under the case study approach: (1) Use of an original travel cost study to value four recreational activities affected by the regulation: fishing, swimming, boating, and wild life viewing; (2) use of a first-order decay model to estimate in-stream concentrations in downstream water bodies; (3) ability to estimate welfare gain to recreational users from reduced discharges of nutrients such as Total Kjeldahl Nitrogen (TKN).

D. Effect on POTW Operations

The final rule only regulates direct dischargers. Therefore, the selected option does not affect POTW operation. For the alternative policy options that consider both direct and indirect dischargers, EPA evaluated two productivity measures associated with MP&M pollutants. The first measure is the reduction in pollutant interference at publicly-owned treatment works (POTWs). The second measure is pass-through of pollutants into the sludge, which limits options for POTW disposal of sewage sludge. These analyses are presented in EEBA Chapter 16.

E. Summary of Benefits

Using the national-level analysis approach, EPA estimates total benefits for the five monetized categories of approximately \$1,500,000 (2001\$) annually (see Table IX-5). EPA's complete benefit assessment can be found in EEBA for the final rule. The monetized benefits of the rule likely underestimates the total benefits of the rule because they omit various sources of benefits to society from reduced MP&M effluent discharges. Examples of benefit categories not reflected in these estimates include non-cancer health benefits other than benefits from reduced exposure to lead; other water-dependent recreational benefits, such as swimming and waterskiing benefits to recreational users from reduced concentration of conventional pollutants and nonconventional pollutants such as TKN; and reduced cost of drinking water treatment for the pollutants with drinking water criteria. In addition, as noted in the prior discussion, although the national-level benefits analysis finds negligible benefits from reduced health risk, the more rigorous analytic approach used for the Ohio case study found more benefits—approximately \$0.5 million.