ABSTRACT

We developed and tested a computer system to help plan the transport of fish from hatcheries to public fishing waters. The objective of the system was to help manage the information needed for planning and to use that information to produce minimum-cost schedules for loading and transporting fish. We divided the problem into two parts, hatchery assignment and truck assignment. Under hatchery assignment, we used linear programming to assign planting sites to the nearest hatcheries. Under truck assignment, we developed an original algorithm to define planting trips and to assign the best type of truck for each trip. Our algorithm was able to define individual truck trips in which more than one site was planted or more than one species or size of fish was planted. Trucks were assigned according to their loading capacities, operating costs, unloading characteristics, and physical availability. The computer system has been used to help plan fish transportation by Michigan Department of Natural Resources since 1980. A number of problems were encountered in applying the system, but they were not unsurmountable. We think the computer system generated more efficient transportation schedules than manual planning methods, but we could not demonstrate this in a field test because confounding variables could not be controlled. However, we used the computer system to reschedule transportation for a group of fish that had been planted before the system was developed and found the computer-generated schedule could have accomplished the same fish plant 23% cheaper than the schedule actually used. If the distribution of fish production was shifted so that fish were reared closer to their planting locations, transportation costs could have been reduced 35%. The transportation system also allows managers to incorporate transportation costs into other management decisions, such as locating new hatcheries or evaluating the need for new trucks. The key to the future success of the computer system will be to keep adapting and refining it as new problems are identified and solved and new technologies allow for improved performance.