Recent success with a simple type of coevolution, resource defined fitness sharing (RFS), involving only pairwise interactions among species, has inspired some static analysis of the species interaction matrix. Under the assumption of equilibrium (w.r.t. selection), the matrix yields a set of linear equations such that if there exists a subset of species that exactly cover the resources, then its characteristic population vector is a solution to the equilibrium equations. And if the matrix is non-singular, a solution to the equilibrium equations specifies an exact cover of the resources. This polynomial-time reduction of exact cover problems to linear equations can be used to transform certain exact cover NP-complete problems to certain linear equation NP-complete problems, such as 0-1 Integer Programming. While these problems are known to be in NP-complete, our new proof technique introduces a practical, polynomial-time heuristic algorithm that is independent of the cardinalities of the sets.