**WATER RESOURCES RESEARCH GRANT PROPOSAL**

**Project ID**: ID4561

**Title**: Phosphorus Source/Sink Dynamics in a Flood-Irrigated Agricultural System

**Focus Categories**: Agriculture, Hydrology

**Keywords**: Agriculture; Irrigation; Phosphorus; Water quality monitoring

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**Congressional District**: 1

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**Abstract**

Water quality protection through restoration and management of watersheds is receiving tremendous attention in the United States at all levels of government and in local communities. The main emphasis presently is on the control of non-point sources originating from urban, forest, agricultural, and recreational lands (sections 208, 303(d) and 319 of the Clean Water Act). Since many water bodies are classified as P-limited water pollution abatement strategies frequently focus on reductions in P loading. State and local agencies throughout the U.S. are in the process of setting permissible load allocations, expressed as Total Maximum Daily Load (TMDL), and developing water quality management plans for all use-limited water bodies. The greatest challenge in developing these management plans is meaningful and realistic allocation of load reductions for all land uses within a watershed. The development of the water quality management plan for the Cascade Reservoir in Idaho requires accurate P loading estimates from agriculture, mainly irrigated pasture and hay land.

Indirect assessment of agricultural P loading is subject to over-estimation and, therefore, is potentially unfair to agricultural land owners. During Phase II of TMDL development, agriculture as a whole would need to reduce its P loading by 30%. Major problems could arise if landowners commit to expensive Best Management Practices (BMPs) only to find out years later that their efforts did not achieve specific water quality goals. Furthermore, several studies show that loading from non-point P sources is seasonally dependent, a fact not addressed in the current Cascade Reservoir load allocations. The research literature contains insufficient information for estimation of P loading from irrigated agriculture. It is clear, therefore, that a comprehensive study is needed to document relationships between P loading and watershed parameters that would 1) provide a more accurate value for agricultural P loading in the Cascade Watershed and 2) provide information that would be transferable to other agricultural regions in the western United States. Such relationships should be developed from direct measurement of flow volumes and soil-water P concentrations monitored throughout a three-year period to accurately determine seasonal P dynamics.