Ecosystem metabolism in an effluent-derived, arid-land river estimated from diurnal dissolved-oxygen profiles
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Introduction
Effluent is used frequently as a source of water to restore (or create new) aquatic ecosystems degraded by water diversion. The application of effluent has typically immediate, profound, and highly visible effects on ecosystem structure, but less clear is the response of ecosystem function.

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Results: patterns of GPP and R

The diurnal DO profile (DDO) immediately below the WWTP (Figure B) is notably flat but dramatic spikes or declines, likely reflecting plant operations, are common. The DDO near PIR (~ 4.9 km below the WWTP, Figure C) exhibits diurnal highs and lows more characteristic of a ‘natural’ lotic system. Maximum DO (~ 4.4 km below PIR, Figure D) also exhibits patterns similar to a more ‘natural’ system. Maximum DO at both PIR (Figure G) and Buckeye (Figure H) is significantly greater at Buckeye relative to PIR.

However, intra-stream variation is evident, and only one significant correlation among minimum DO concentration and water chemistry (Table A). A few weak correlations among maximum DO concentration and wastewater chemistry were evident, and only one significant correlation among minimum DO concentration and water chemistry (Table A).

Results: environmental controls

While minimum DO concentration was relatively consistent throughout the year, maximum DO concentration exhibited a distinct seasonal pattern at both PIR (Figure G) and Buckeye (Figure H). Correspondingly, maximum DO concentration at both sites was correlated significantly with atmospheric conditions (Table A). Maximum DO concentration at both sites was correlated significantly with atmospheric conditions (Table A).

Discussion
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Summary & Conclusions
The early-winter condition of 2005–06 suggests that ecosystem function responds quickly (but not immediately) to effluent addition. Though the DDO exhibited a pattern corresponding to the maximum primary producers capitalize quickly on favorable conditions, but suggest also more subtle, complex dynamics (e.g., controls on ecosystem function may be fundamentally different in effluent-driven systems).

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