Ecological impact of a constant flow regime on an aquatic macroinvertebrate community

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Characteristic Flow Regime

Flow

Year

Day of the year

Flow

California Map
Mediterranean Climate – part I
Mediterranean Climate – part II
Green River UT. – below Flaming Gorge Dam
Highly Modified Flow Regime

Lake Oroville
Oroville Dam
Forebay
Afterbay
Constant Flow
Variable Flow

Lower Feather River
Feather River Flow Alteration

variable CMS
constant CMS

remove variation ➞ ecological disturbance

water year 2003-2004

17 m³/s
Macroinvertebrate Communities

- bio-assessment
- IBI’s
- constant flow impact?
Drift samples

Benthos samples
• composite samples/site
• 4 sites/flow treatment
• 3 seasons in year
• ID’d to genus/sp.
• CPUE
Two Endpoints

- **gen. community properties**
  (richness, diversity etc.)
- **specific community membership**
  (ordination - NMDS)
Drift

Avg. species richness

Benthos

* significant @ α = 0.05
**Drift**

![Graph showing Drift](image)

- Significant at $\alpha = 0.05$

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**Benthos**

![Graph showing Benthos](image)

- Significant at $\alpha = 0.05$
Drift

Benthos

* significant @ $\alpha = 0.05$
• general measures

→ no difference
NMDS Plot – Drift

between flow groups $p=0.001$
between seasons $p=0.001$

constant
variable
NMDS Plot – Benthos

between flow groups $p=0.001$

between seasons $p=0.001$

constant
variable
Results

1. general community measures show little effect

2. specific community membership altered
stable isotope food-web data
Take-home message:

• removing flow variability has community effects

• impact on food-web
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