



Estimates of Systemwide Above-Ground Biomass and Terrestrial Vegetation Inputs for the Colorado River Ecosystem

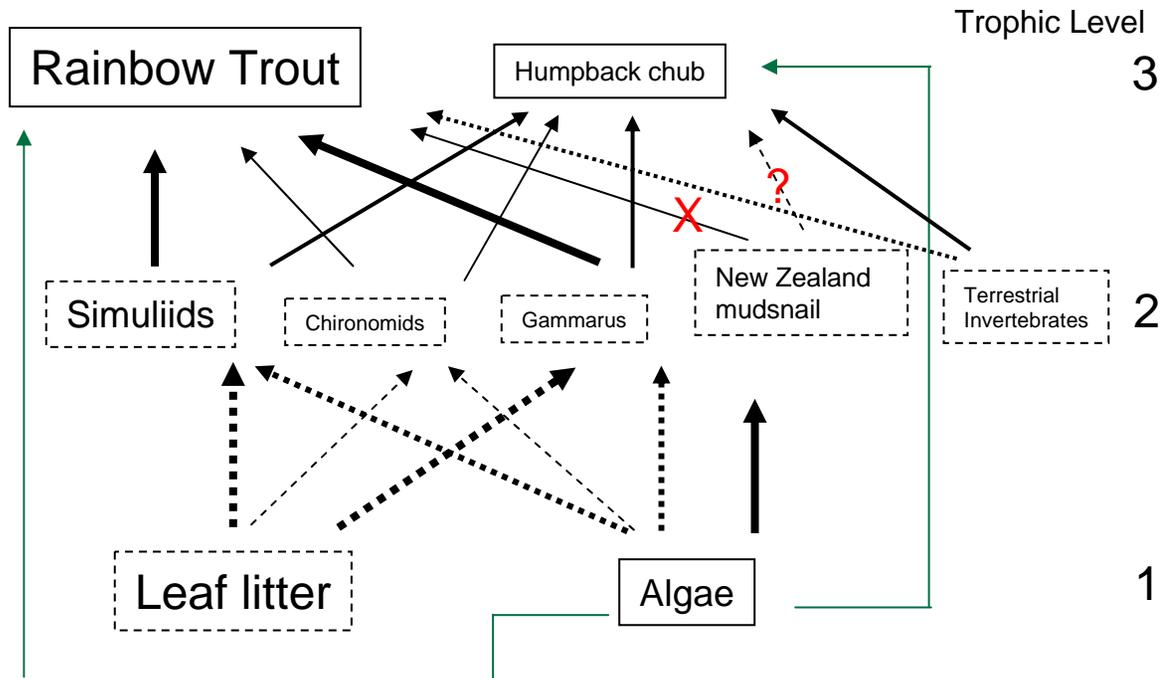
Theodore Kennedy and Barbara Ralston,
SBSC, GCMRC

Outline

- Background
- Vegetation Mapping Methods
- Allochthonous Inputs
- Do they matter?

Background

Colorado River at LCR confluence



Background

- “Riparian vegetation and associated fauna (especially invertebrates) are potential sources of allochthonous organic matter debris and energy to the aquatic ecosystem. Small discharge fluctuations may scour and transport some riparian vegetation into the river, but the overall influence is probably small.”

Duncan Patten, 1998. Integration and Evaluation of Glen Canyon Environmental Studies Research Findings.

Background

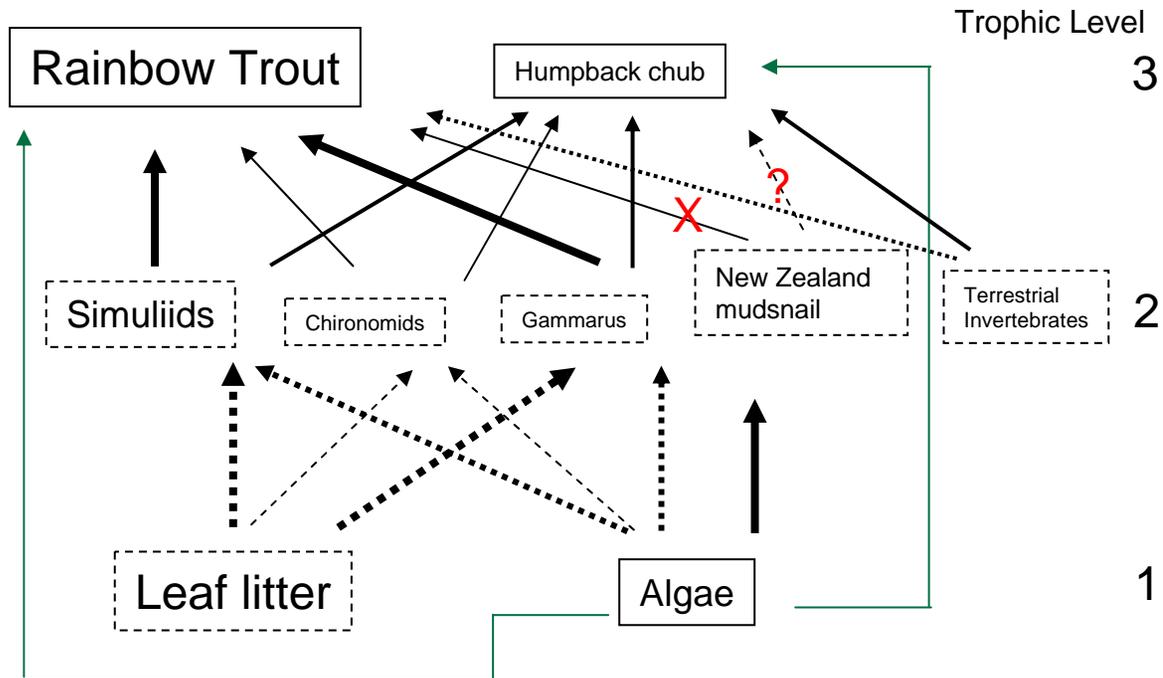
- “Benthic algal communities (mainly *Cladophora* and *Oscillatoria*) and the epiphytic diatoms that they support are apparently the main source of food for aquatic insects. Insect biomass declines dramatically downstream from the area of high primary production below Glen Canyon Dam, indicating that other detritus sources are insufficient to support high insect production (i.e., the system does not change from autochthonously driven to allochthonously driven...That is, the whole downstream aquatic ecosystem appears to be driven by changes in aquatic primary productivity, particularly in the upper reaches. ”
- C. Walters, J.Korman, L.E Stevens, and B. Gold, 2000. Ecosystem modeling for evaluation of adaptive Management policies in the Grand Canyon. *Conservation Ecology* 4(2).

Background

- “Allochthonous terrestrial food sources are greatly reduced compared to pre-dam conditions, and benthic communities have been transformed from a predominantly insect assemblage of primarily filter feeders to an invertebrate assemblage of primarily grazers.”
- R. Valdez & S. Carothers, 1998. The aquatic ecosystem of the Colorado River in Grand Canyon—Grand Canyon Data Integration Project Synthesis Report.

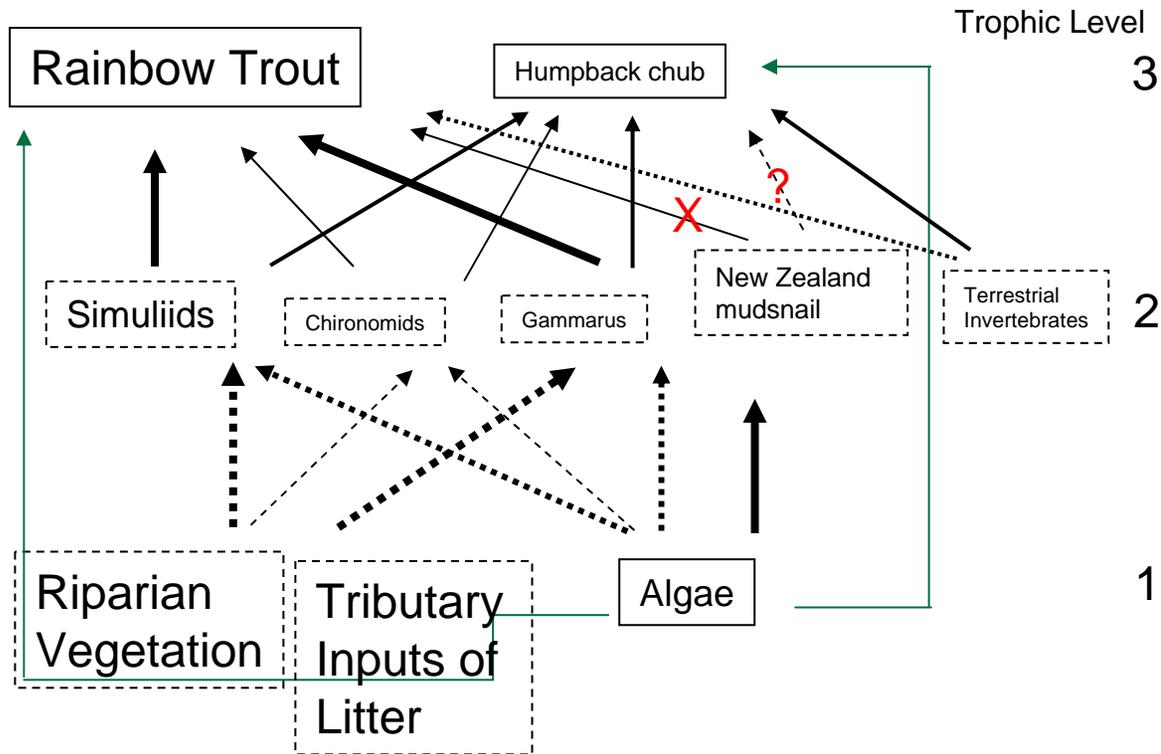
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Colorado River at LCR confluence



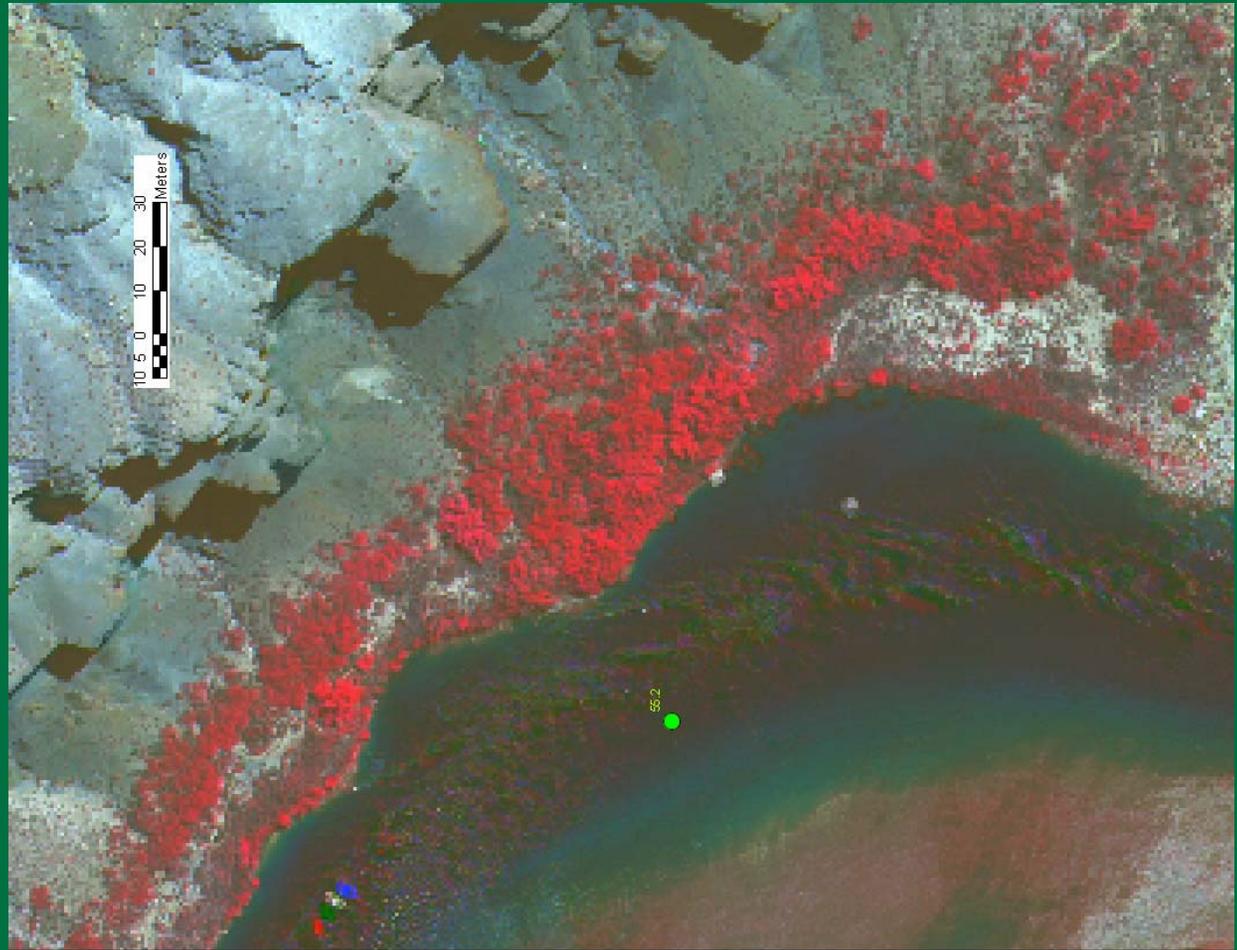
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Colorado River at LCR confluence



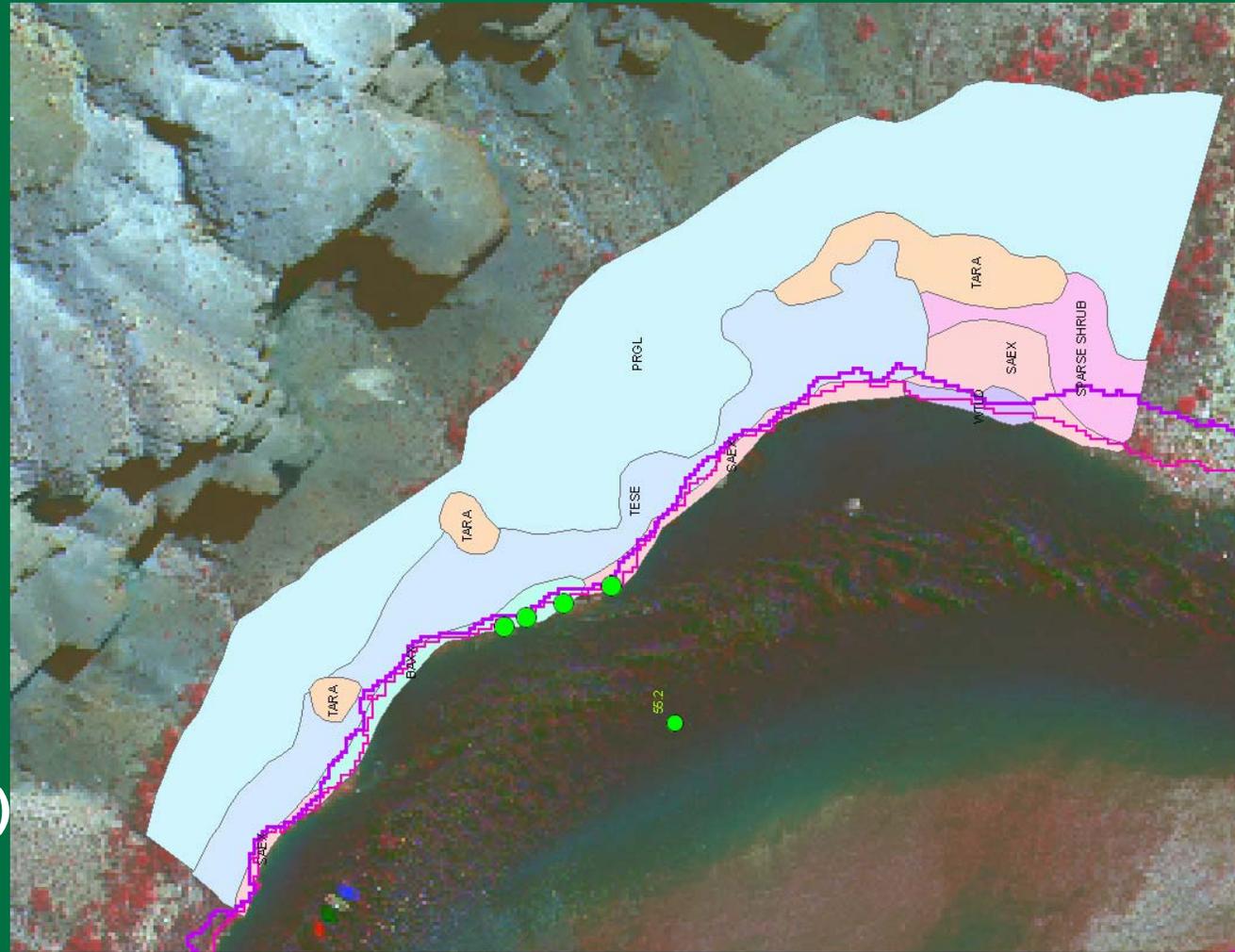
Methods

- CIR photos from 2002



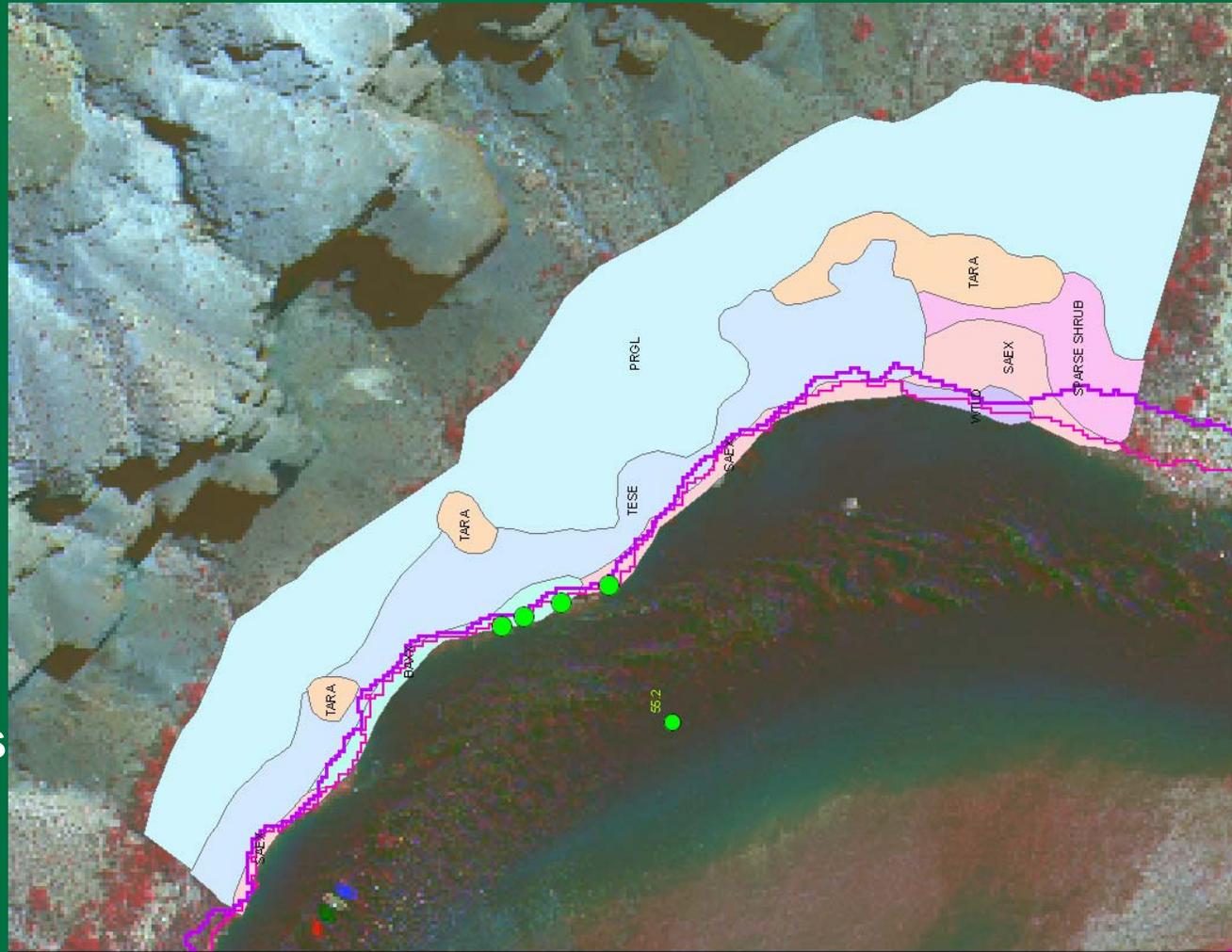
Methods—Vegetation Classification

- Automated classification for entire 225 miles
- 10% of corridor ground truthed
- Ground truth data used to 'correct' entire automated data set
- Data presented today for LF to Unkar (RM 0-76)



Methods—Allochthonous Inputs

- Intersect vegetation coverage with 20k cfs stage line
- Annual production determined using harvests and literature values
- Assume 100% of production is captured by river annually



Lees Ferry to Unkar

- Length: 121,660 meters
- River Surface Area: 16,077,355 m²
- Total Vegetative Cover: 1,645,901 m²

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**Answer: 7 m wide riparian zone between
8k and 20k.**

Allochthonous Inputs—LF to Unkar

Veg. Type	Cover (%)
Saltcedar	65
Arrow weed	20
Sparse Shrub	6
Baccharis Spp.	4
Other	5
Total	100

Allochthonous Inputs—LF to Unkar

Veg. Type	Cover (%)	Cover (m ²)
Saltcedar	65	1,076,803
Arrow weed	20	335,105
Sparse Shrub	6	106,654
Baccharis Spp.	4	60,405
Other	5	82,295
Total	100	1,645,901

Allochthonous Inputs—LF to Unkar

Veg. Type	Cover (%)	Cover (m ²)	Annual Litter Prod. (g/m ² /yr)
Saltcedar	65	1,076,803	436
Arrow weed	20	335,105	90
Sparse Shrub	6	106,654	90
Baccharis Spp.	4	60,405	90
Other	5	82,295	90
 Total	100	1,645,901	

Allochthonous Inputs—LF to Unkar

Veg. Type	Cover (%)	Cover (m ²)	Annual Litter Prod. (g/m ² /yr)	Total Inputs (g/yr)
Saltcedar	65	1,076,803	436	469,485,928
Arrow weed	20	335,105	90	30,159,489
Sparse Shrub	6	106,654	90	9,598,894
Baccharis Spp.	4	60,405	90	5,436,411
Other	5	82,295	90	7,406,554
 Total	100	1,645,901		522,087,277

Allochthonous Inputs—LF to Unkar

	Total Inputs (g/yr)	Inputs per m of river (g/m/yr)	Inputs per m ² of river surface (g/m ² /yr)
Riparian Vegetation	522,087,277	4,291	32

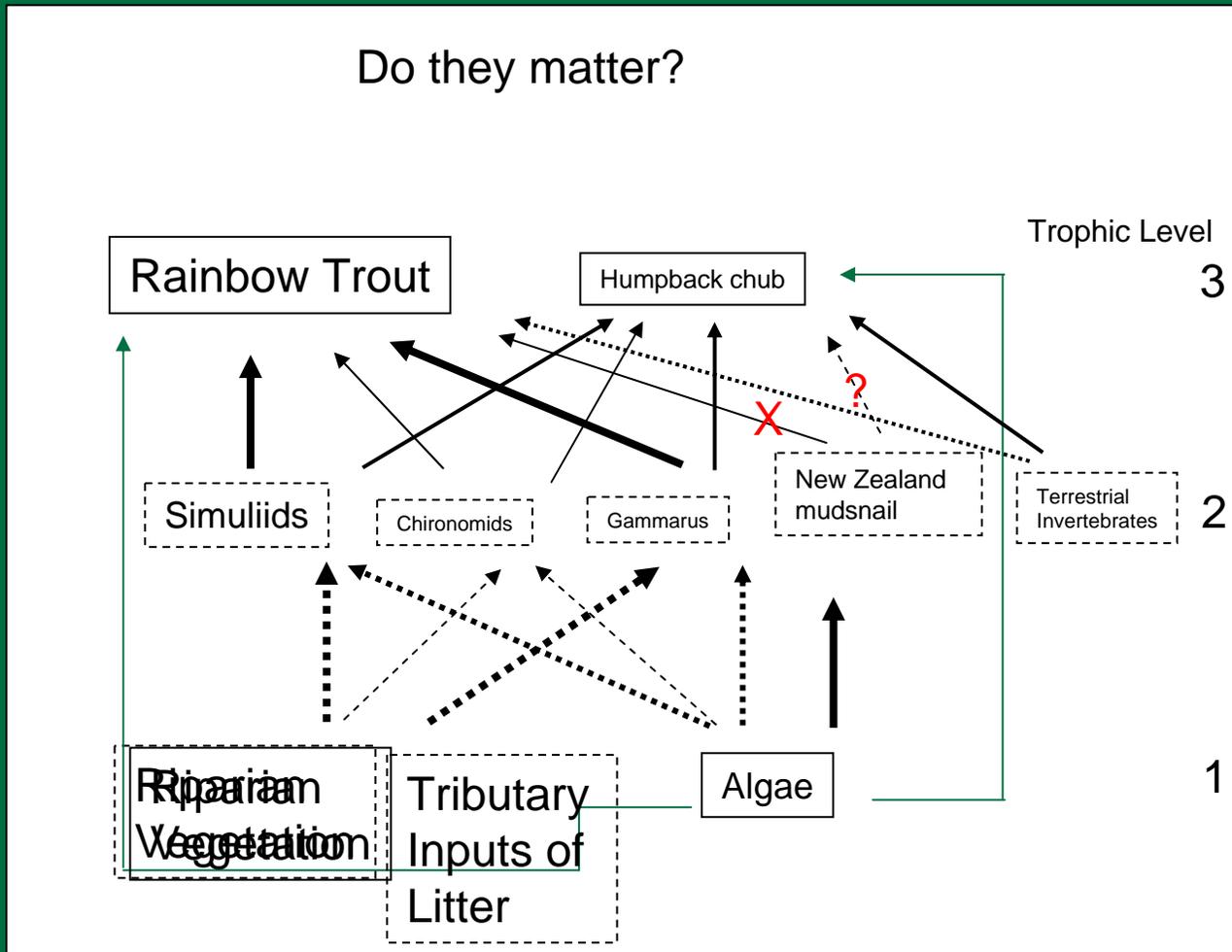
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Riparian Vegetation	522,087,277	4,291	32
Algae (standing mass)			0.1-10
Algae (annual production)			0.5-50

Do They Matter?



Do They Matter? Sure seems possible to me.

