Mapping waterhyacinth dispersal with GPS trackers

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Water hyacinth
(*Eichhornia crassipes* (Mart.) Solms))

- Perennial free-floating aquatic plant species
- Native to the Amazon region of South America
- Introduced to US in late 19th century
- Very fast growth rate; spreads vegetatively through rhizomes
- Intertwined roots and leaves form plant mats
- Widespread in the Sacramento-San Joaquin Delta

Objective:

- Determine to what extent wind, tidal movement, and mass flow drove the dispersal of water hyacinth mats in the Delta
**Methods**

- **Drogue**: 2000 mL Nalgene bottle released into floating water hyacinth mats

- **Bottle contained**:
  - Trackstick GPS tracker
  - Sportdog TEK 1.0

- Each drogue drifted 2-4 hours before being collected and the Trackstick downloaded

- **Trackstick recorded**:
  - location
  - direction
  - speed of the plant mat

- Drogues recovered and downloaded 79 times from June 2016 - February 2018
Direction of each tracker was compared to the water direction and wind direction during the period the tracker was deployed

- ANOVA (P < 0.05)
- Simple linear regression

Water movement, including tidal fluctuation, had a much greater effect on plant movement than wind

Table 1. ANOVA results for waterhyacinth mat direction compared with water direction.

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Corrected Total: 78

Table 2. ANOVA results for waterhyacinth mat direction compared with wind direction.

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</table>

Corrected Total: 78

Figure 8. Fit plot from simple linear regression for waterhyacinth plant direction of travel with water movement.

Figure 9. Fit plot from simple linear regression for waterhyacinth plant direction of travel with wind direction.

Figure 9. Plant mat paths recorded in the Sacramento-San Joaquin Delta, CA, 2016-2018.
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Conclusions

- 50 miles inland from the Pacific Ocean
- Tides have a strong influence on the water there
- Rather than long distance travel over days, plant mats move back and forth with the tide
- Plant mats become entrained by riprap, other plants, tree branches, etc. during the time they were being tracked (74% were entrained when recovered), are moved by the water a short distance, then get caught again

Figure 10. An example of a plant mat changing course as the tide changed. The red line records the track of the GPS in a water hyacinth mat. San Joaquin main channel. November 16, 2017.

Figure 11. An example of a plant mat changing course as the tide changed. The red line records the track of the GPS in a water hyacinth mat. Adjacent to Mandeville Island, Sacramento-San Joaquin Delta. February 7, 2018.
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Thanks

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