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Effects of Shoreline Oiling on Salt Marsh Macroinvertebrates 2012-2016

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Plan Design Enable

Study Program

Long-Term Recovery of the Structure, Function, and Sustainability of Louisiana Salt Marshes

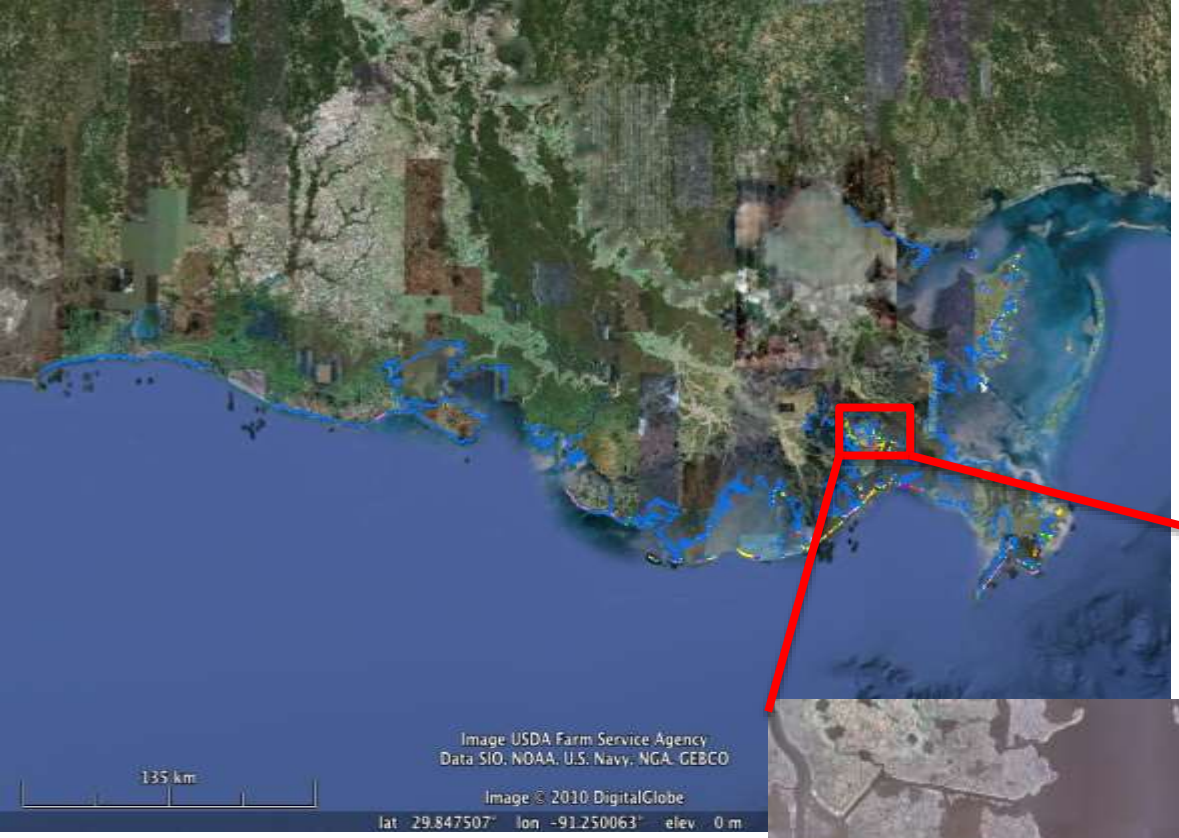
Heavy oiled Station 3

30 months after spill (November 2012)

78 months after spill (October 2016)

Program outline

- 21 stations in northern Barataria Bay – three oiling levels
  - Reference (7 stations)
  - Moderate Oiling (7 stations)
  - Heavy Oiling (7 stations)
- Sampling from November 2012 to October 2016 (30, 36, 40, 42, 48, 54, 60, 66, 74, and 78 months after spill)
- Total Petroleum Hydrocarbon Concentration
- Plant Parameters
- Soil Parameters
- Organisms



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Northern Barataria Bay Sampling Sites

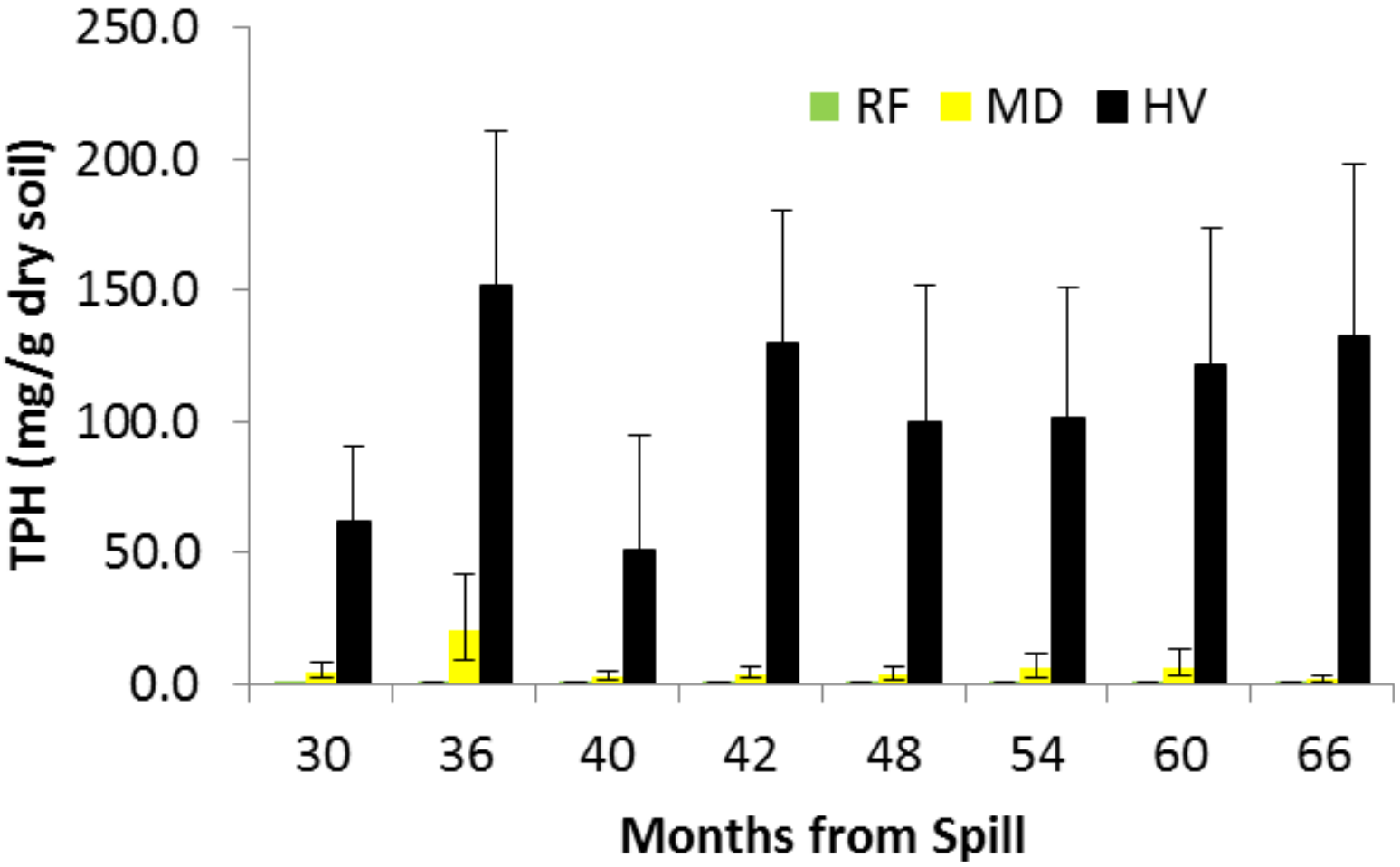
- Heavy oiling
- Moderate oiling
- Reference

“Conspicuous” Macroinvertebrate Species

Uca longisignalis
Gulf Marsh Fiddler Crab
From Zengel et al., 2014

Littoraria irrorata
Marsh Periwinkle

Total Petroleum Hydrocarbon



Spartina Aboveground Biomass

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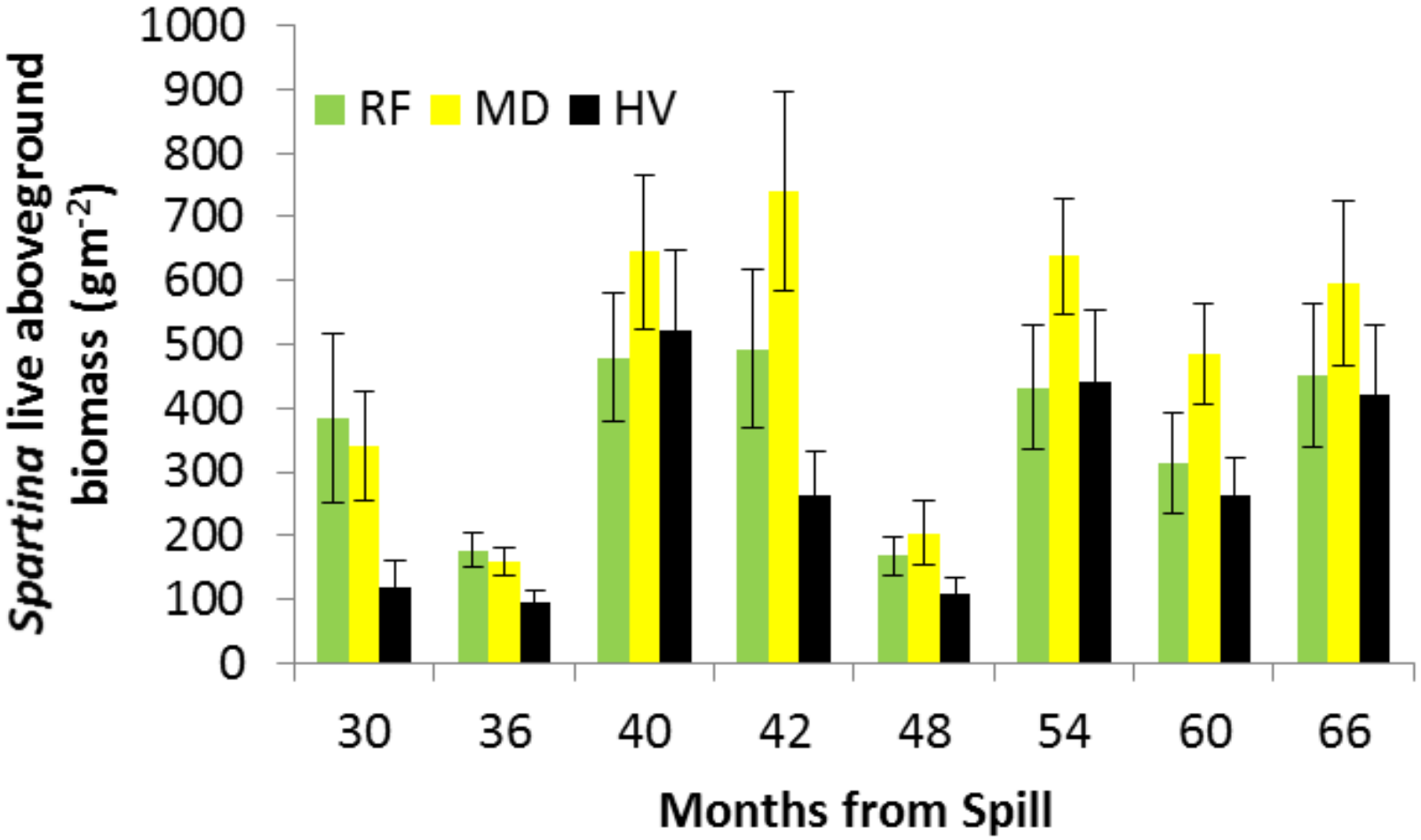

Juncus Aboveground Biomass

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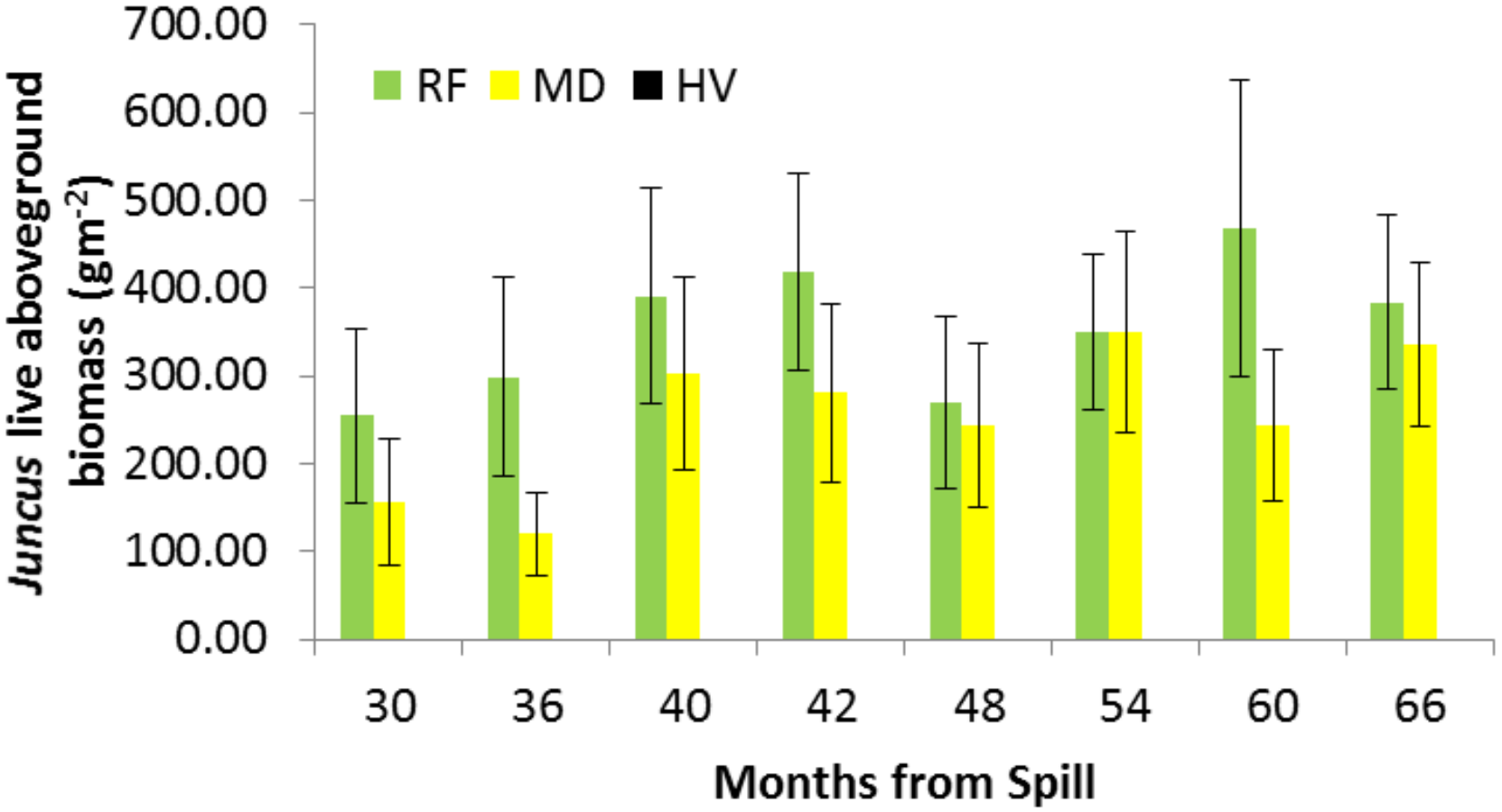

Uca Burrow Density

Uca longisignalis vs. *Uca spinicarpa*

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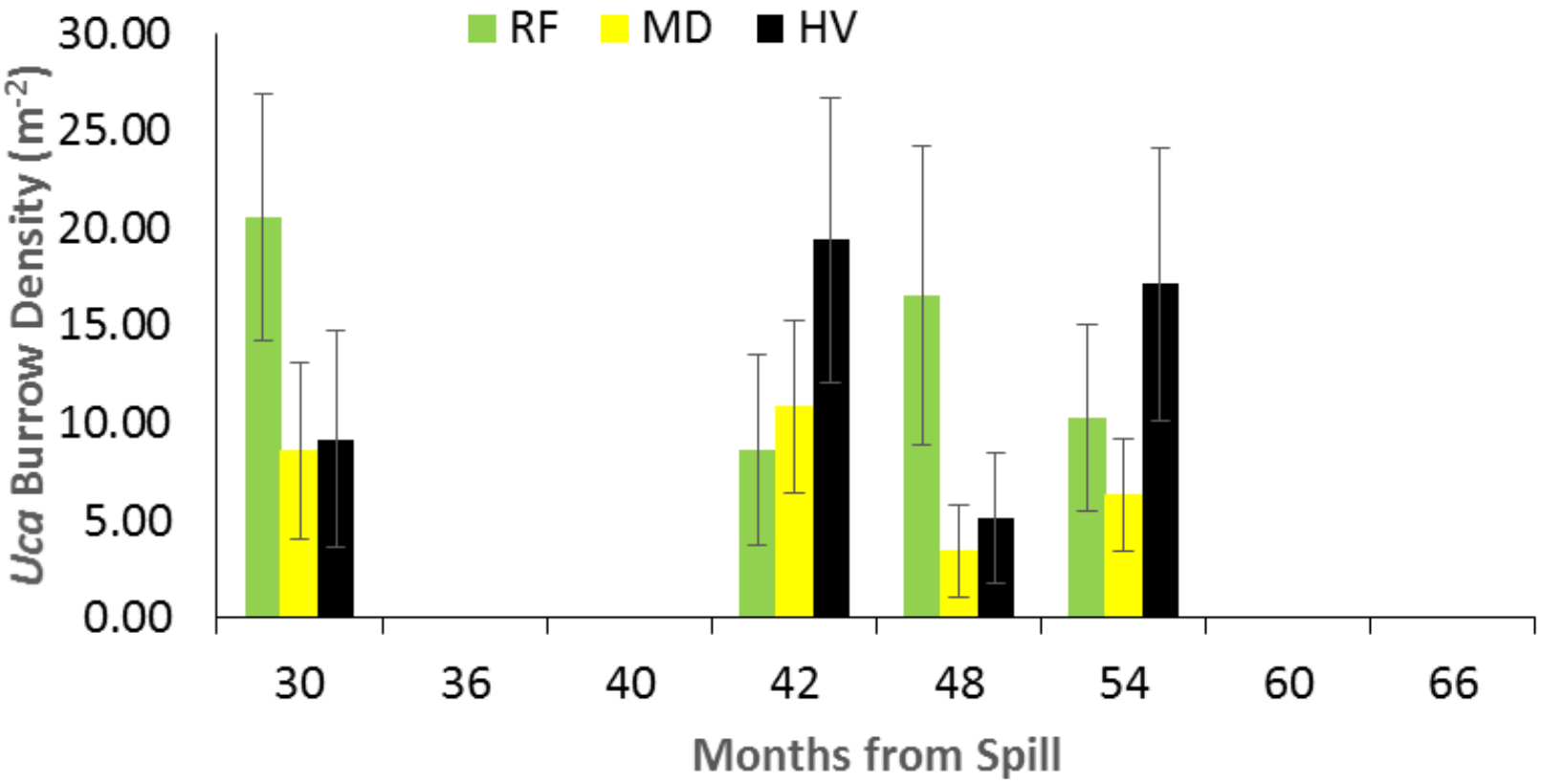
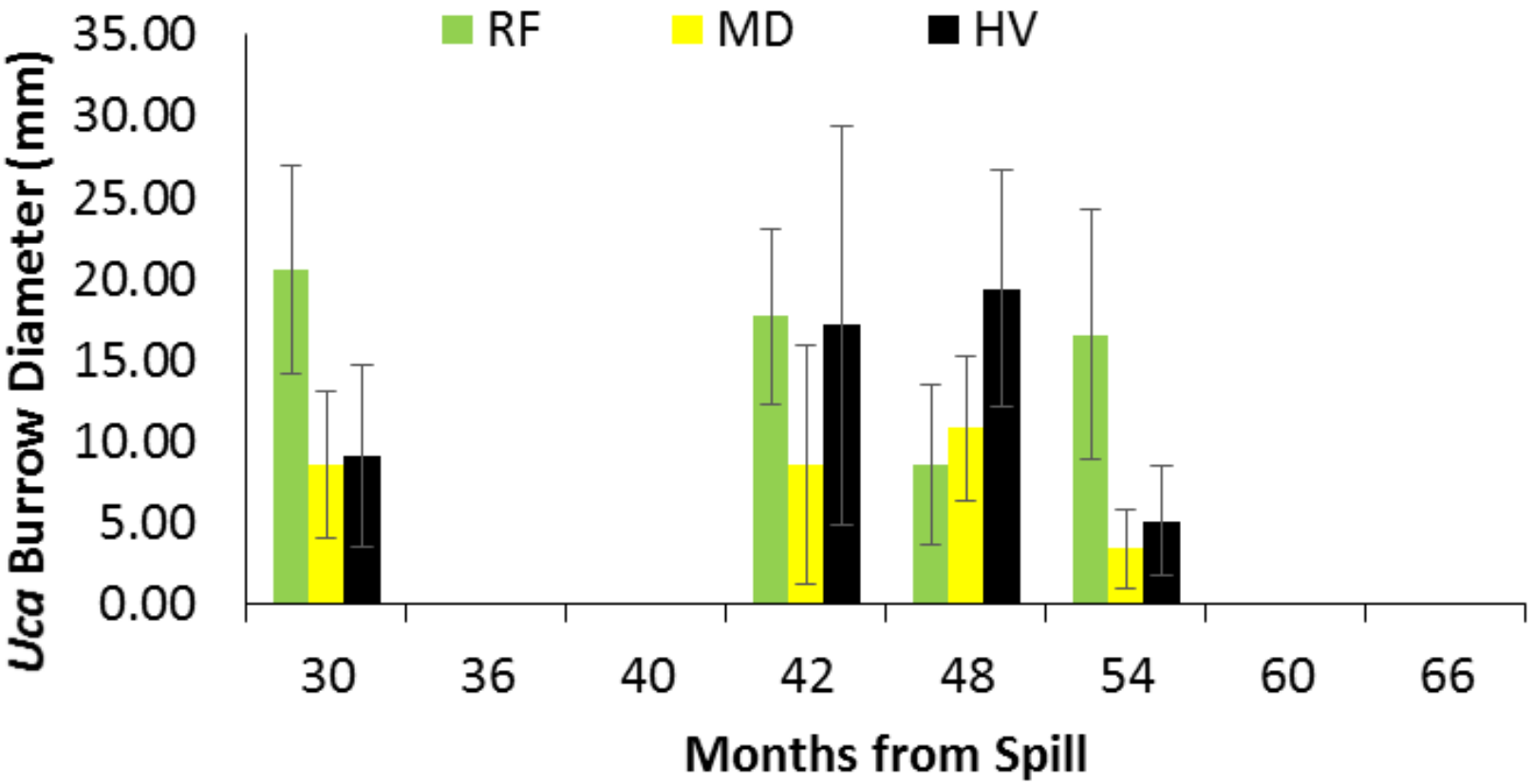


Uca Burrow Diameter



Study Data and Pooled Data from Zengel et al. (2016a)

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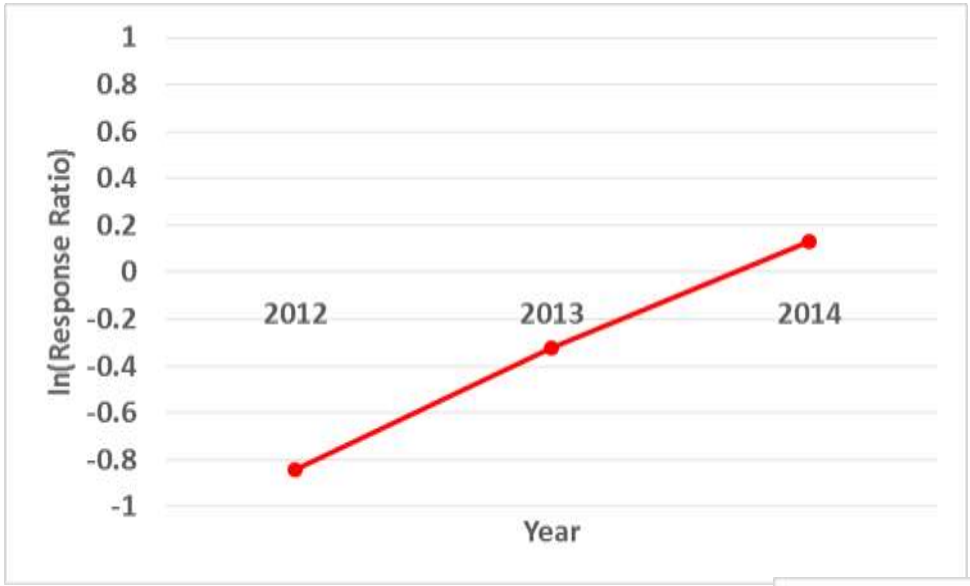
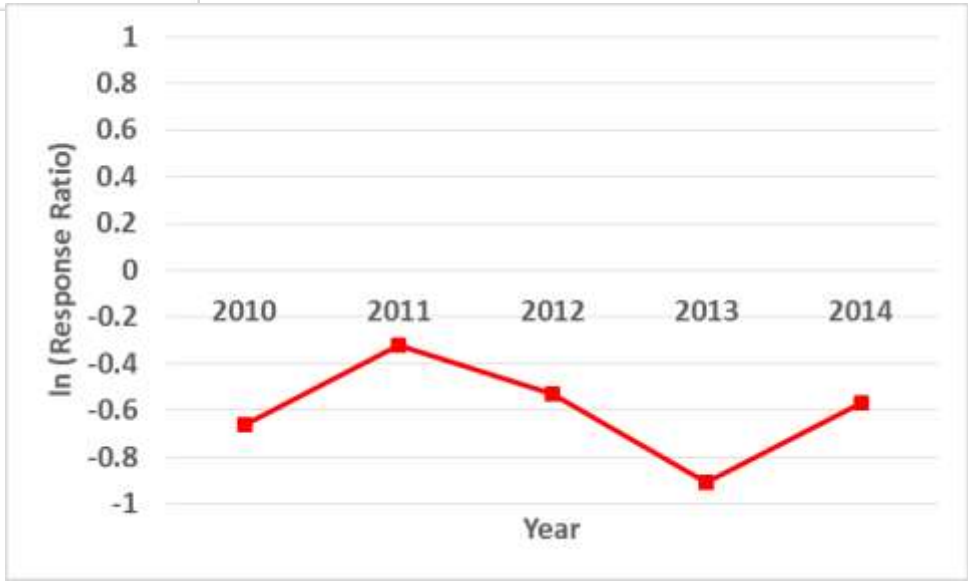


Burrow Density

Our Study

Zengel et al. 2016a



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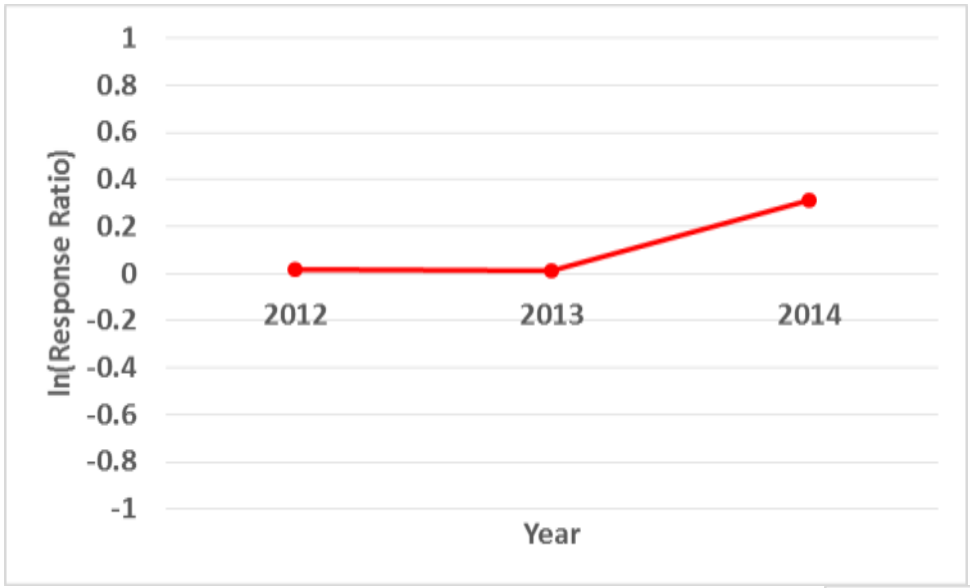

Burrow Diameter

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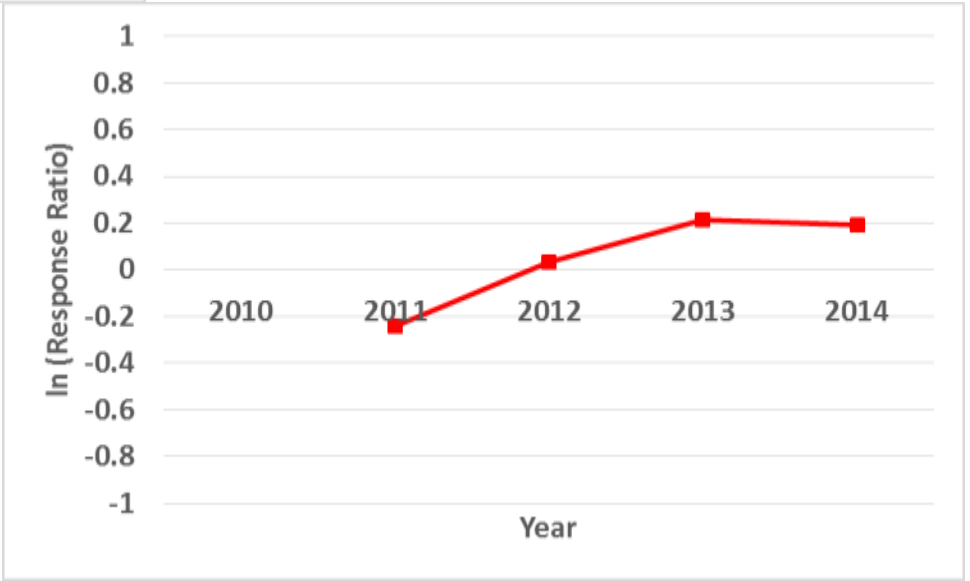
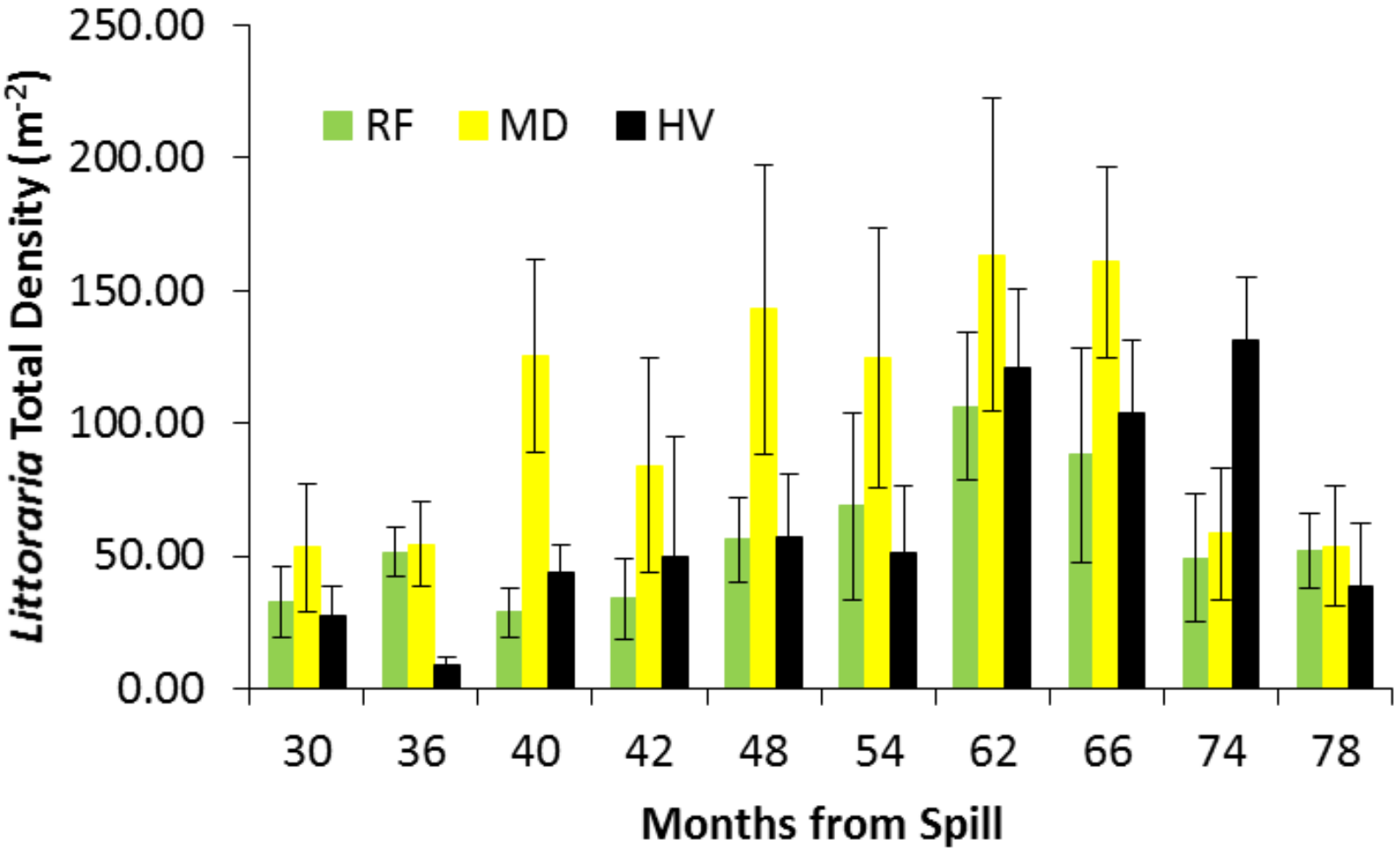
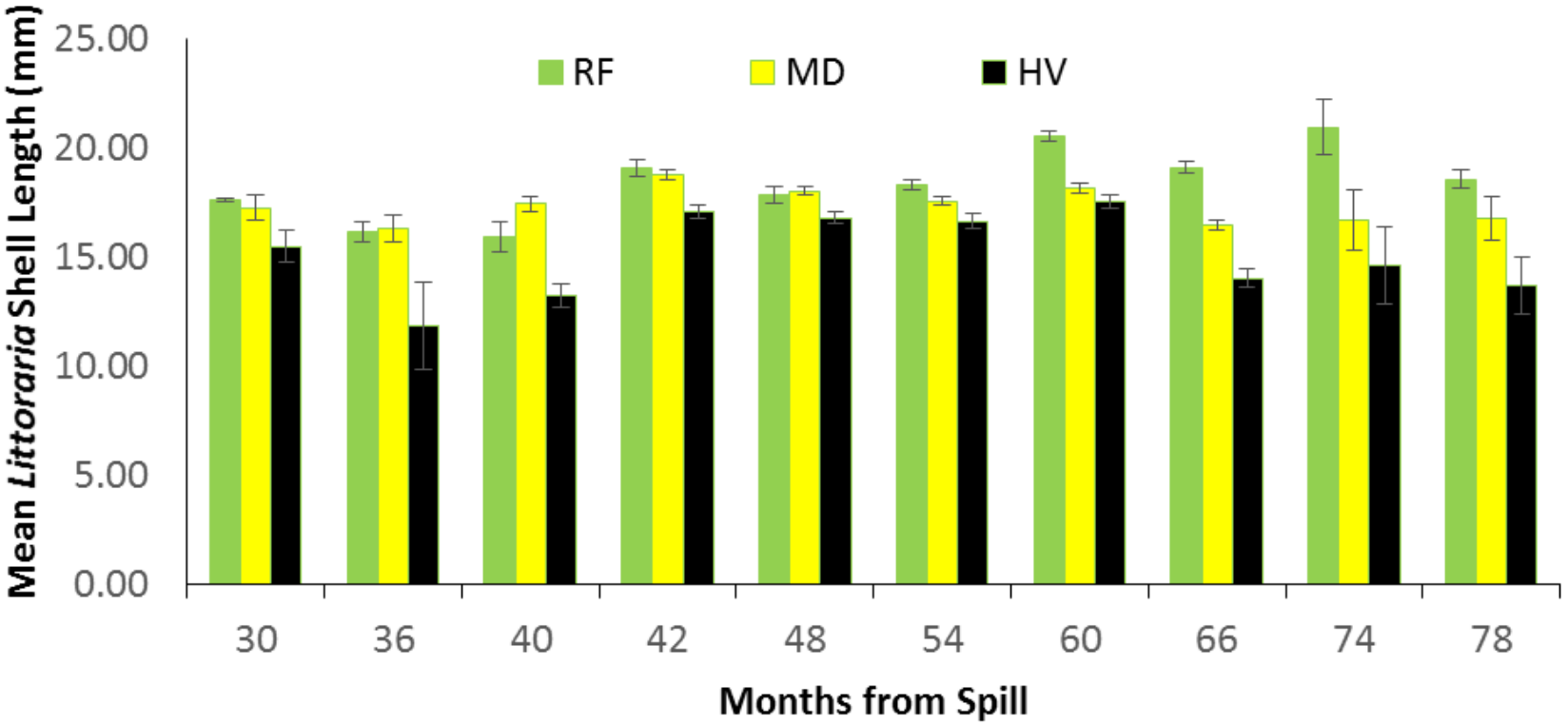


L. irrorata Total Density



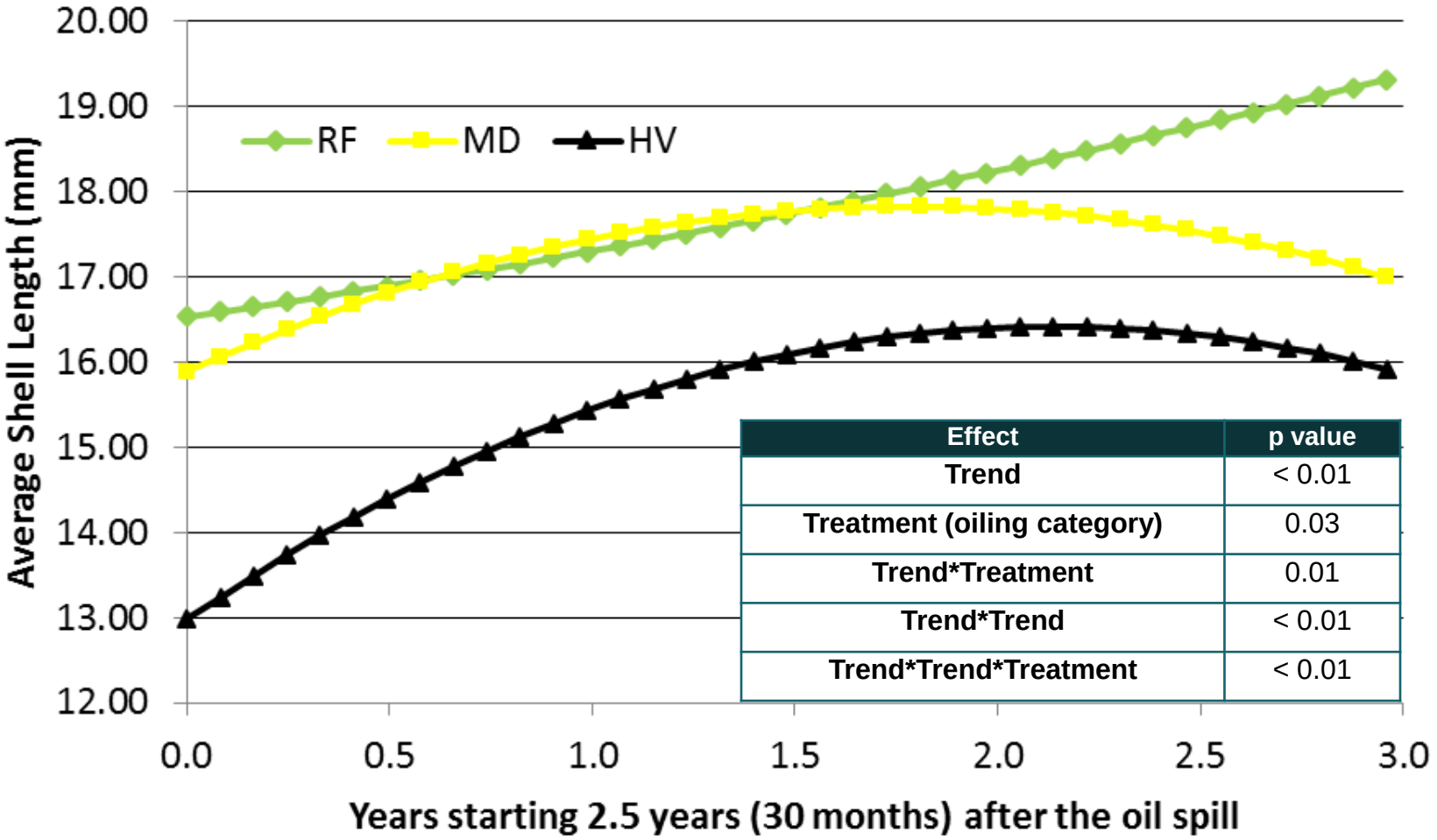
Mixed Model ANOVA – Treatment ($p=0.08$); sampling period ($p<0.01$); interaction ($p=0.49$)

L. irrorata Mean Shell Length



Mixed Model ANOVA – Treatment ($p=0.05$); sampling period ($p<0.01$); interaction ($p<0.01$)

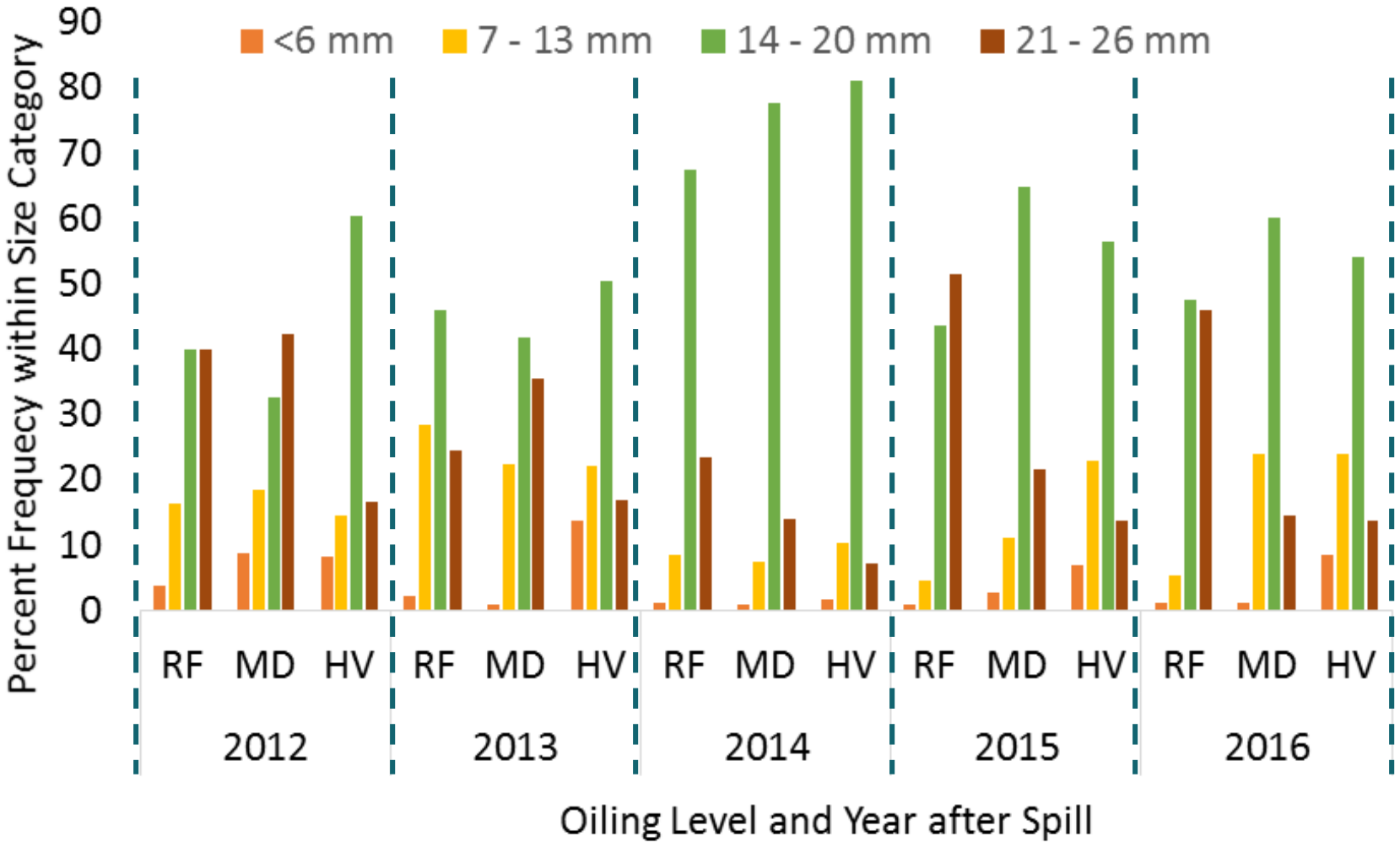
L. irrorata Mean Shell Length Trend



Effect	p value
Trend	< 0.01
Treatment (oiling category)	0.03
Trend*Treatment	0.01
Trend*Trend	< 0.01
Trend*Trend*Treatment	< 0.01

ANCOVA regression means model used to create the intercepts and slopes for quadratic regression for HV and MD and gradually increasing slope for RF.

L. irrorata Shell Size Frequency



Study Data and Pooled Data from Zengel et al. (2016b)

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Snail Density

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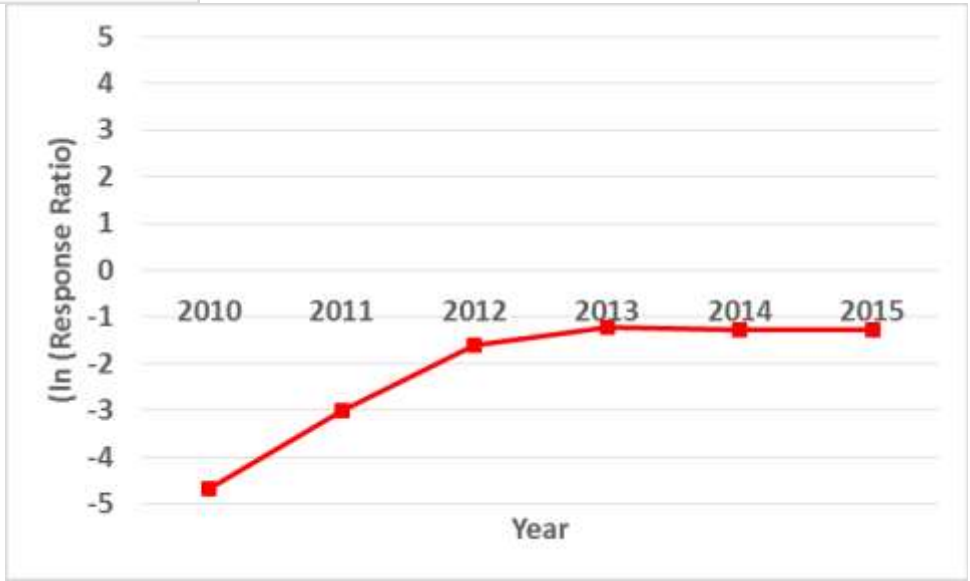
Zengel et al. 2016a



Study Data and Pooled Data from Zengel et al. (2016b)

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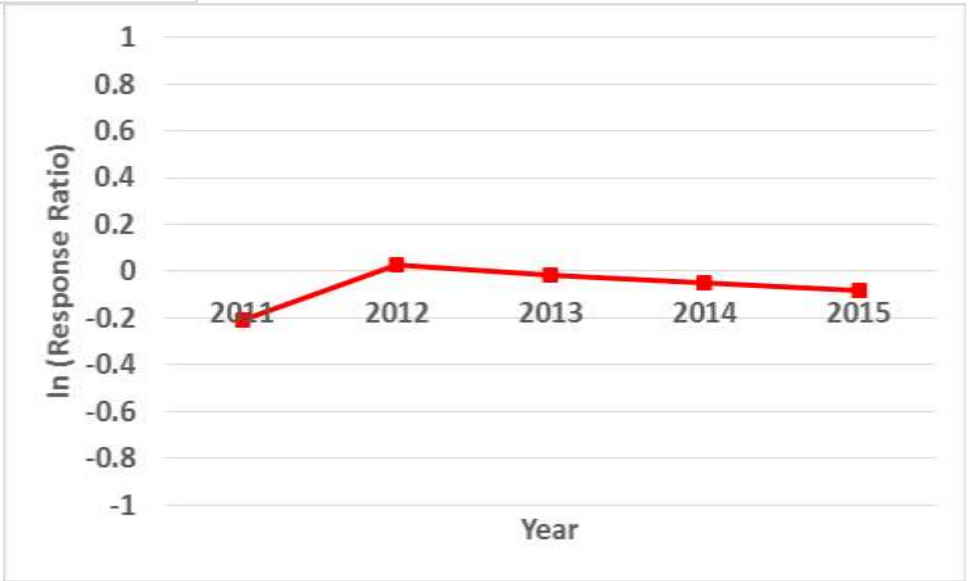
Snail Length

Our Study

Zengel et al. 2016a



Where are we?

- Began approximately 2.5 years after the spill through approximately 6.5 years after spill – ongoing study.
- The recovery of fiddler crabs and periwinkles is related to the recovery the *Spartina alterniflora*.
- The dynamics of *Uca spinicarpa* and *Uca longisignalis* describes the recovery of the fiddler crabs in this marsh environment.
- The trend of the mean shell length of the periwinkle within the oiling level stations seems to be a sensitive indicator of recovery of the oiled marsh habitat.
- What is happening to the larger adult periwinkles – chronic toxicity or immigration to a better environment.

Acknowledgements

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