



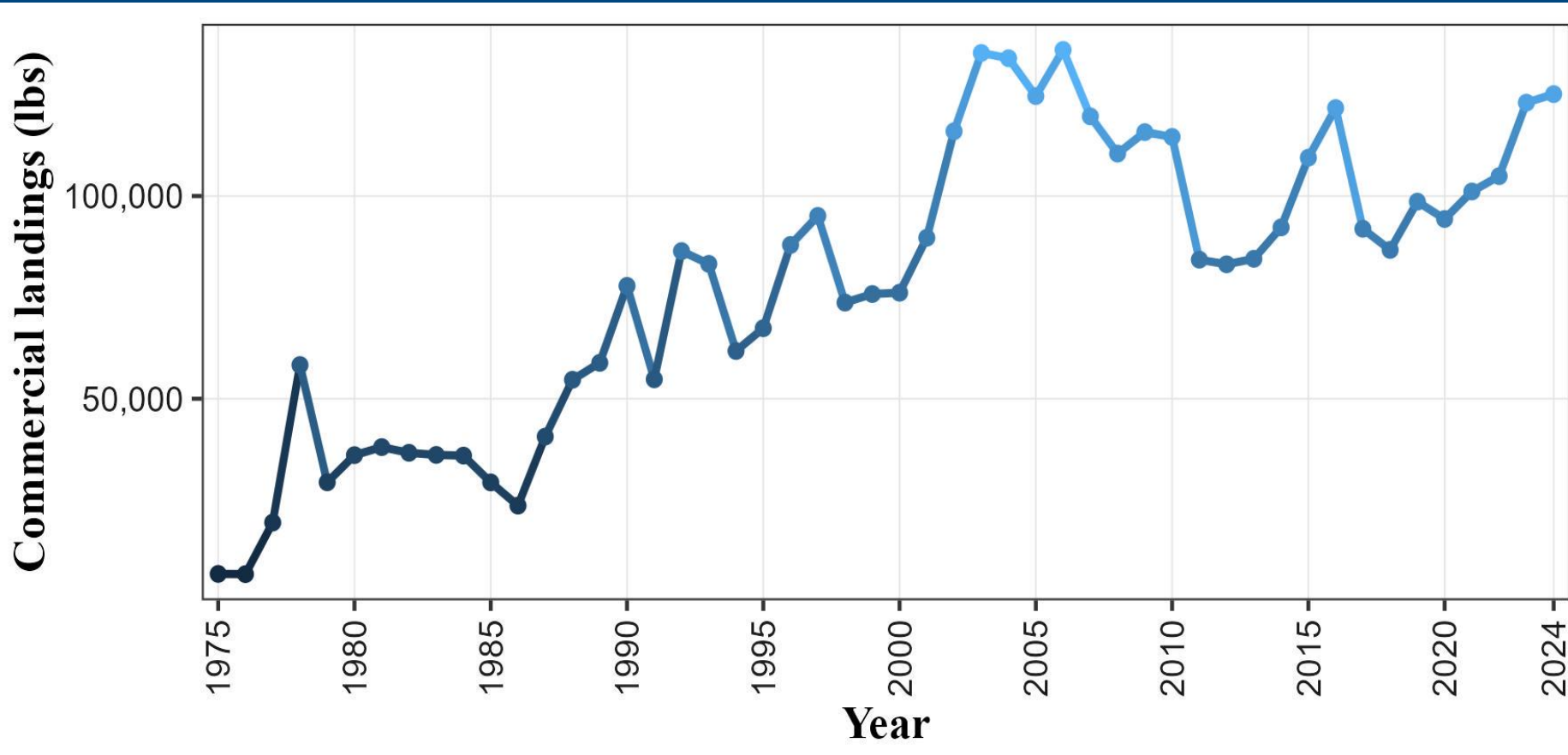
NOAA
FISHERIES

SEDAR 91 St. Thomas and St. John Spiny Lobster Index

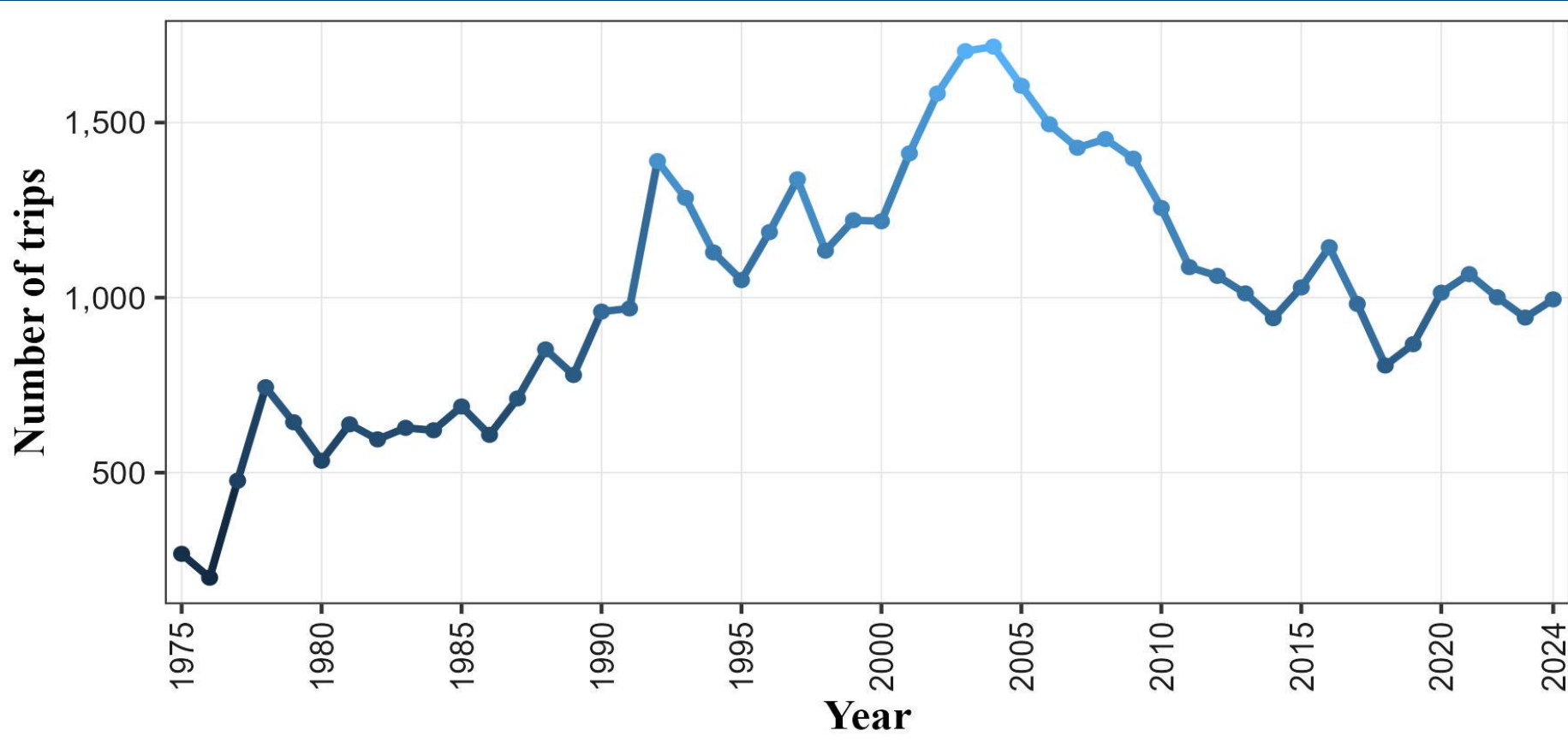
Stephanie Martinez Rivera, Adyan Rios and Kevin McCarthy

NOAA Fisheries, SEFSC, Sustainable Fisheries Division, Caribbean Fisheries Branch

STTJ Spiny Lobster Commercial Landings SEDAR 91



STTJ Spiny Lobster Commercial Trips SEDAR 91



Standardized Index of Abundance

- ✓ Landings and fishing effort of commercial fishers from the Caribbean Commercial Logbook (CCL)
- ✓ Each fishing trip has a unique trip identifier, the landing date, fishing gear, gear-specific fishing effort, species landed, and weight of the landings
- ✓ Catch per unit effort (CPUE) defined as whole weight per fish traps hauled

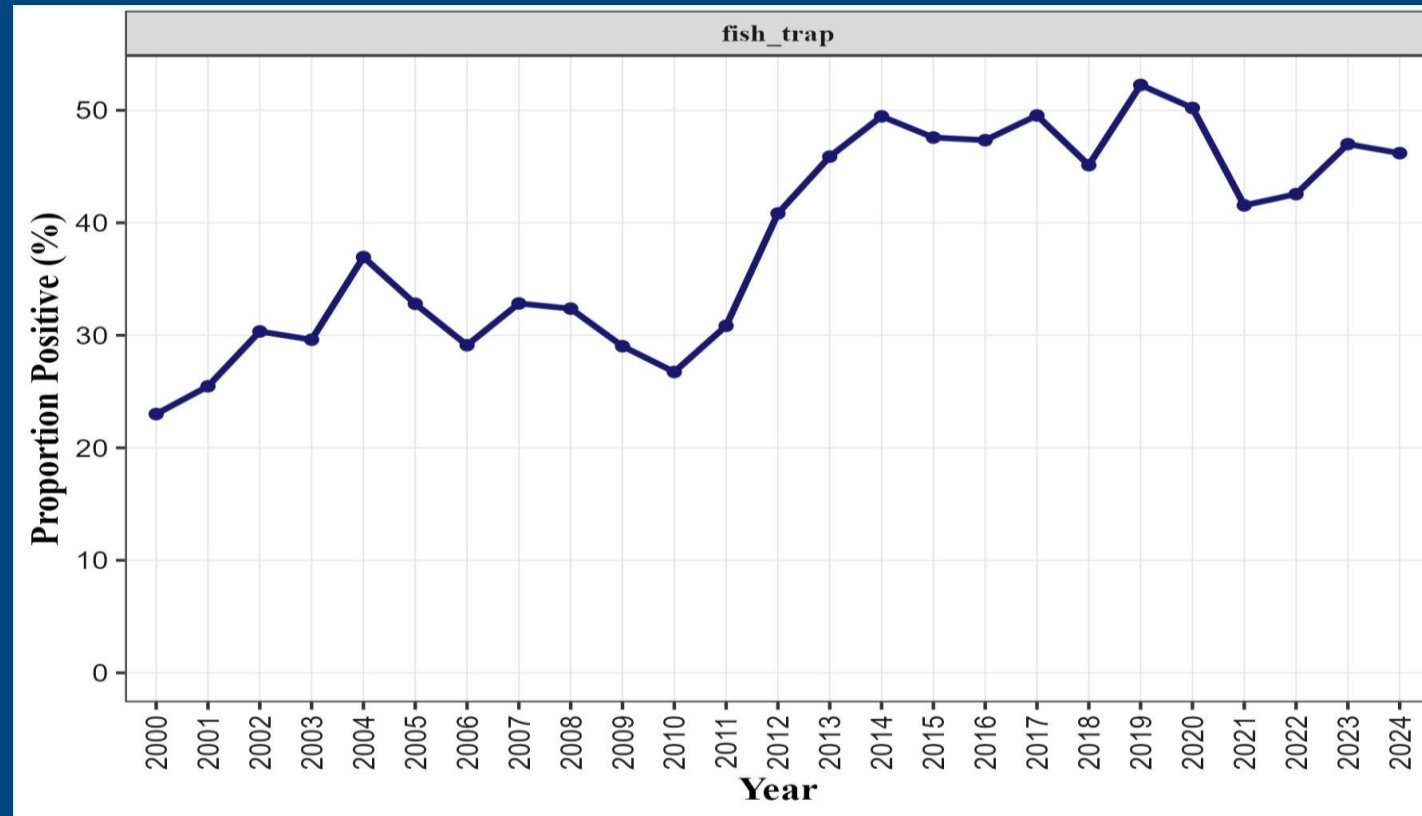


Data exploration and preparation

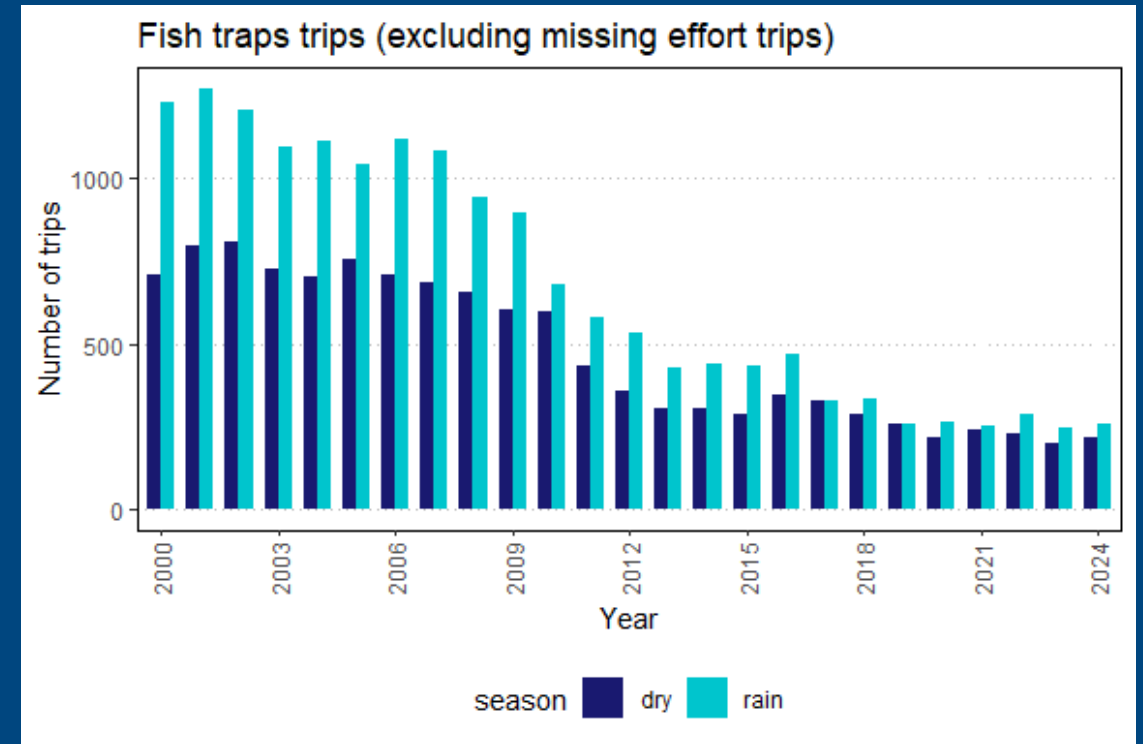
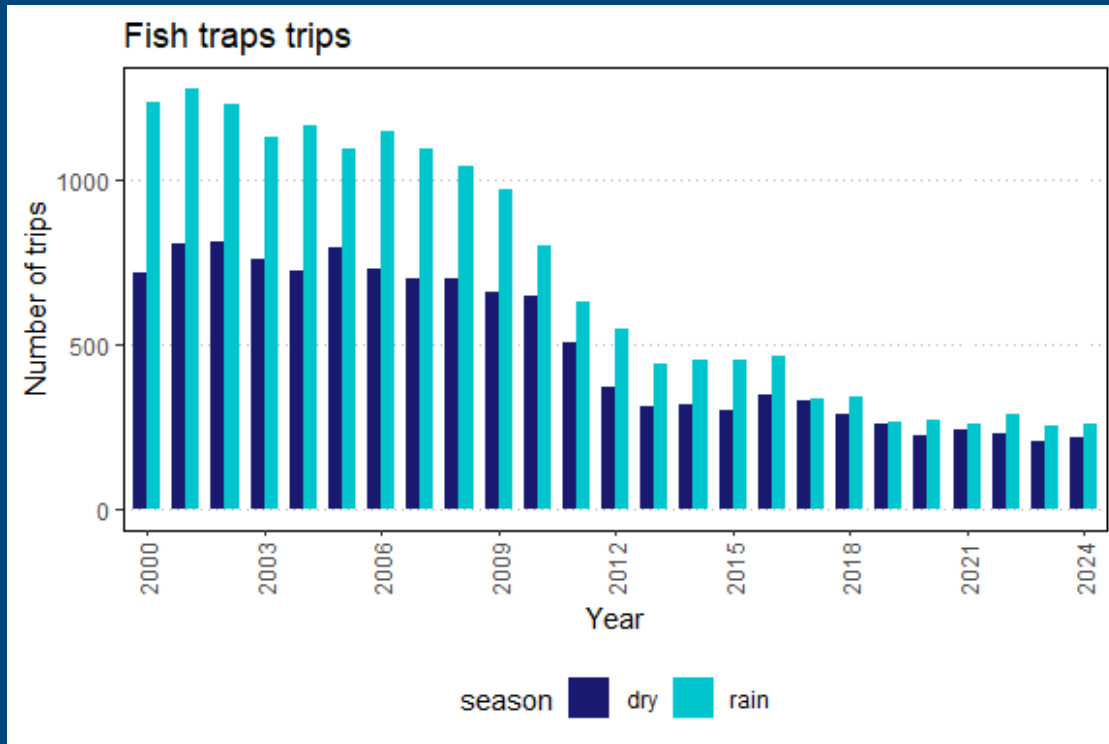
- ✓ Outlier removal – 97.5th percentile cutoff for effort data
- ✓ Data exclusions and assumptions – fish trap only trips, missing effort data trips removed, reclassification of fish traps
- ✓ Lobster trap data not used due to targeting resulting in very high proportion positive and likely hyperstability
- ✓ No data subsetting (Stephens and McCall method) due to high proportion positive by year
- ✓ Years included – 2000-2024; used classification tree to identify fish trap trips, could not be conducted on pre-2000 trips
- ✓ Seasons – December-April, dry season; May-November, wet season
- ✓ Effort – number of fish traps hauled



Proportion of fish trap trips with spiny lobster landings



Fish trap index sample size and time period



Analyses

- ✓ CPUE was modeled using the delta-GLM approach
- ✓ Combines two separate generalized linear models
 - ✓ One to describe presence/absence – Bernoulli submodel
 - ✓ One to describe catch rates of successful trips – Positive CPUE model

Analyses: Bernoulli submodel

- ✓ Stepwise AIC (Venables and Ripley 1997) with a backwards selection algorithm was used to eliminate those variables that did not improve model fit
- ✓ Fish trap model:

$CPUE \sim YEAR + SEASON + GEAR_QUANTITY$



Analyses: Positive CPUE submodel

- ✓ Two parametric distributions were considered for modeling positive values of CPUE, lognormal and gamma
 - ✓ **Lognormal** outperformed gamma
- ✓ Stepwise AIC (Venables and Ripley 1997) with a backwards selection algorithm was used to eliminate those variables that did not improve model fit
- ✓ Fish trap model:

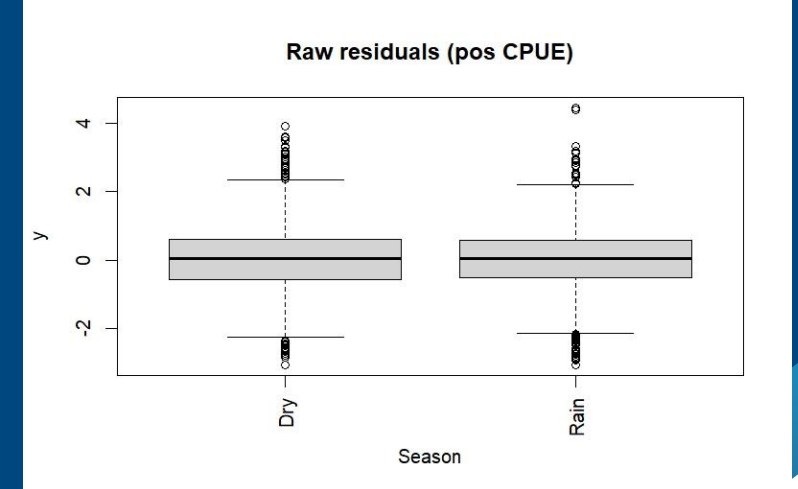
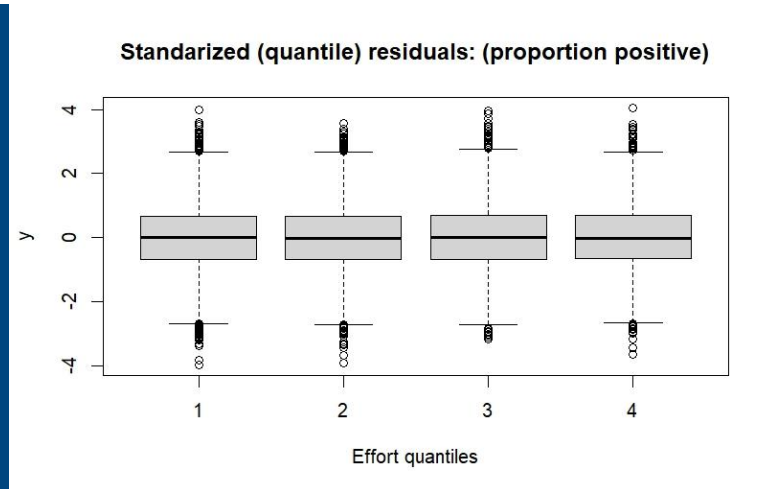
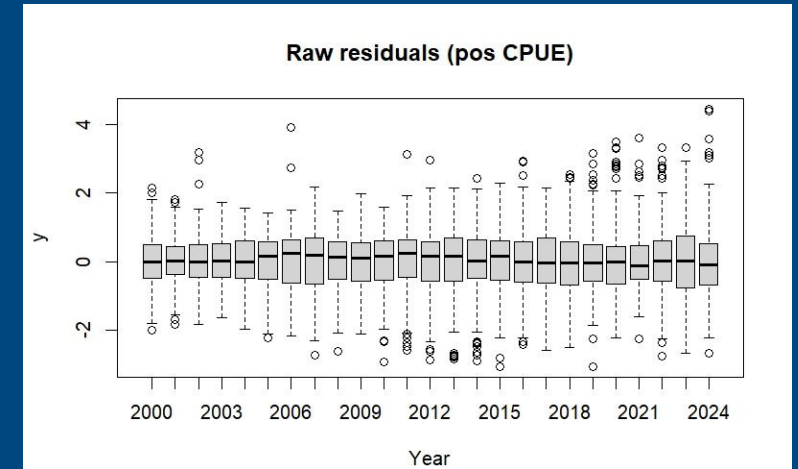
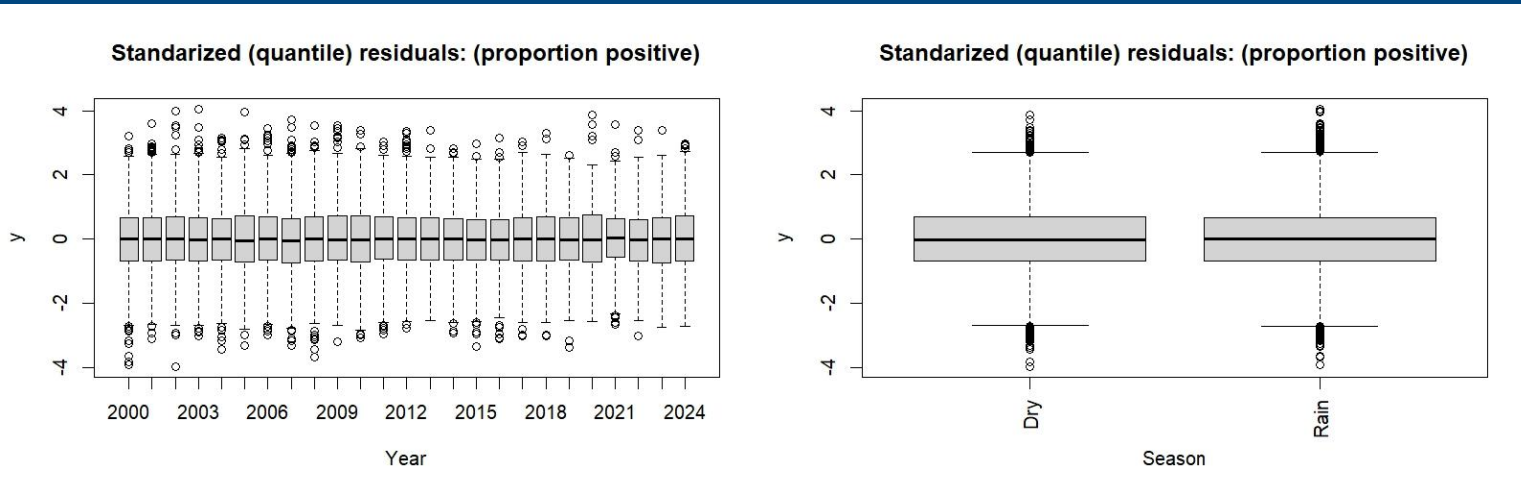
$$\text{CPUE} \sim \text{YEAR} + \text{SEASON}$$



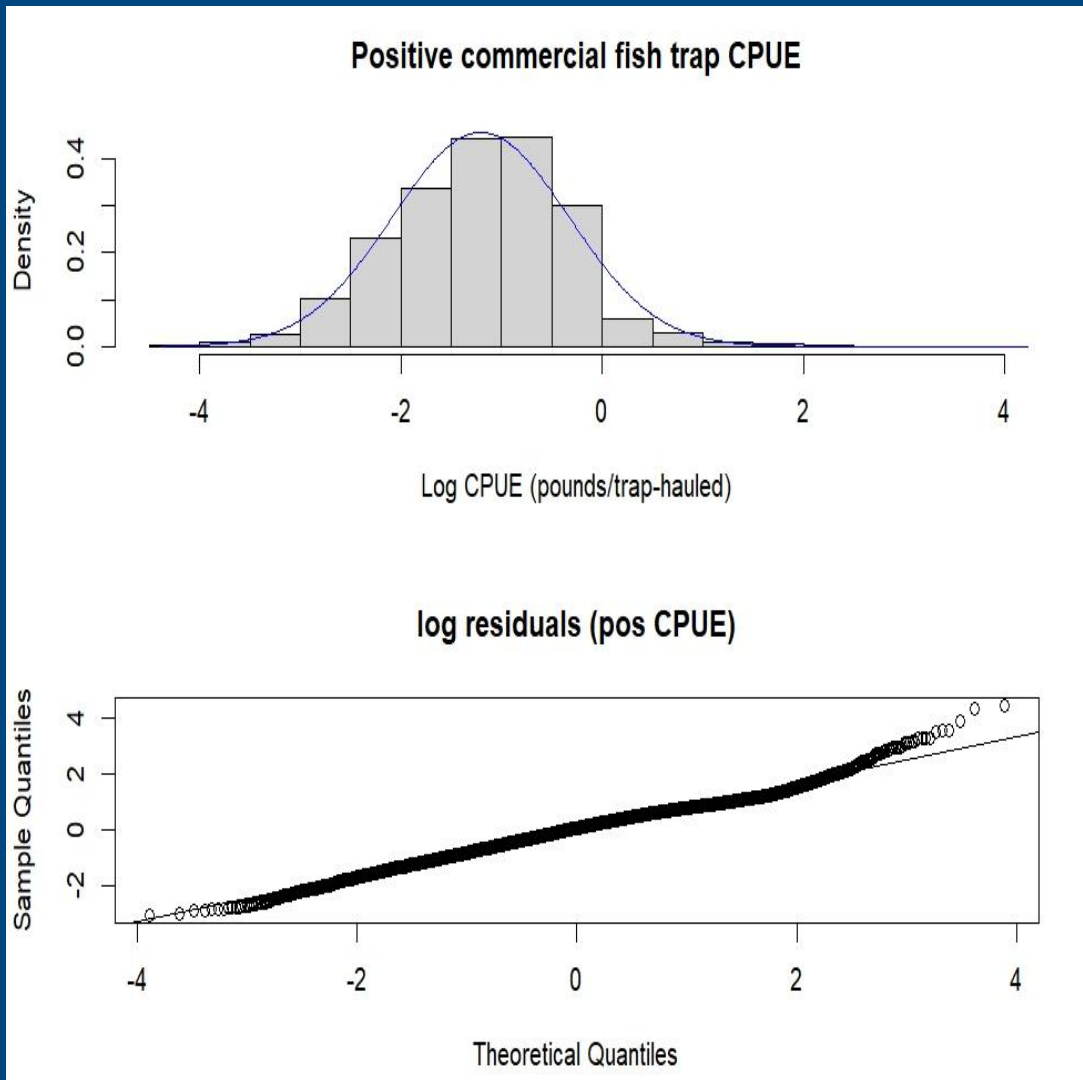
Fish Trap Index: diagnostics

Bernoulli submodel: fits to binomial data

Lognormal submodel fits to positive CPUE data



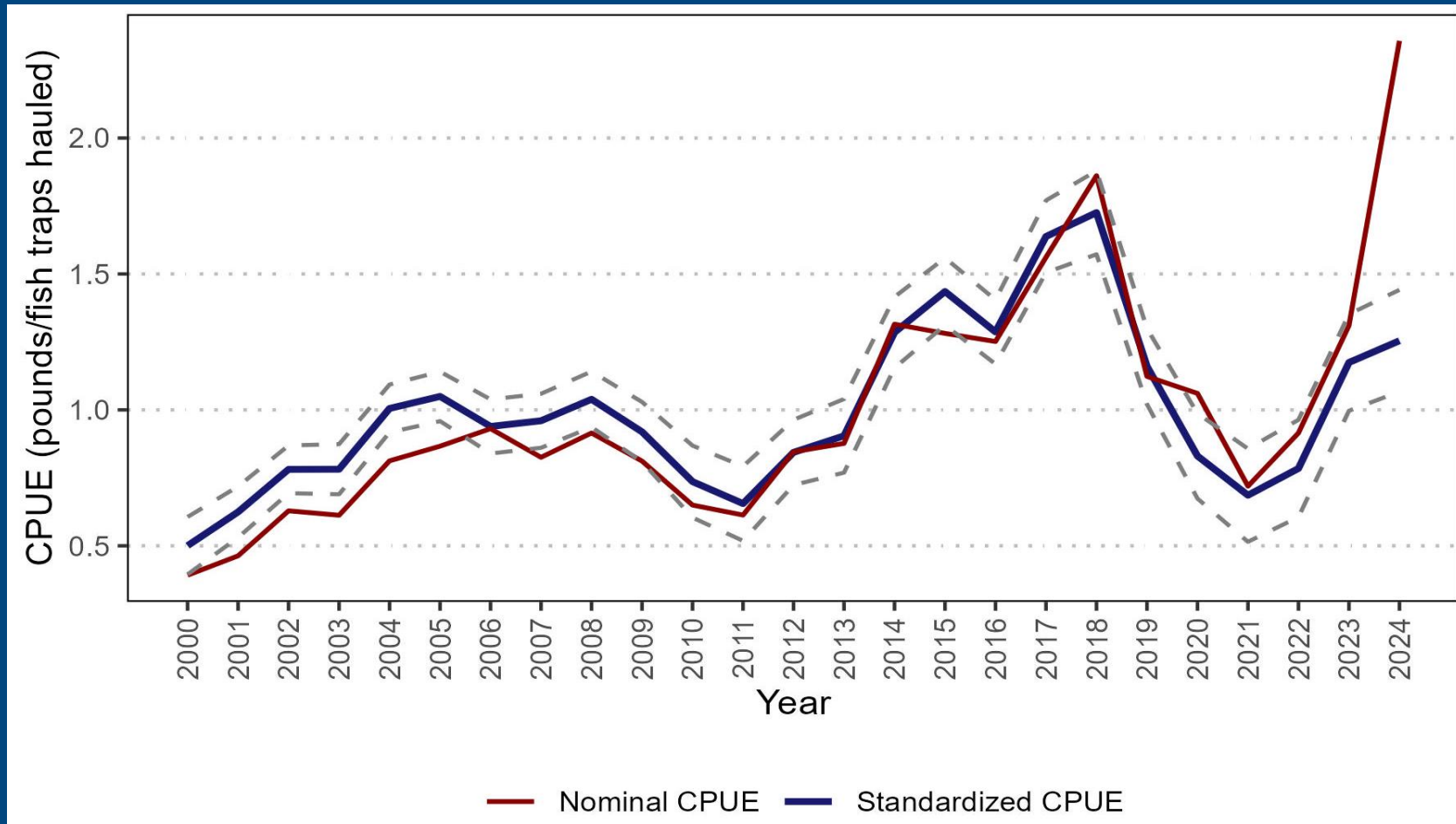
Fish Trap Index: diagnostics



Top left - Histogram of empirical CPUE with the lognormal distribution overlaid

Bottom left - Quantile-quantile plot of residuals from the fitted lognormal submodel to the positive cpue catch

Standardized Index: Fish Trap



A vibrant underwater photograph of a coral reef. The scene is filled with various types of coral, including branching and leafy varieties, in shades of brown, orange, and green. Several small, colorful fish are visible swimming in the clear blue water. The overall atmosphere is bright and healthy.

Thank you!

¡Gracias!



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