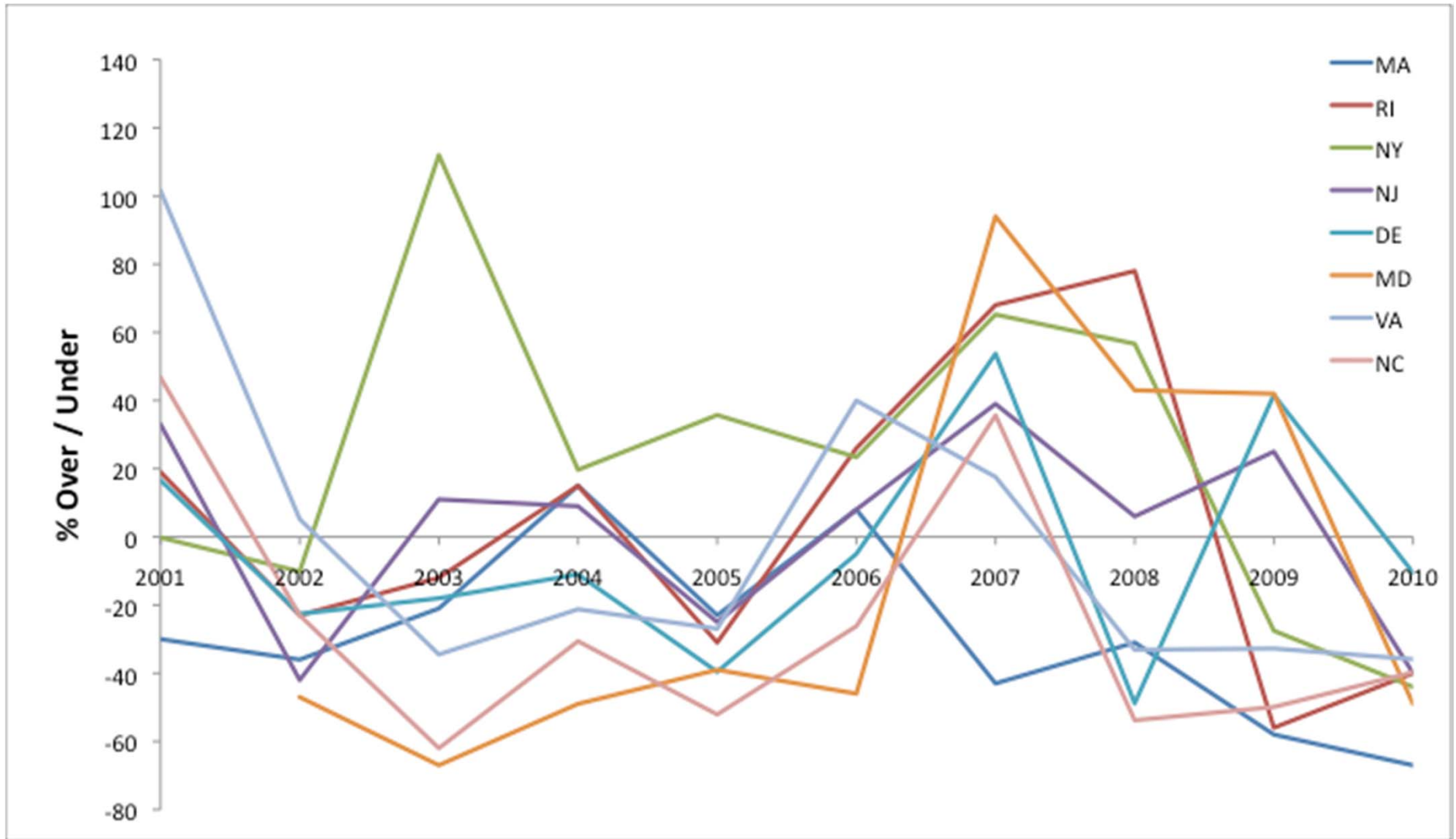


Evaluation of Management and Regulatory Options for the Recreational Summer Flounder Fishery

John Wiedenmann, Michael Wilberg, Eleanor Bochenek, John Boreman, Bruce Freeman, Jason Morson, Eric Powell, Brian Rothschild, Pat Sullivan

Recreational Landings Relative to Target



Recreational Fishery Effects on Females

- Higher minimum size limits target females
- Recreational fishery may disproportionately harvest females

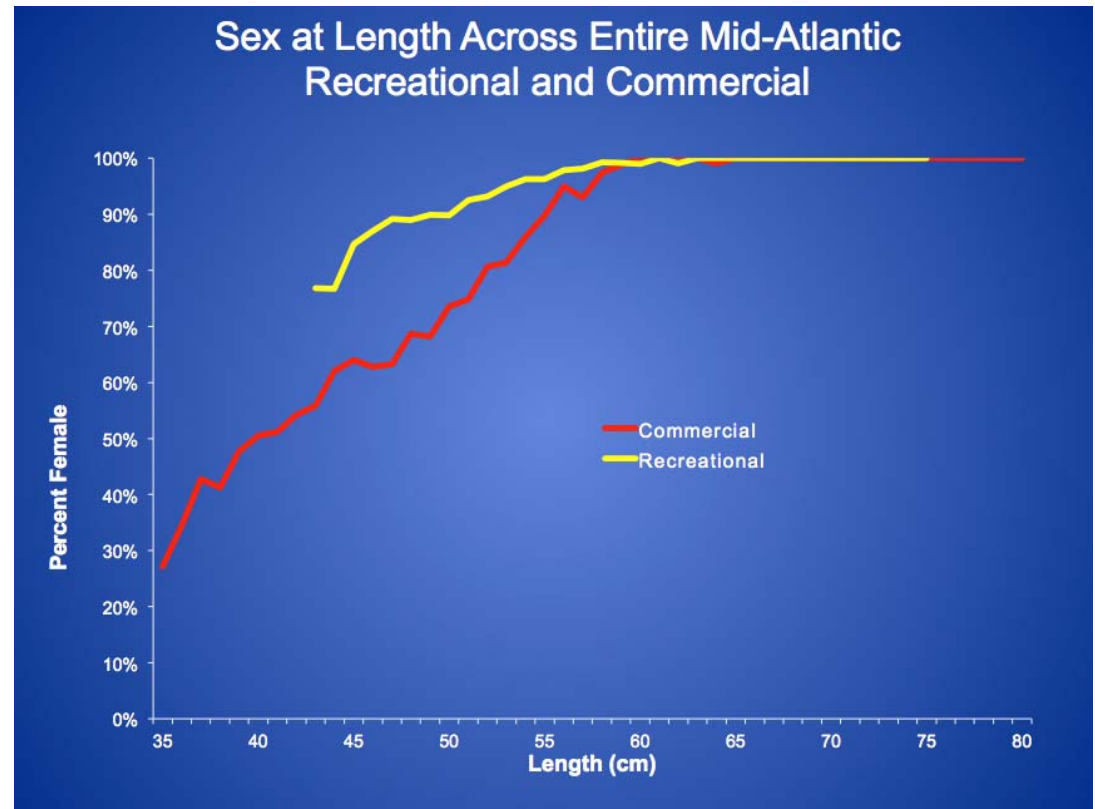


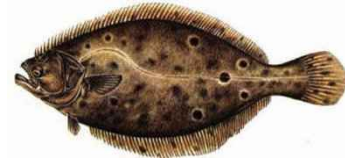
Figure provided by Jason Morson et al.

Objective

- Test management options for the summer flounder recreational fishery using a simulation model
 - Understand the effects of the current and alternative regulations on population and recreational fishery
 - Identify effective buffer sizes for setting the ACT to reduce overages and penalties
 - Determine the effectiveness of an alternative approach for setting regulations that accounts for changes in weight and harvest per angler with changes in size limits.

Management Strategy Evaluation (MSE)

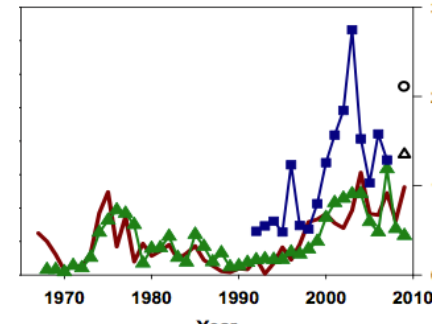
Summer Flounder Population Dynamics



Management Process



Generate Data



Stock Assessment



Evaluate Performance of Management Actions

Model Structure

- Age, sex, length, and spatially structured population dynamics
- North – South areas
- Seasonal timestep
- Commercial and Recreational Fisheries

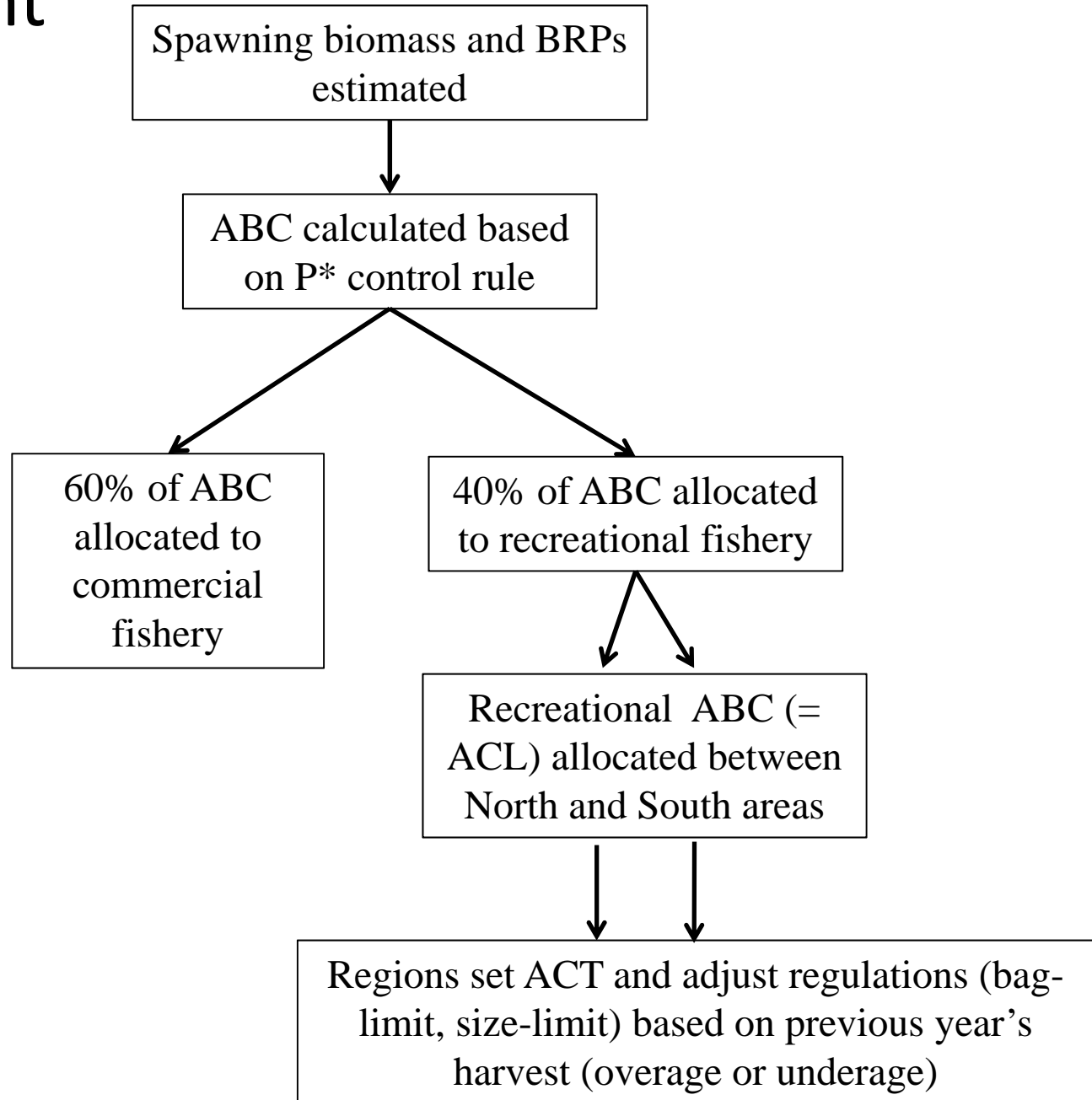


Spatial Dynamics



- Population aggregated offshore for half the year
 - Commercial fishery only
- Population migrates inshore to N or S regions for half the year
 - Recreational and commercial fisheries
 - Migration age- and sex-dependent

Management Steps



Fishing Mortality
(Effort + success)



Bag Limits determine
fishing effort

Size limits affect the
amount retained

Discard Survival

Population

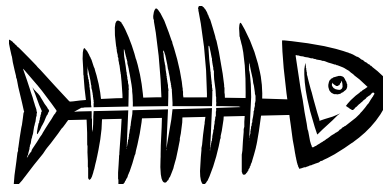
Total Catch

Discarded Catch

Retained Catch (Harvest)

Discard Mortality

Total Removals (Harvest + Dead Discards)



Model Runs

- Project population for 25 years (starting in 2010)
- Recreational regulations determined each years based on target and last year's harvest
 - Changing only bag limit, coastwide min. size = 17 in
 - Changing bag and min. size limits (status quo approach and new approach)
 - Changing bag and slot size limits (status quo approach and new approach)
 - Bag limit ≥ 2 , Min. size ≤ 21 in., Slot size range ≥ 3 in.
- Buffer Sizes
 - Regional ACT = 100%, 90% and 80% of ACL

Model Runs

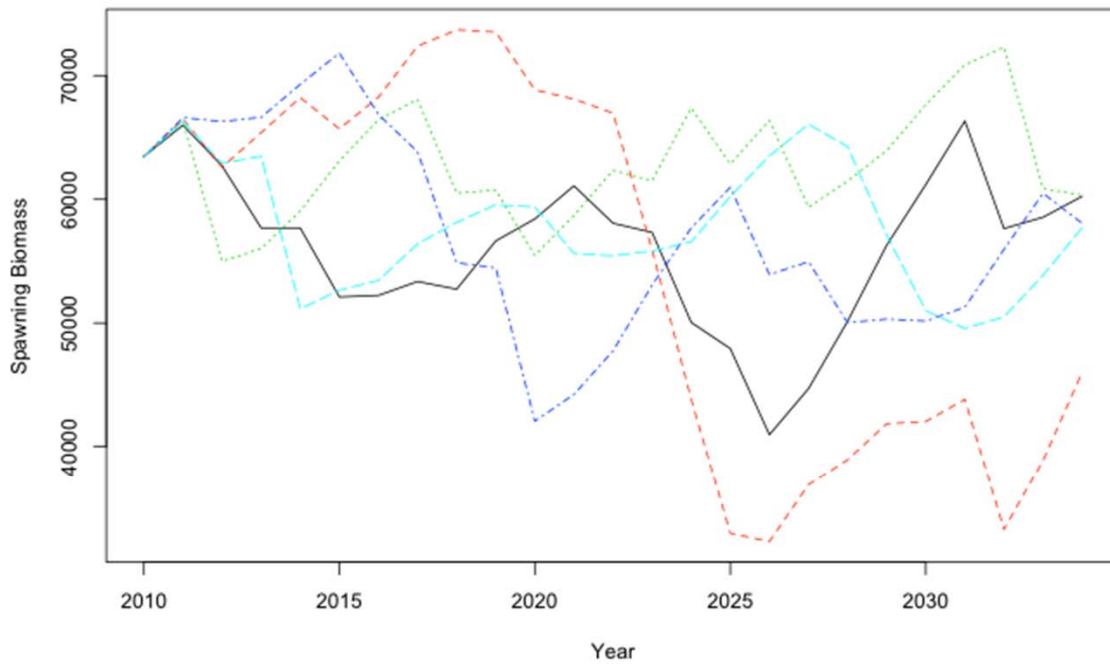
- Status quo and “new” approach for setting regs.
 - Status quo approach designed to approximate what the states are doing and does not account for changes in weight and harvest per angler with changing size limits
 - new approach includes the effects of changing size regulations
- Model run 1000 times for each scenario to account for randomness (recruitment, migration, harvest estimates, assessment uncertainty, angler effort, angler success) and performance summarized for each run

Example Performance Measures

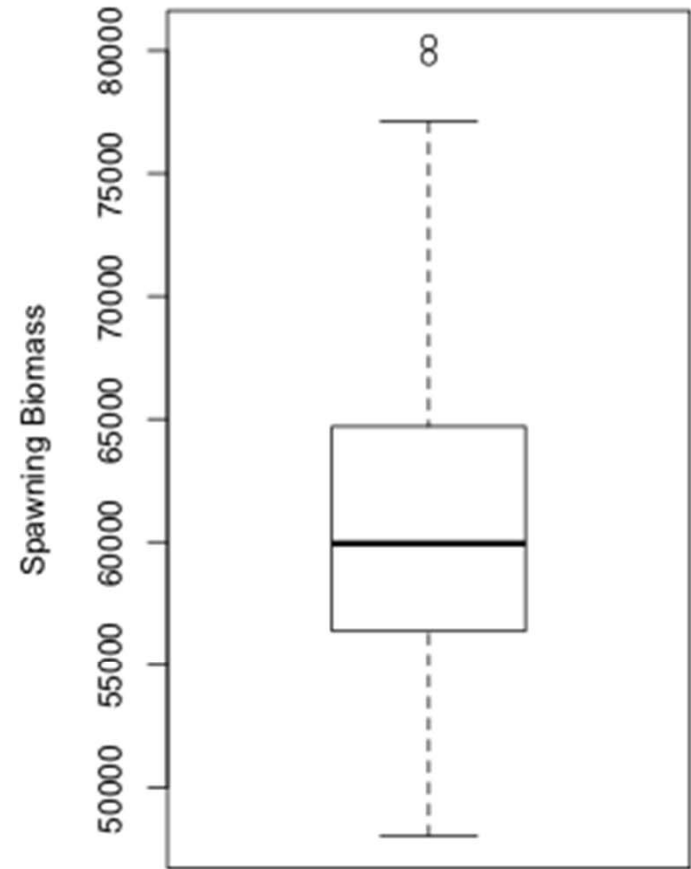
- Mean Spawning Biomass
- Proportion female in landings
- Proportion Female in Spawning Biomass
- Mean Recreational Landings + Discards
- Harvest / ACL
- Proportion of years and size of overages
- Proportion of years and size of penalties

Calculating Performance

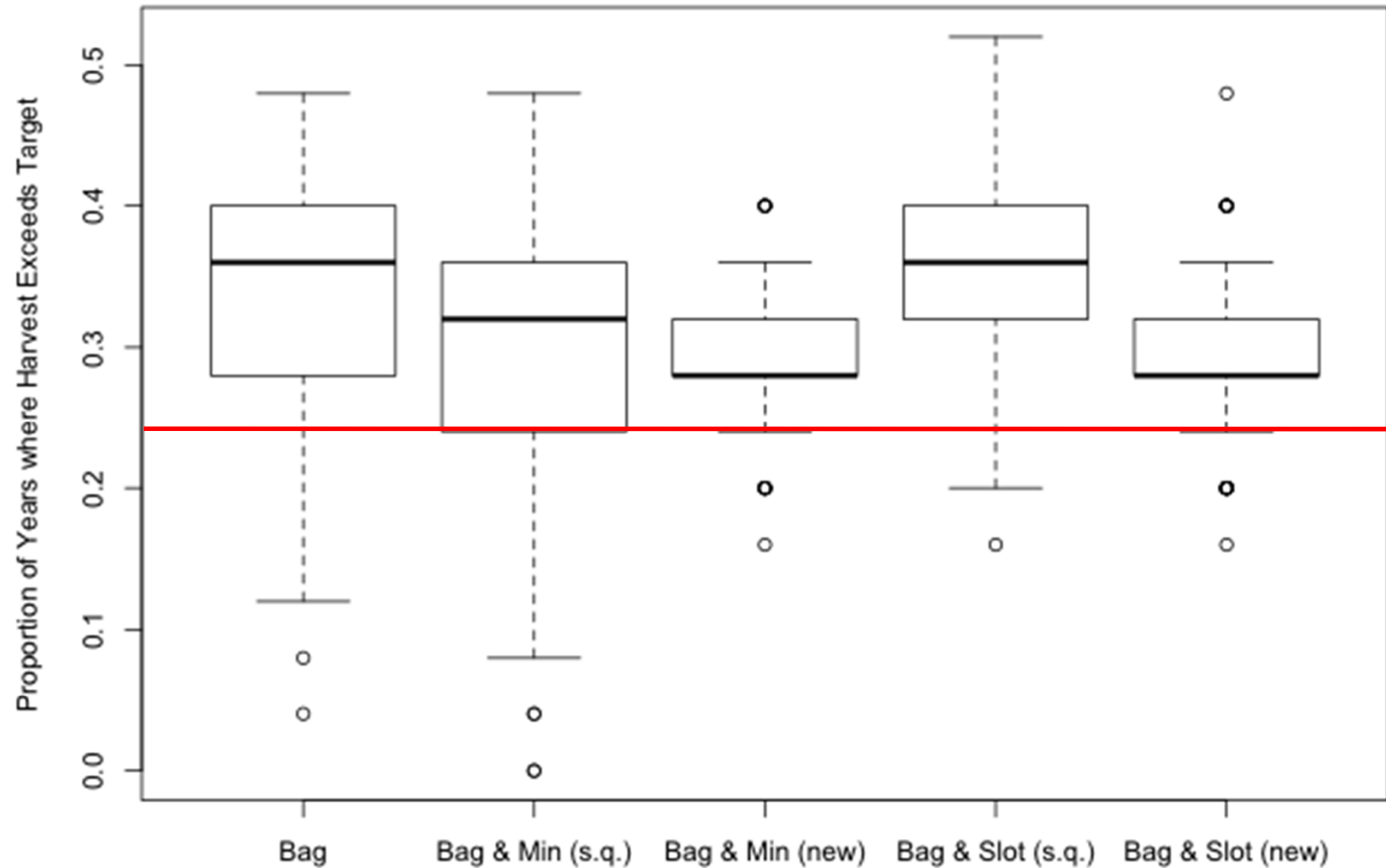
Mean biomass over individual runs



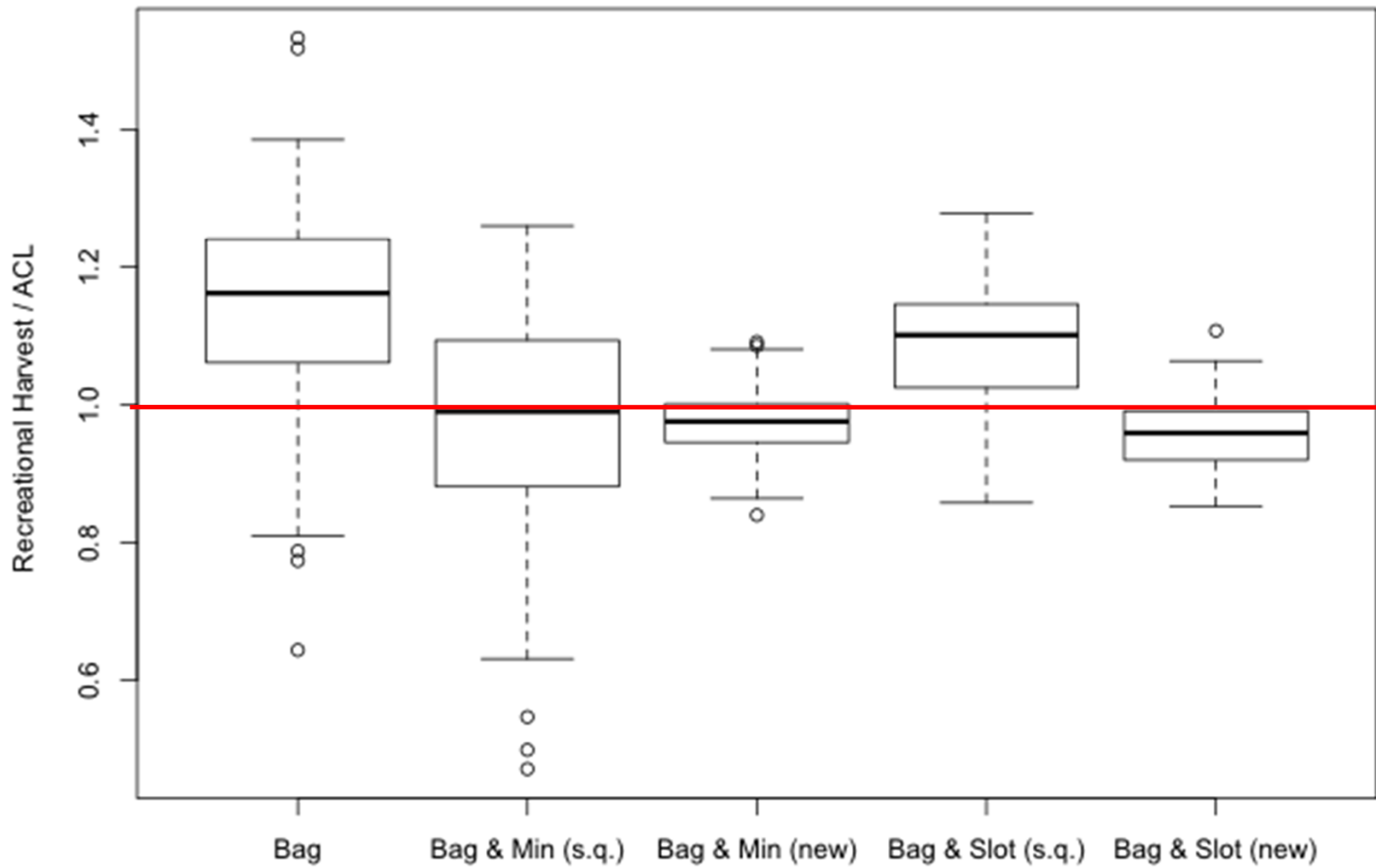
Distribution of Means



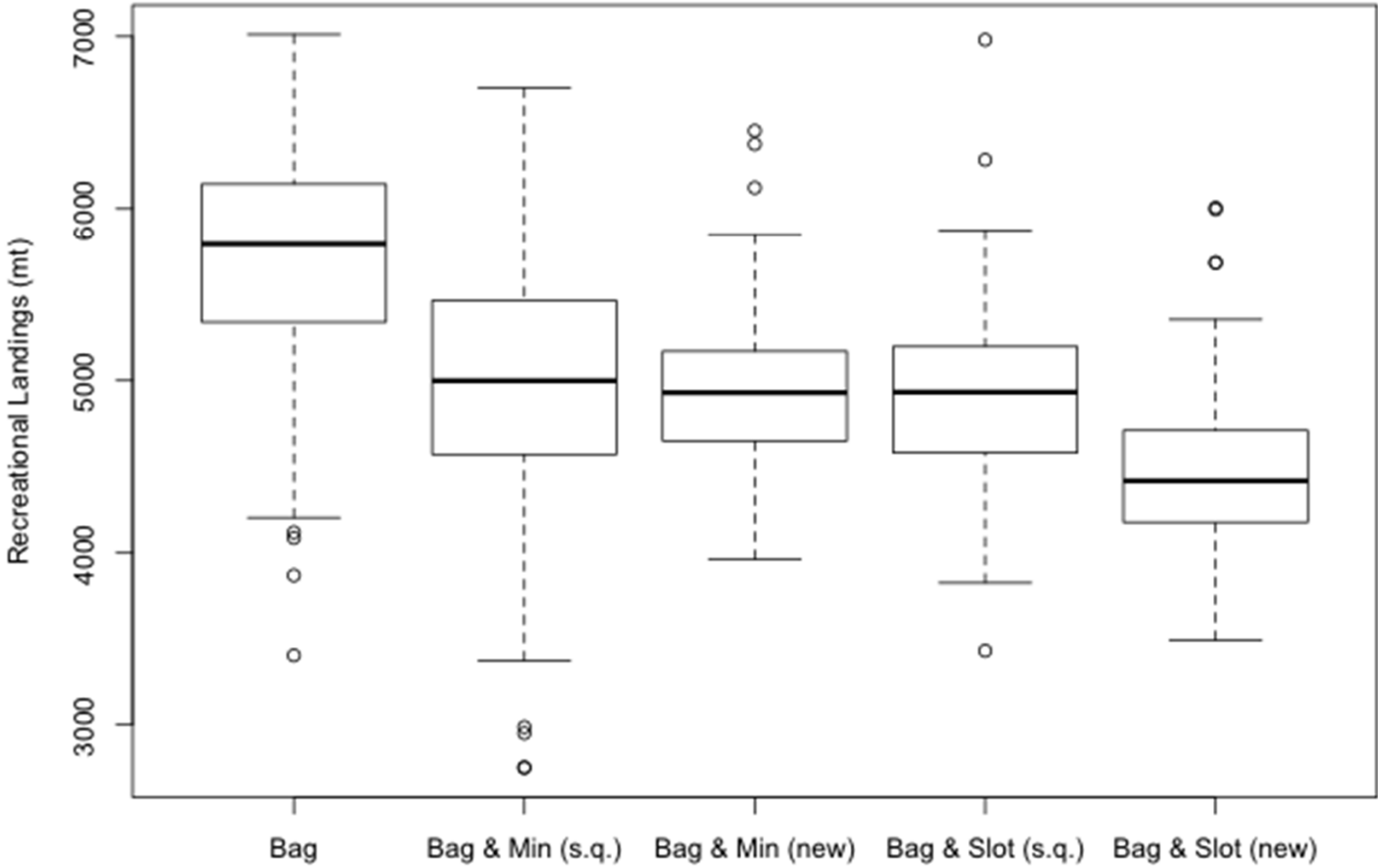
Proportion of Years with Overages



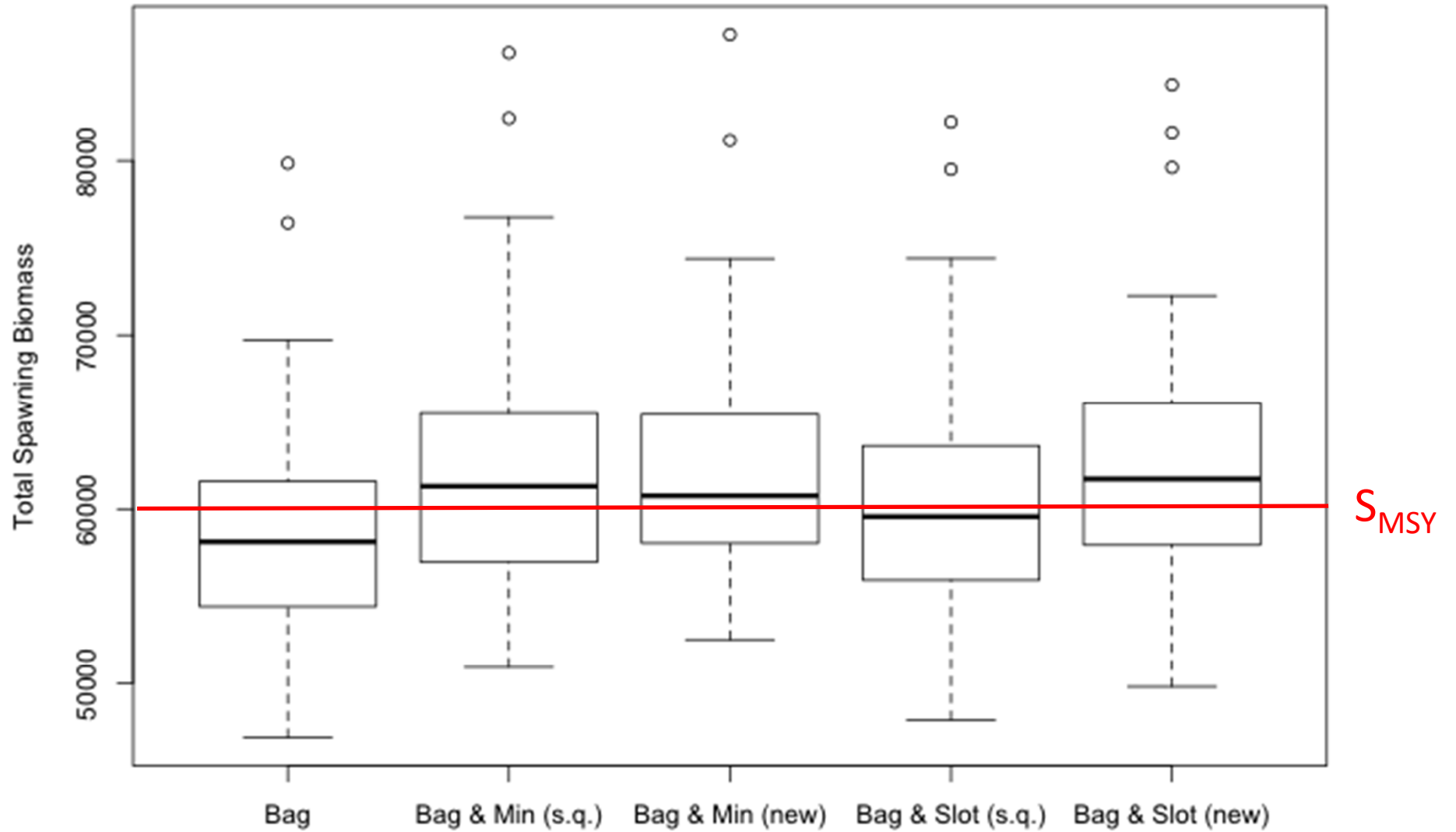
Harvest / ACL



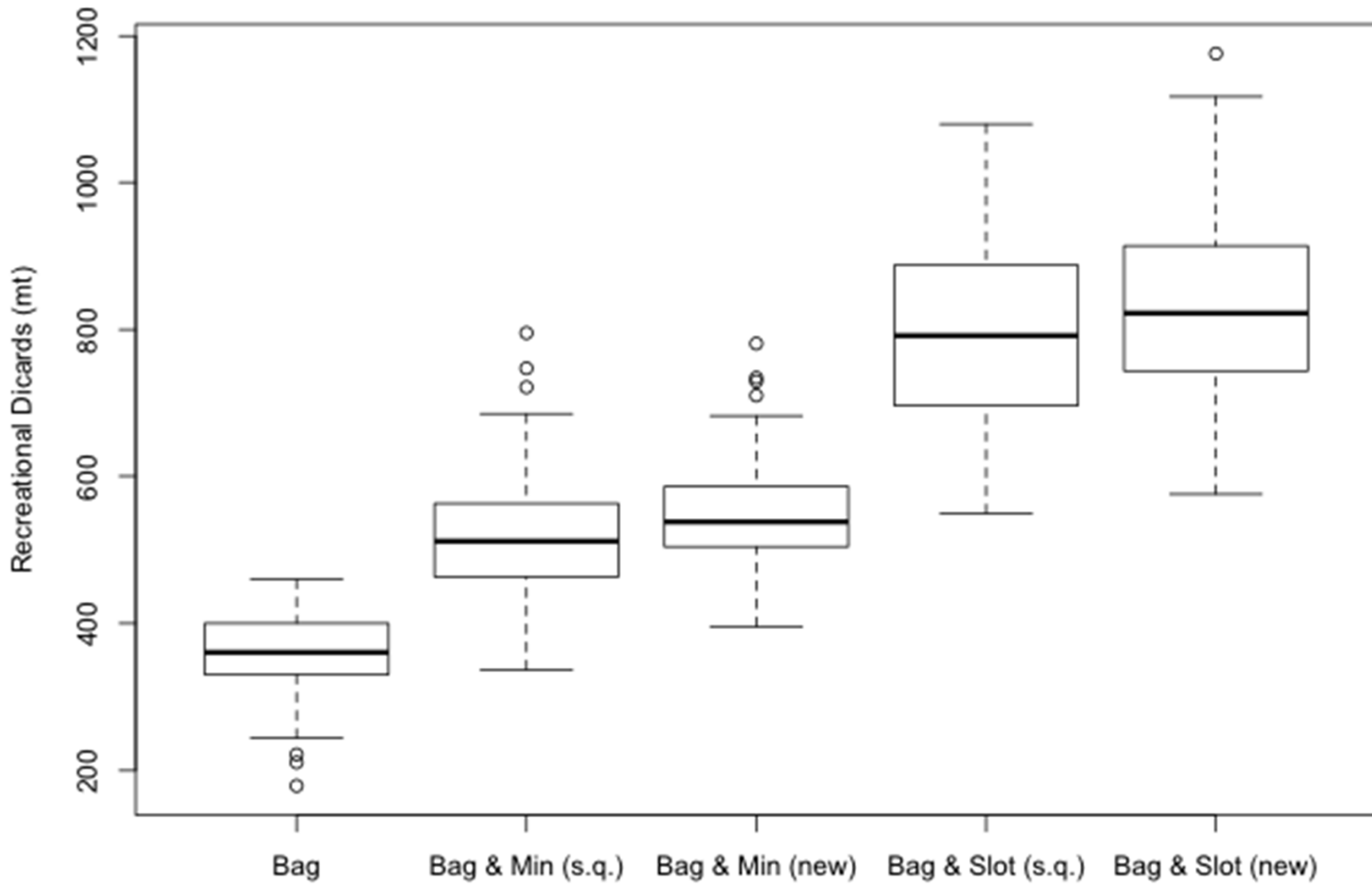
Recreational Landings



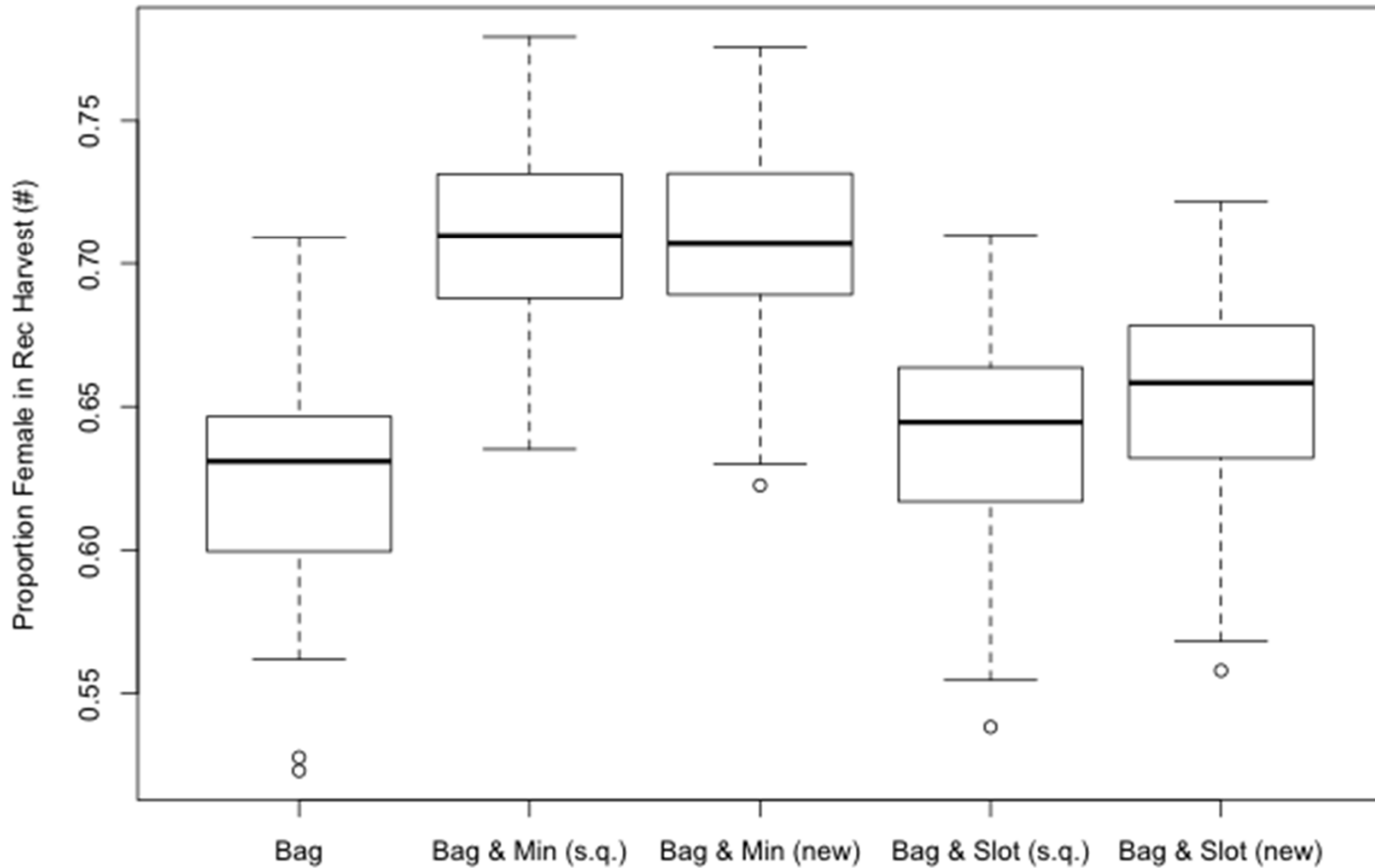
Spawning Biomass



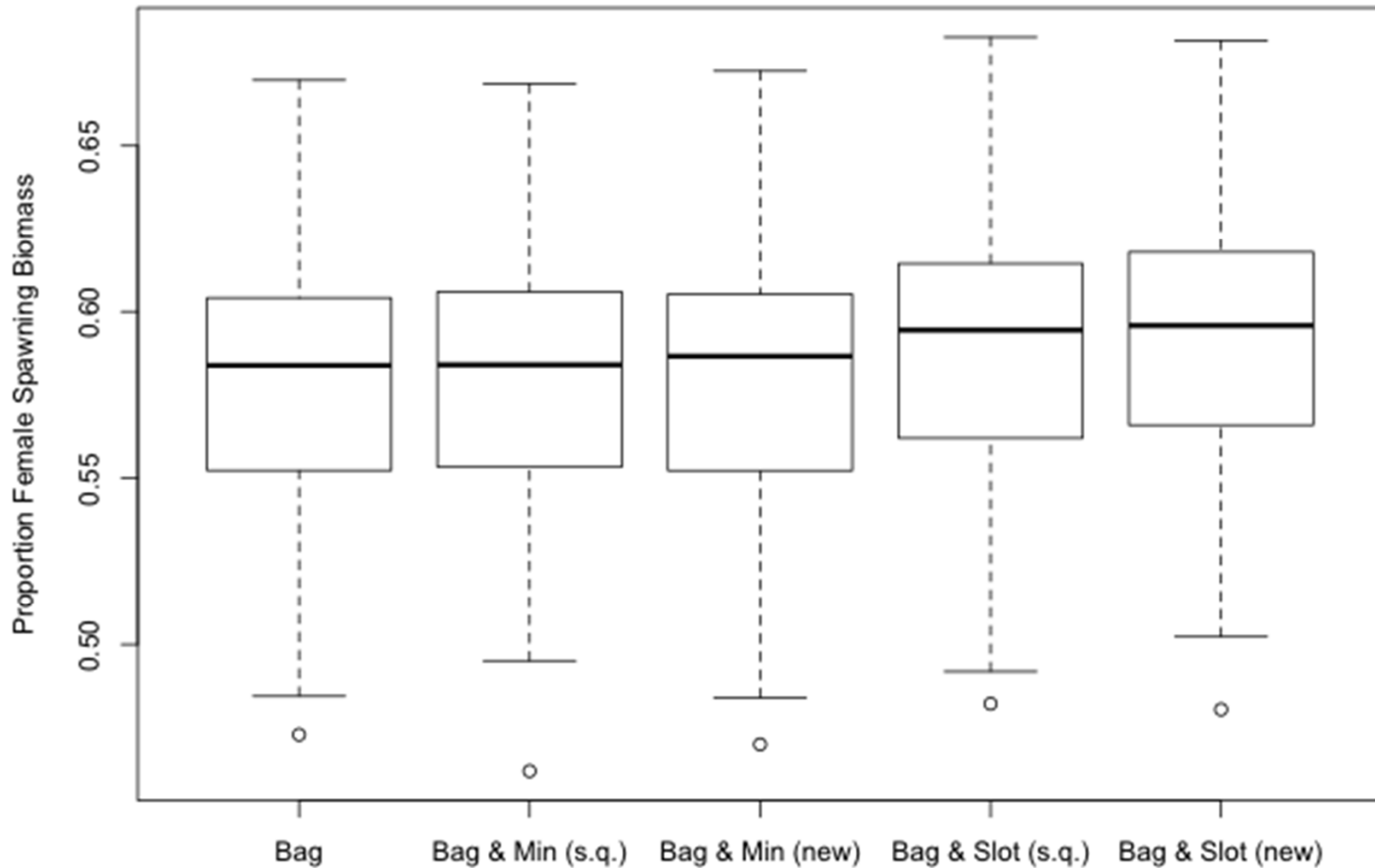
Recreational Discards



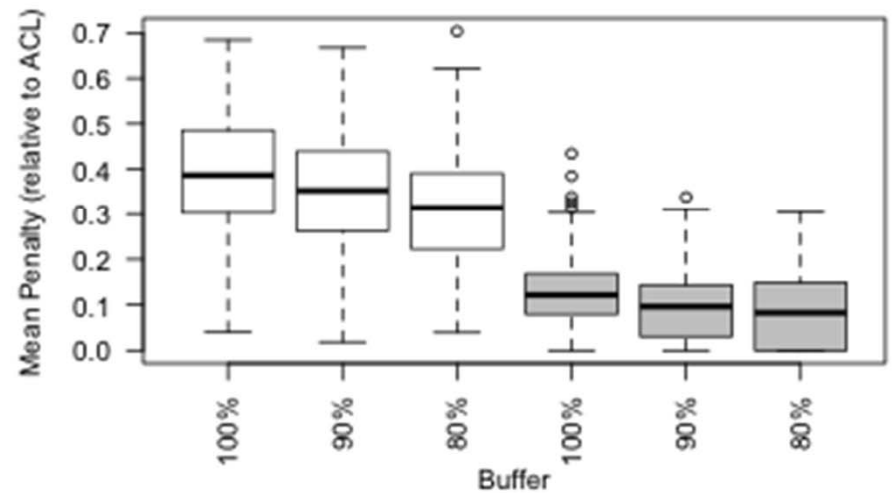
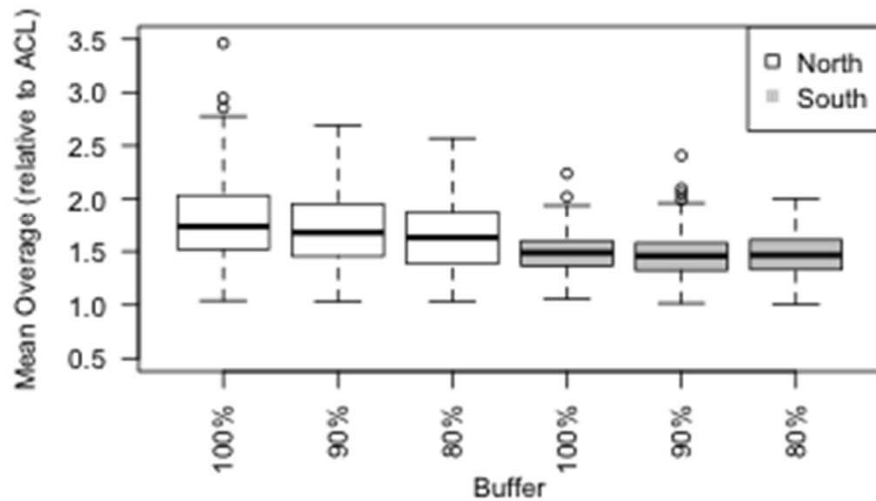
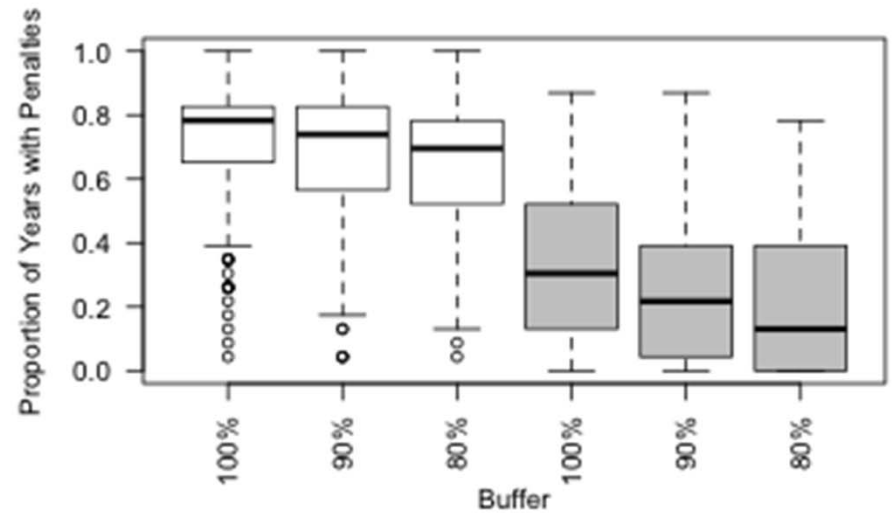
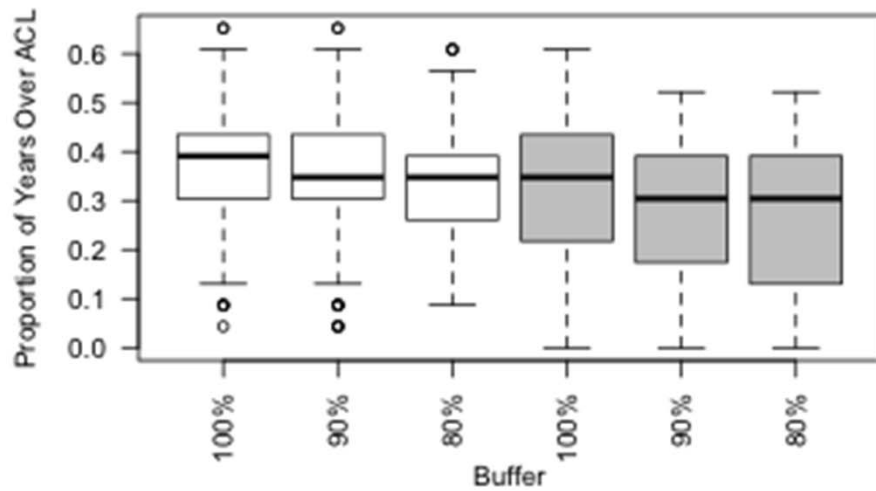
Proportion Female in Rec. Landings



Proportion Female in Spawning Biomass



Overages and Penalties



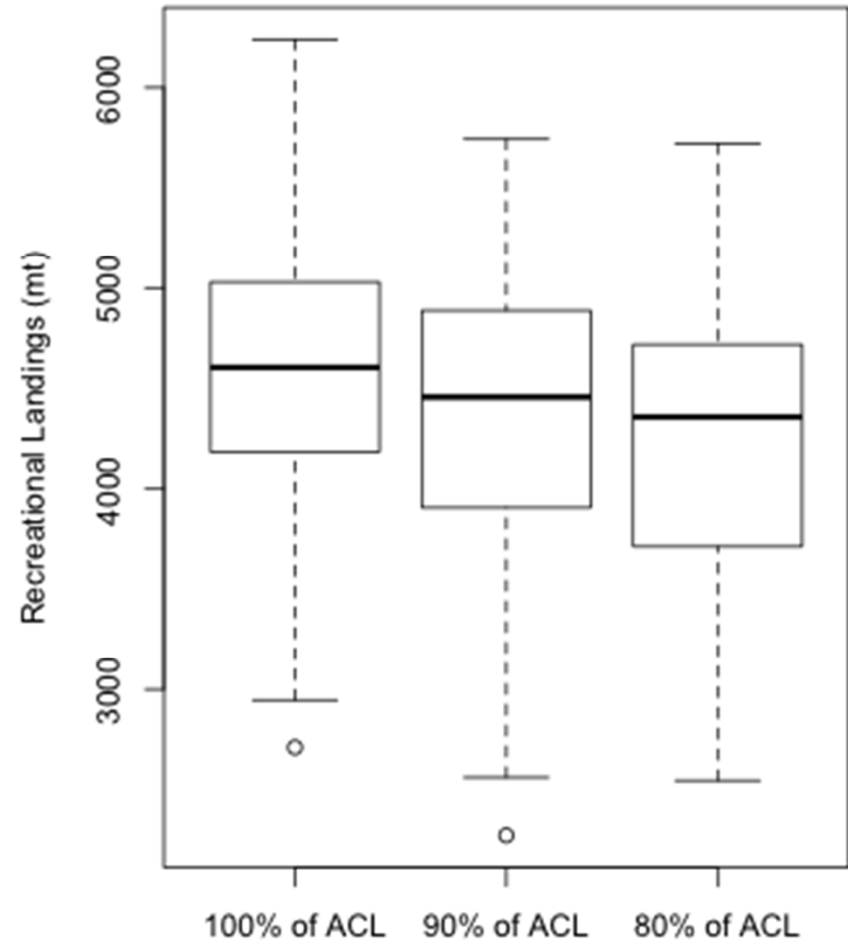
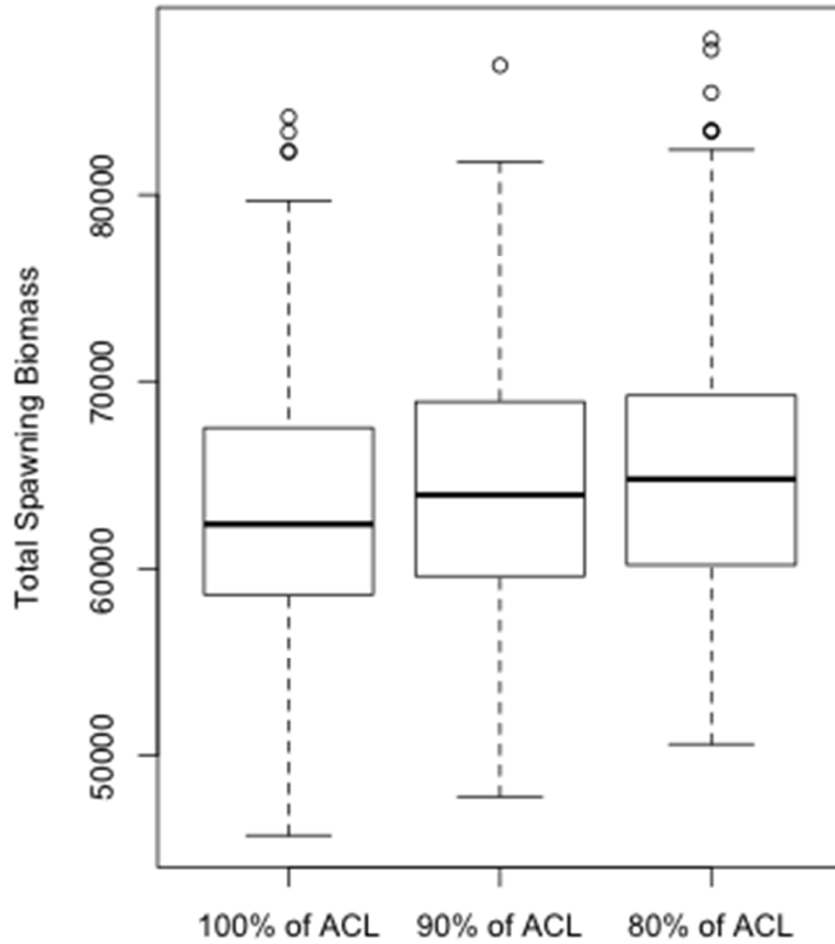
Summary

- Small differences in mean spawning biomass and proportion female in the population
- Slot size limits harvest fewer females, but result in higher discards (by wt) and more overages
- “New” approach more closely achieves the ACL

- Larger buffers result in:
 - Fewer and smaller overages
 - Fewer and smaller penalties

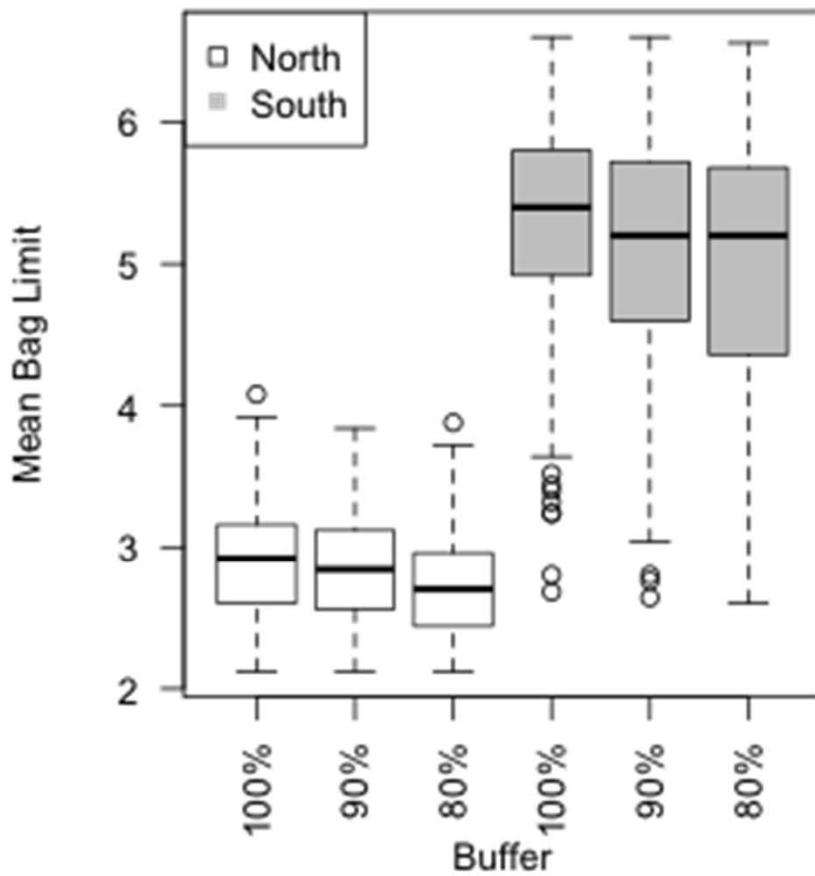
- Regionally:
 - South region has fewer and smaller overages, resulting in fewer and smaller penalties

Effects of Buffers

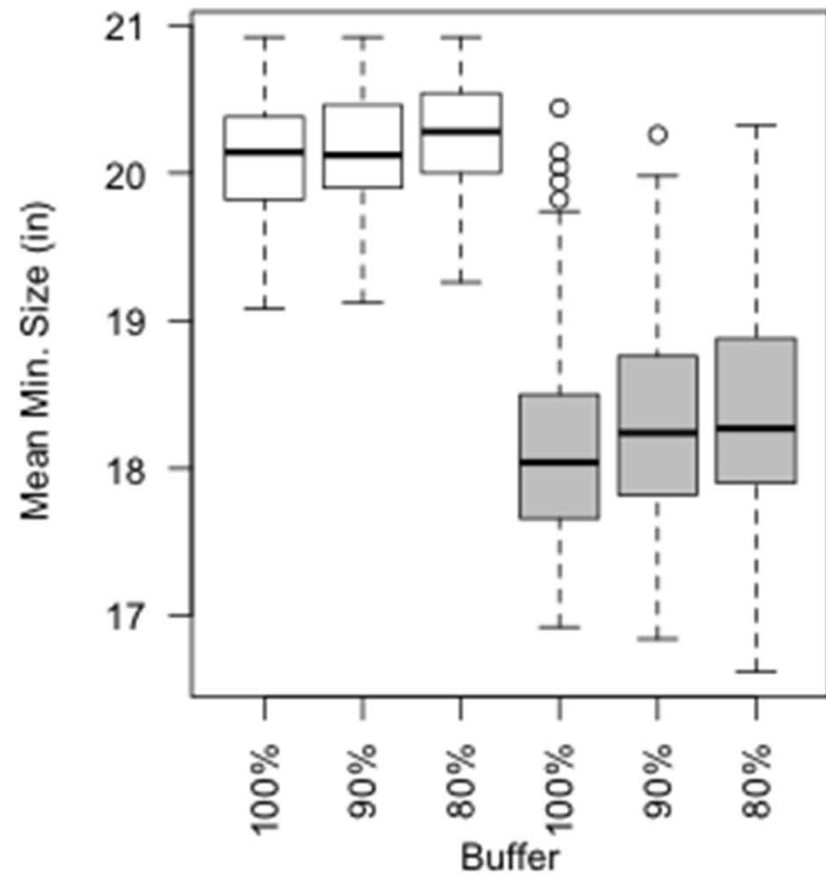


Regional Regulations

Bag Limit

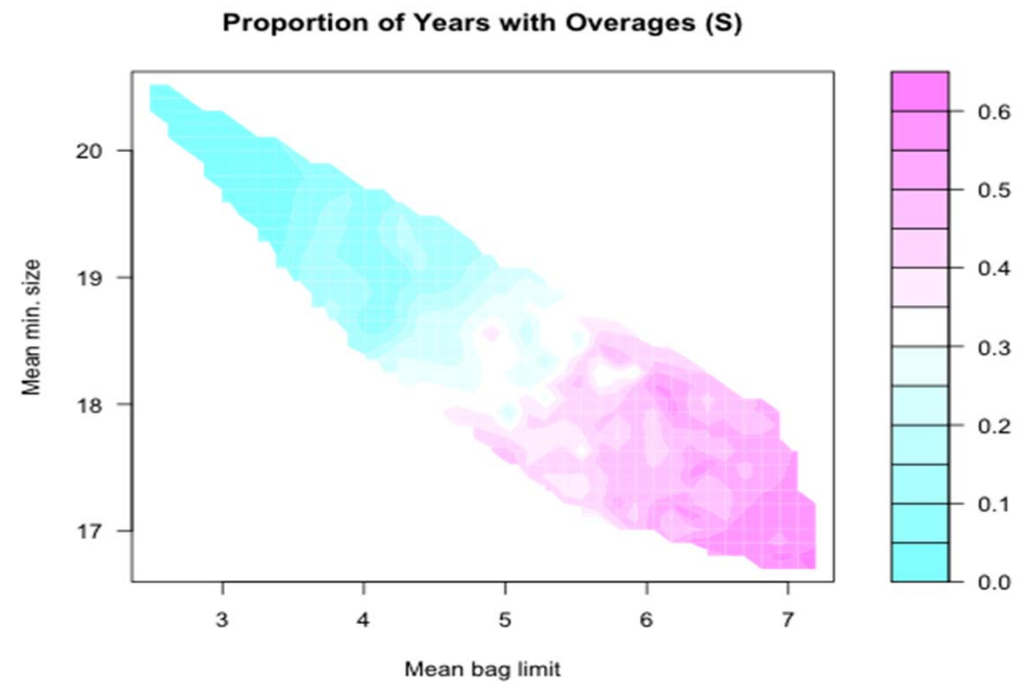
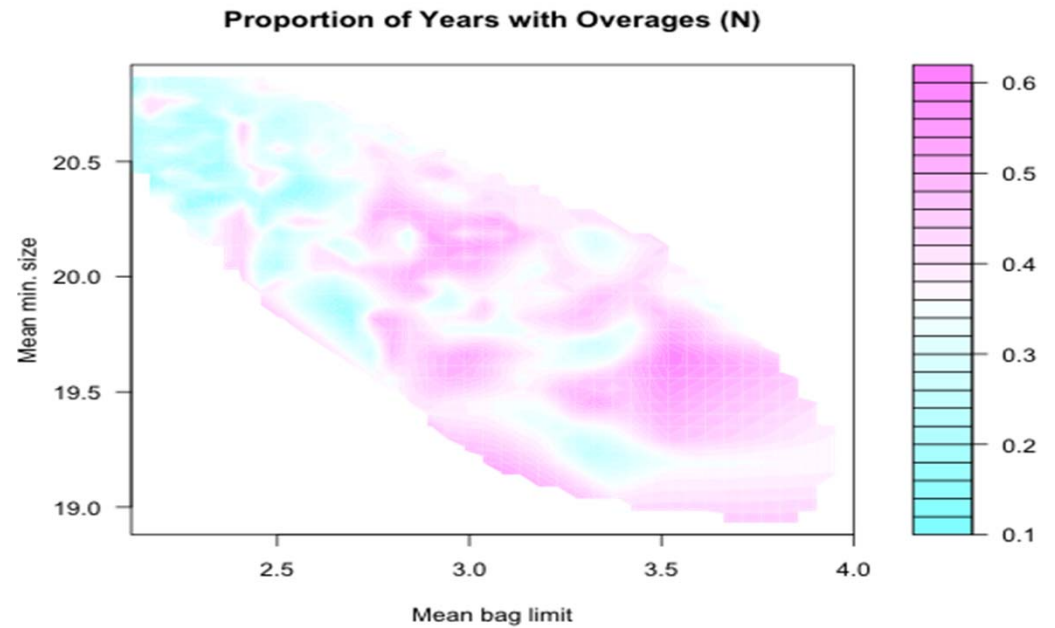


Minimum Size Limit



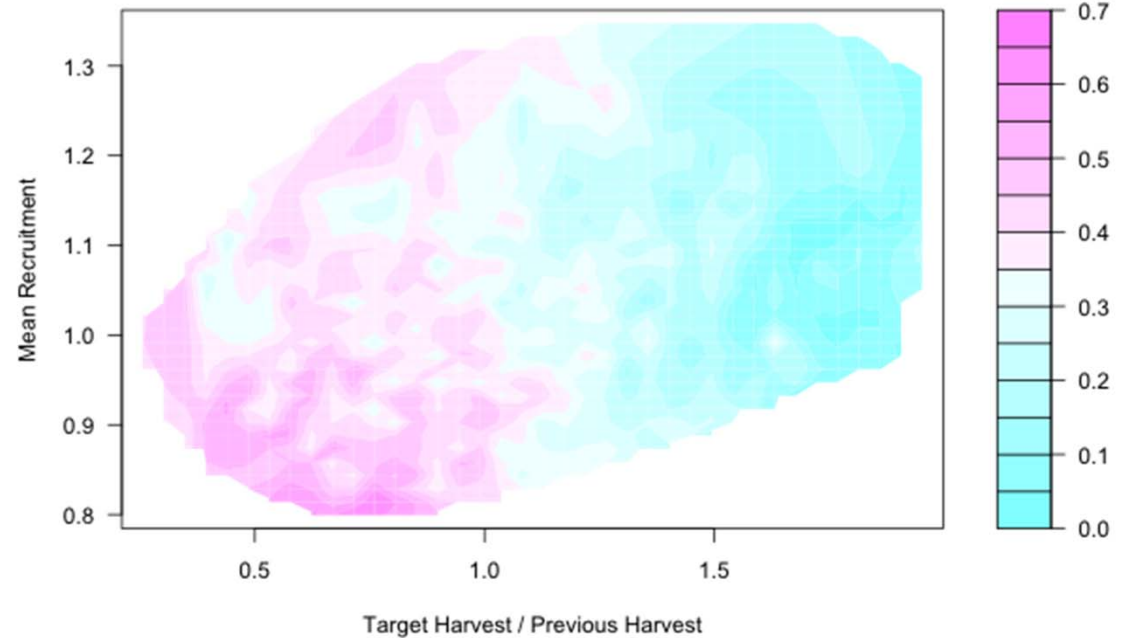
- Large and frequent overages and underages
- Penalties now enacted for overages (3-yr average)
- Current methods for setting regulations (bag / min. size limits) do not account for:
 - Changes in weight of landed fish with changes in size limits (+)
 - Changes in harvest per angler with size limits (-)

Effects of Regulations on Overage frequency

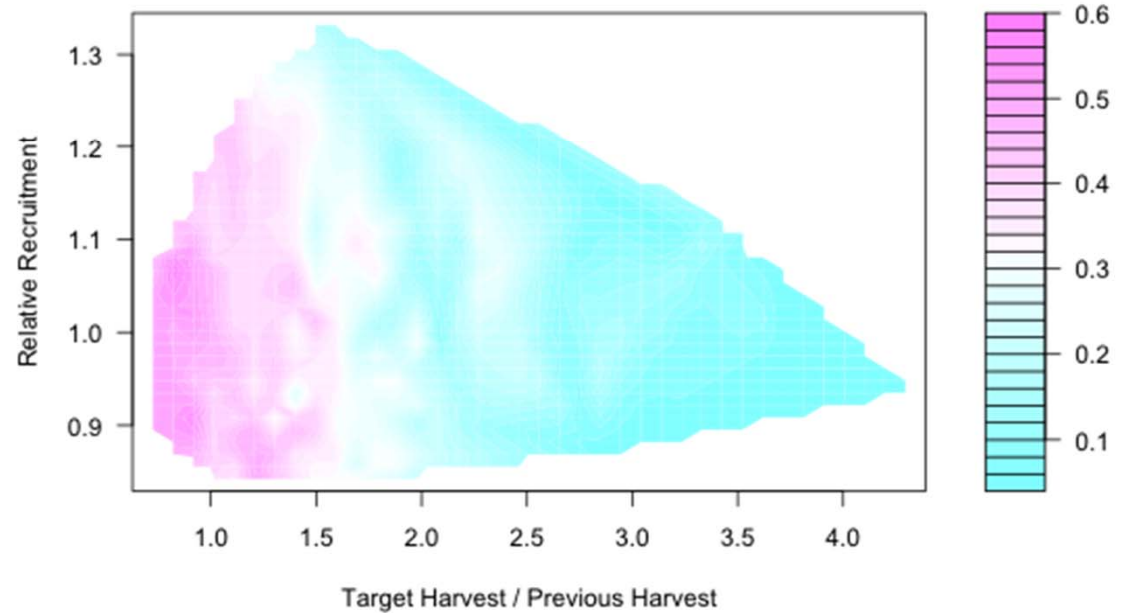


Effects of Recruitment and changing regulations (liberalization vs. restriction) on overage frequency

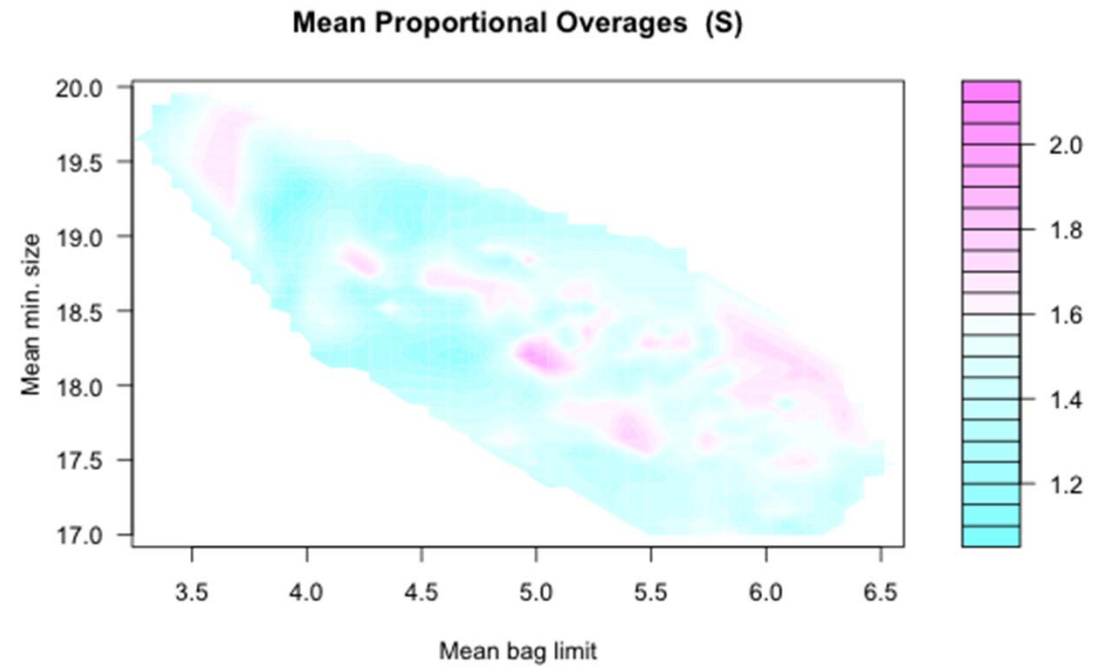
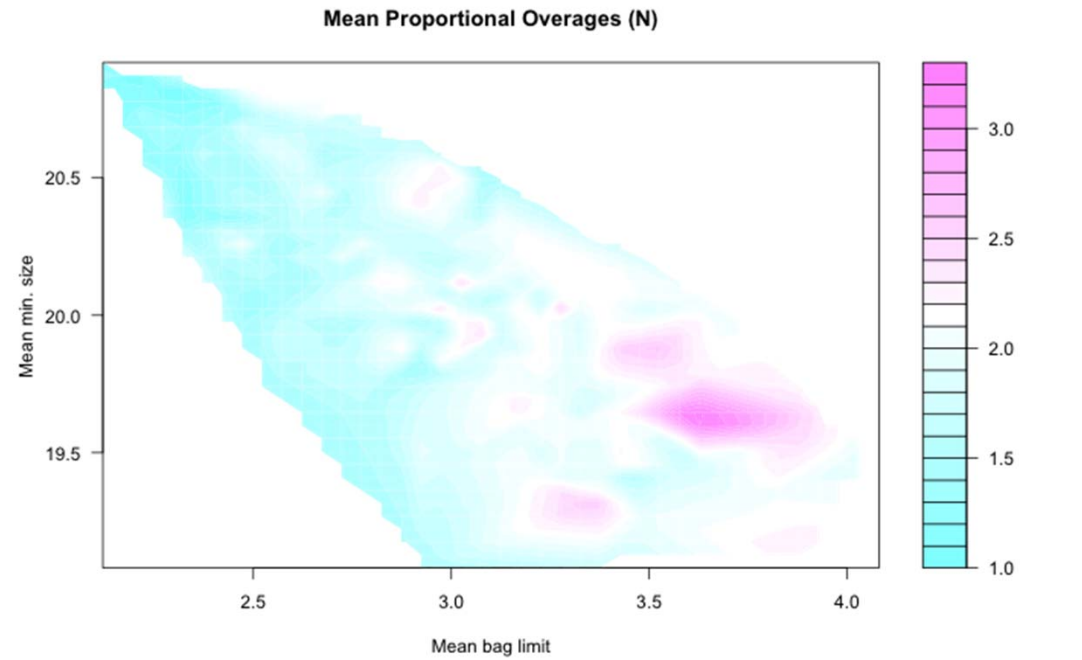
Proportion of Years with Overages (N)



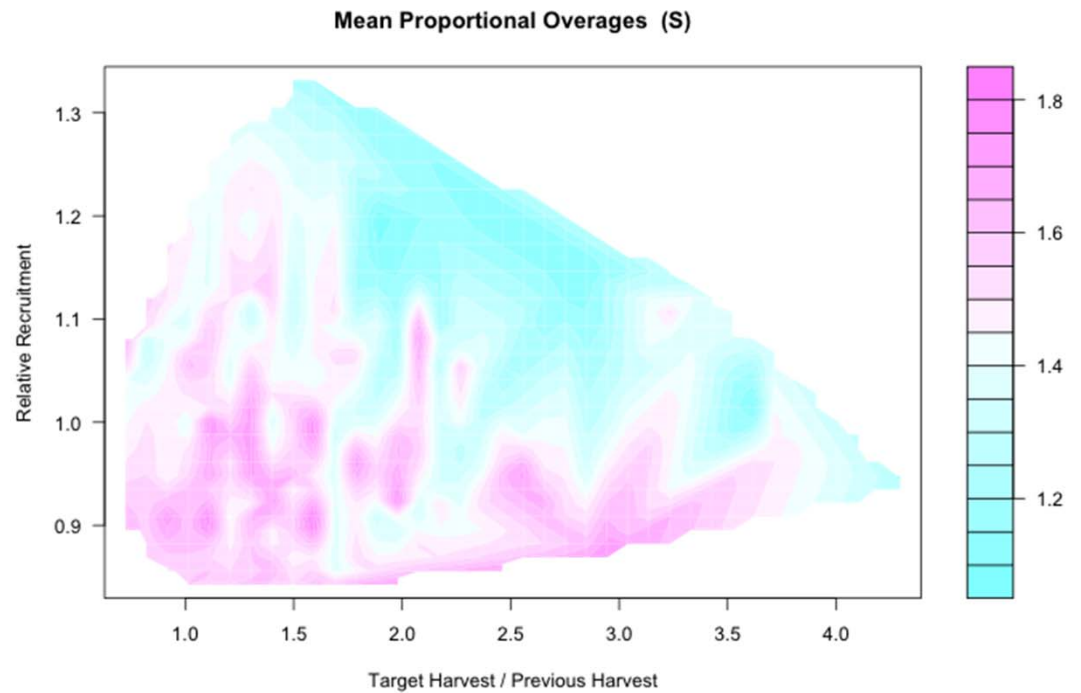
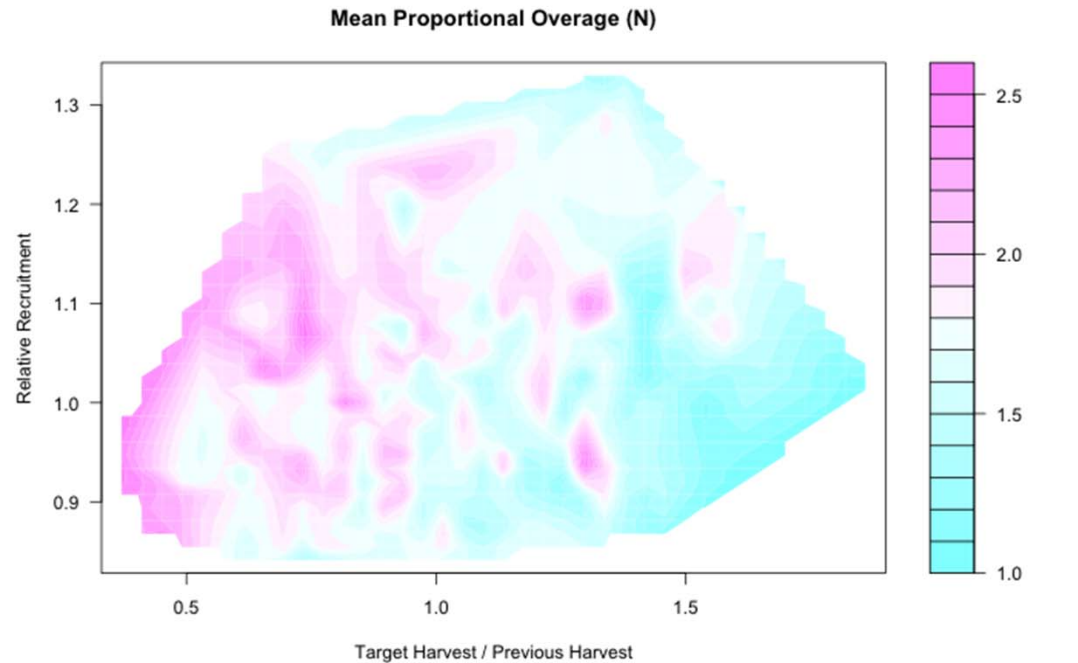
Proportional of Years with Overages (S)



Effects of Regulations on Overage Amount



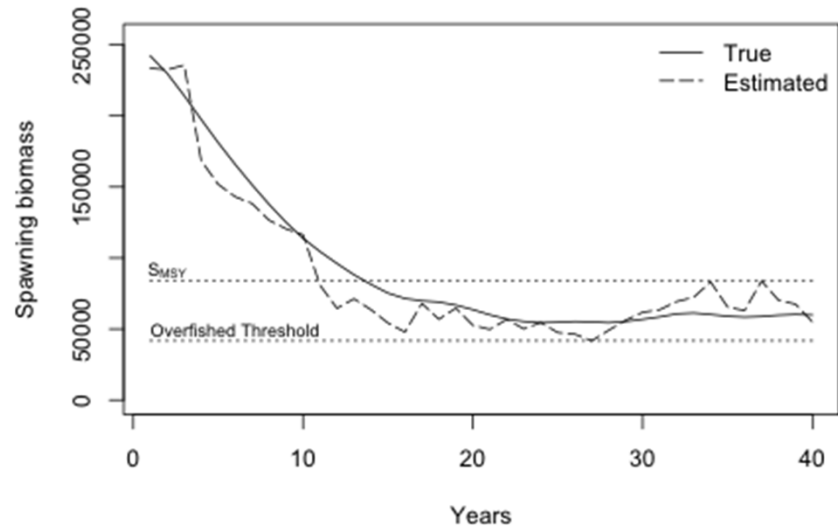
Effects of Recruitment and changing regulations (liberalization vs. restriction) on overage amount



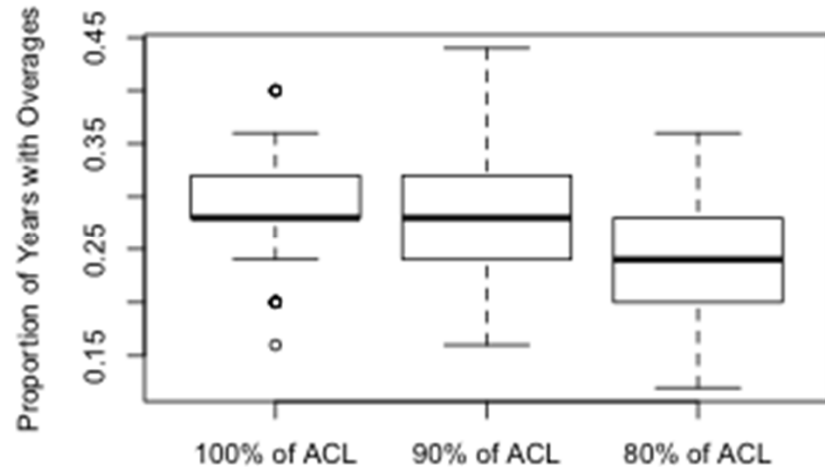
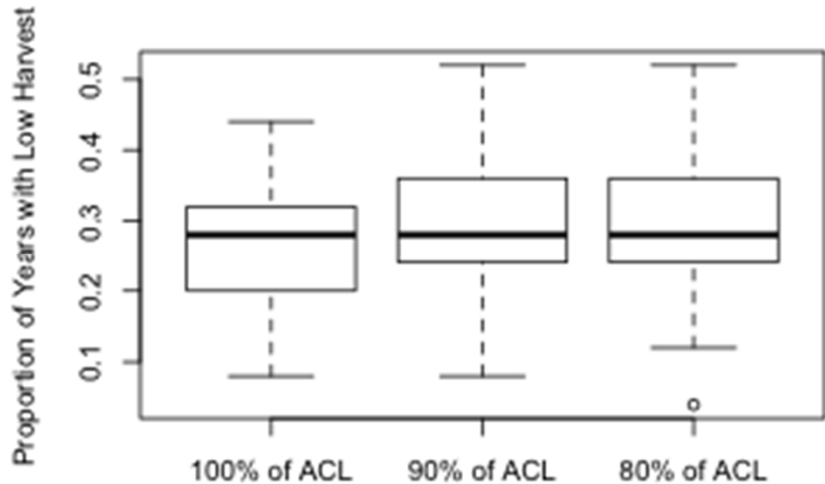
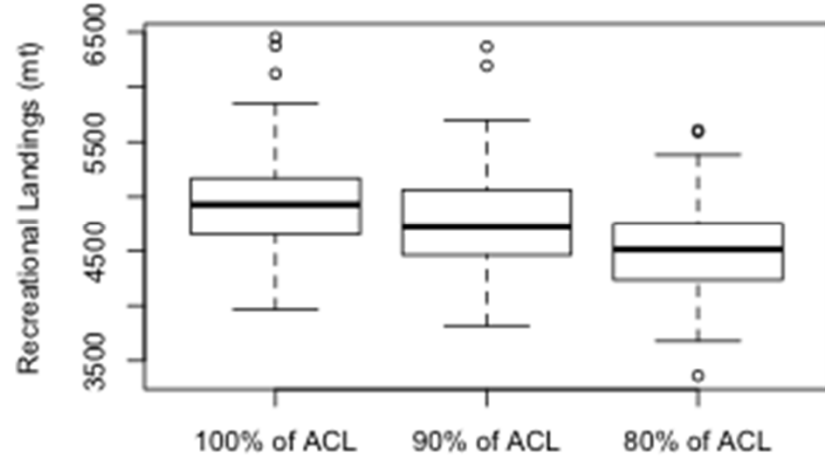
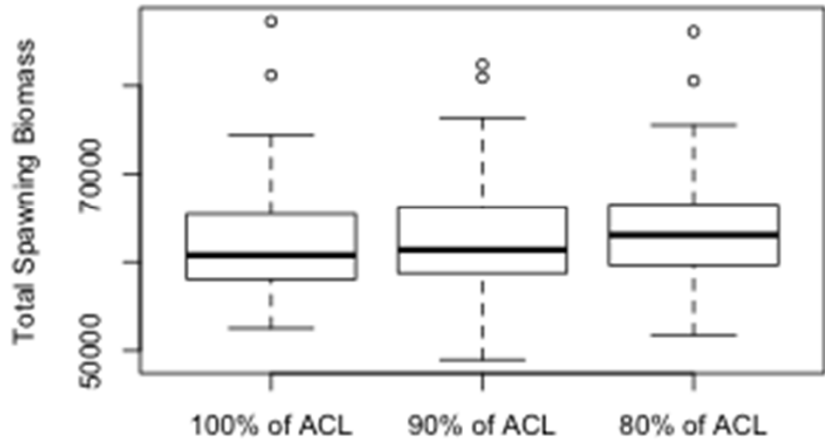
Overage Summary

- More frequent overages associated with higher bag limits and smaller min. size limits
- More frequent overages when restricting catches
- Larger overages in N when restricting catches
- Larger overages in S when restricting regulations and below average recruitment

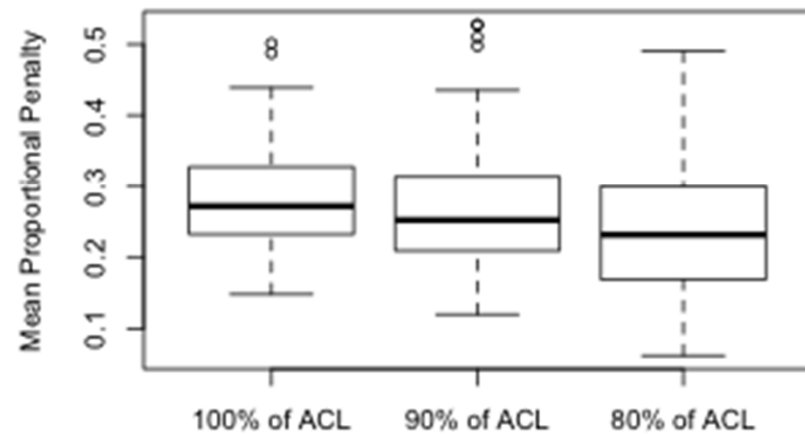
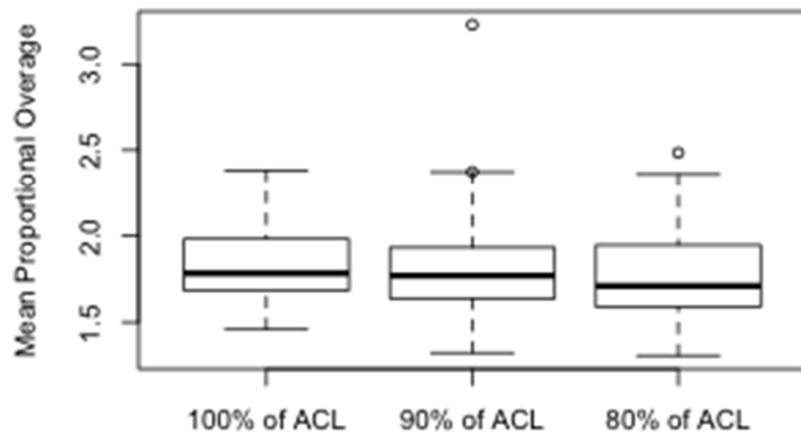
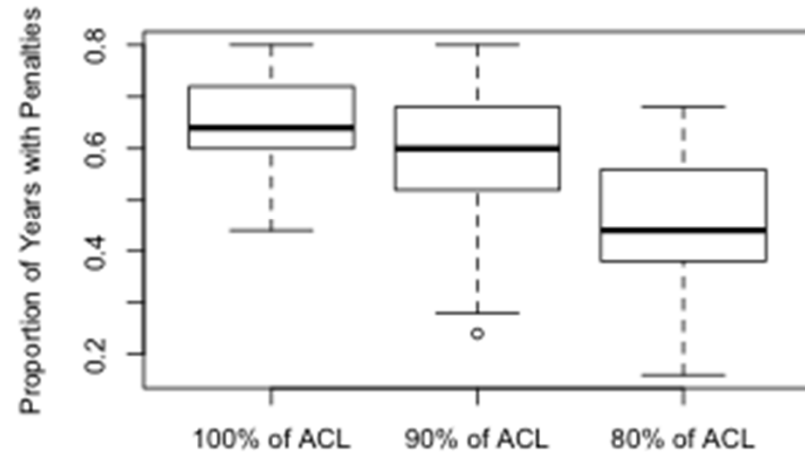
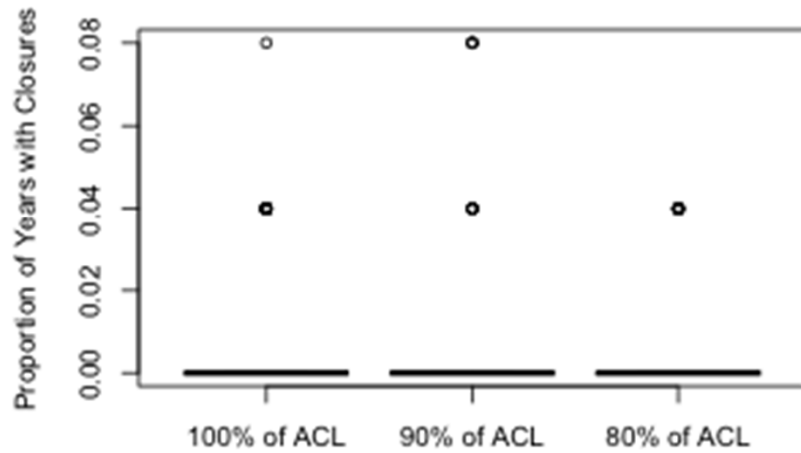
1) Assess population



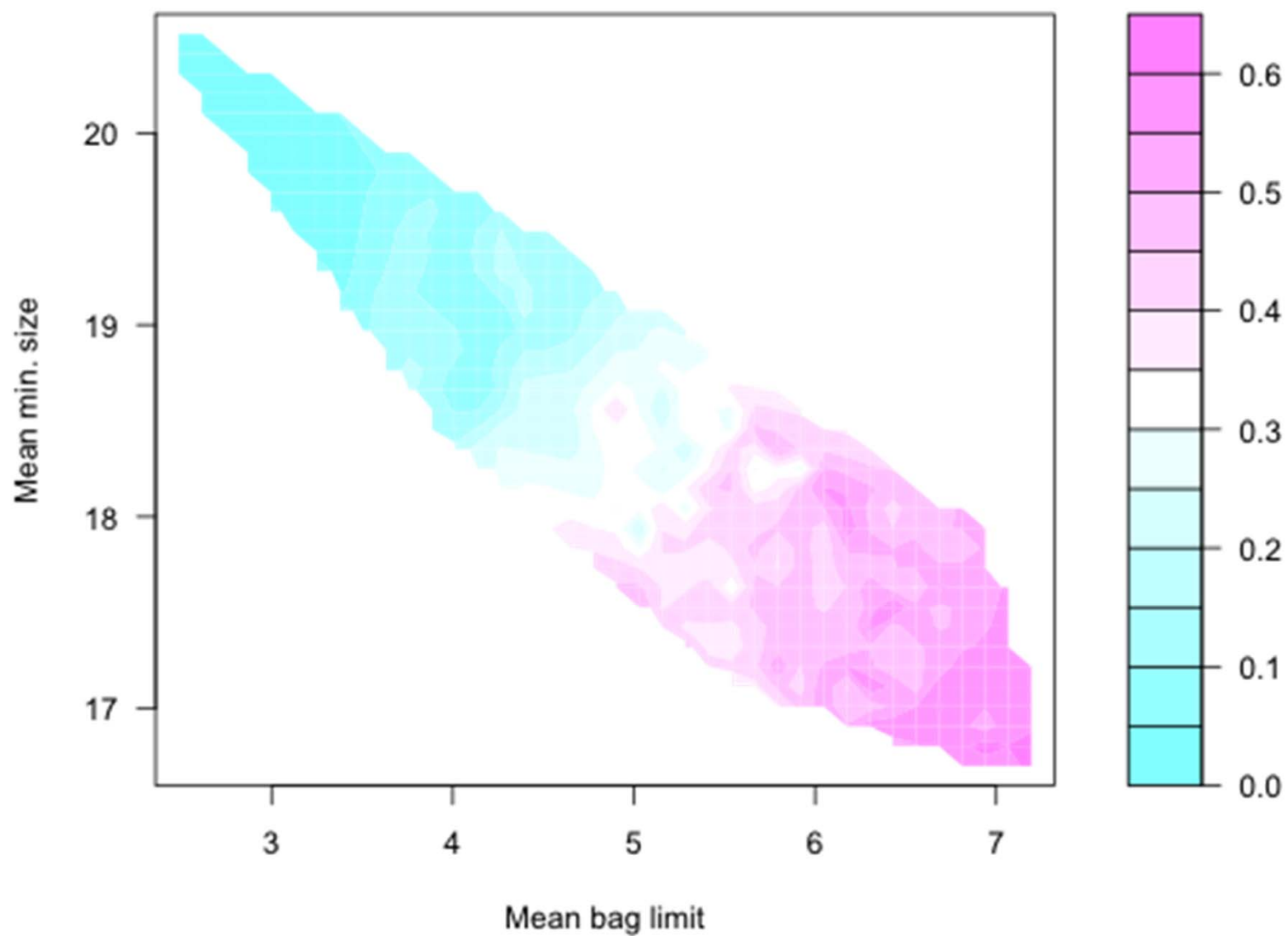
Effects of Buffers



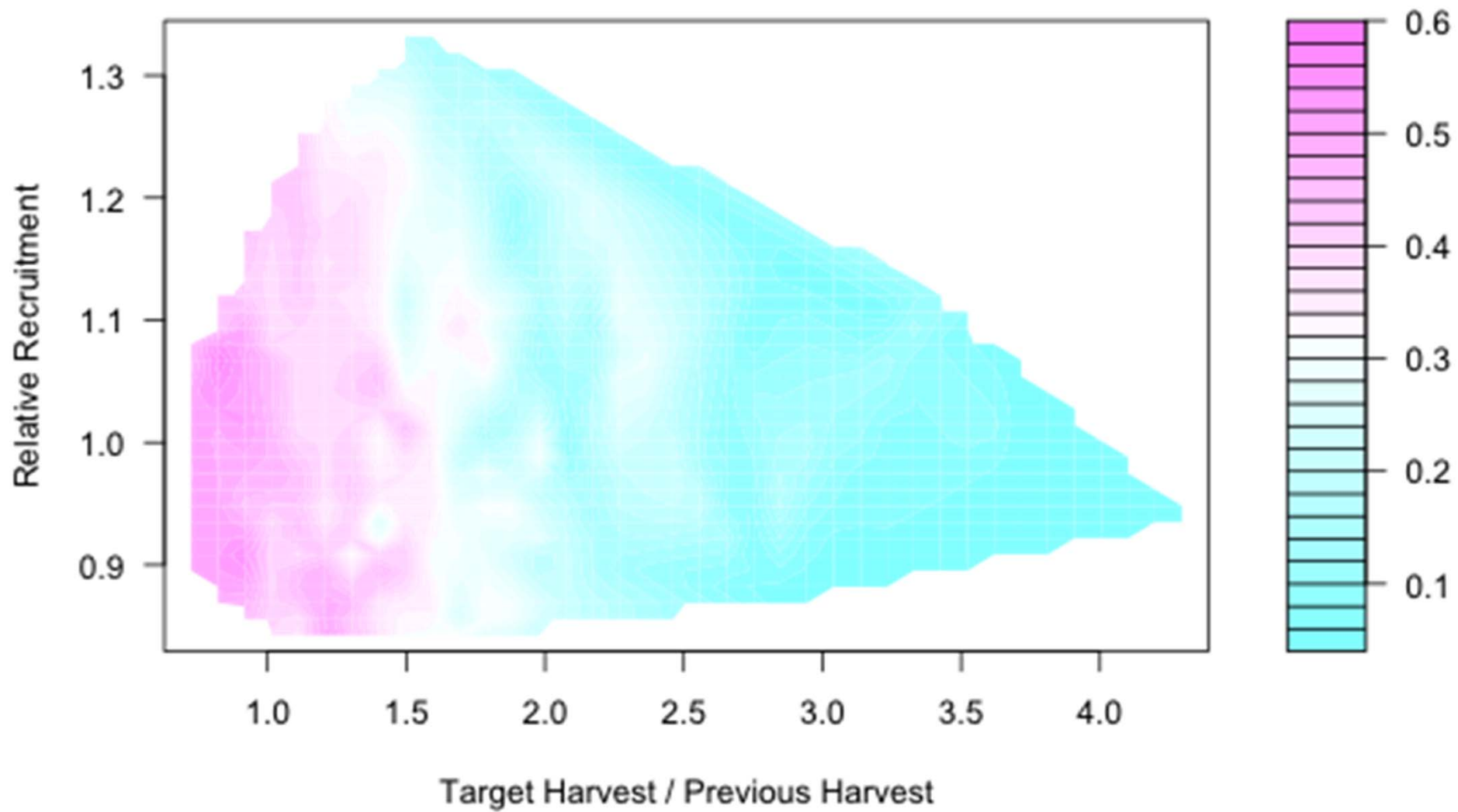
Effects of Buffers When Setting ACT



Proportion of Years with Overages (S)



Proportional of Years with Overages (S)



Age- and Sex-Structured Population Dynamics

