**Spotted Seatrout Management Scenarios**

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## Overview

The simulated projections of the Louisiana spotted seatrout stock presented in this report use the parameter values and population dynamics model of the most recent Louisiana Department of Wildlife and Fisheries (LDWF) spotted seatrout stock assessment (West et al. 2019). To remain in the same currency as the stock assessment, the stock projections and fishery savings presented in this report represent only the female proportion of the population and landings.

## Management Scenarios

Management scenarios representing reductions in female yield were projected forward ten years from 2019 (Table 1; Figure 1) by reducing total apical fishing mortality rates corresponding with specific percent reductions in equilibrium female yield (5, 10, 15, 20, 25, and 30% reductions). The ten-year projection was conducted by assuming future recruitment levels and winter severity impacts as averages of the most recent decade (2009-2018). The projection from the terminal year of the assessment through 2019 assumed equivalent fishing mortality rates. Projected population metrics are stock status indicators only: spawning stock biomass (SSB), spawning potential ratio (SPR), and the average fishing mortality rate (F_avg).

In each projection, 2020 represents the first full year of new regulation implementation. If regulations are implemented during the course of 2020, the effects of those measures would be to a lesser extent than a full year. In such a case, specific values of each following year would be different, but the population trajectories would remain consistent with those reported here.

Changes to size limits were not explicitly modeled due to limitations of the age-structured population dynamics model. Estimated benefits for each management scenario are modeled directly from changes in the overall fishing mortality rate without adjusting the age-structure of the catch. If size limit regulations are modified upward, population trajectories of SPR and SSB would likely increase marginally from those reported here due to that differential fishing mortality-at-age.

## Fishery Savings

Empirical fishery savings, in terms of female yield (landed weight), from changes in creel and size limits were calculated using the 2016-2018 information available from the LDWF Recreational Creel Survey and Biological Sampling Programs (Tables 2-4; Figures 2-4). Female yield reductions from size limit increases were calculated based on two assumptions of discard mortality (10 and 25%). Female yield reductions from creel limit decreases were calculated based on the assumption that future directed fishery effort will remain comparable to current directed fishery effort. Fishery savings from alternative management measures such as closed seasons or areas are not included in this report.

Tables:

Table 1: Projection of average F, SSB, and SPR. Red cells represent values below (SPR and SSB) and above (average F) the respective limits. Yellow cells represent values above (SPR and SSB) and below (average F) the respective limits, but below (SPR and SSB) and above (average F) the respective targets. SSB units are millions of pounds; average F units are years$^{-1}$.

| F_avg | Percent Reduction (Female Yield) | | | | | | |
|---|---|---|---|---|---|---|---|
| Year | 0% | 5% | 10% | 15% | 20% | 25% | 30% |
| 2018 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 |
| 2019 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| 2020 | 0.82 | 0.63 | 0.51 | 0.43 | 0.37 | 0.32 | 0.28 |
| 2021 | 0.82 | 0.64 | 0.53 | 0.45 | 0.39 | 0.34 | 0.30 |
| 2022 | 0.83 | 0.64 | 0.53 | 0.45 | 0.39 | 0.34 | 0.30 |
| 2023 | 0.83 | 0.64 | 0.53 | 0.44 | 0.38 | 0.33 | 0.29 |
| 2024 | 0.83 | 0.64 | 0.53 | 0.44 | 0.38 | 0.33 | 0.29 |
| 2025 | 0.83 | 0.64 | 0.52 | 0.44 | 0.37 | 0.32 | 0.28 |
| 2026 | 0.83 | 0.64 | 0.52 | 0.44 | 0.37 | 0.32 | 0.28 |
| 2027 | 0.83 | 0.64 | 0.52 | 0.44 | 0.37 | 0.32 | 0.28 |
| 2028 | 0.83 | 0.64 | 0.52 | 0.44 | 0.37 | 0.32 | 0.28 |
| 2029 | 0.83 | 0.64 | 0.52 | 0.44 | 0.37 | 0.32 | 0.28 |

| SSB | Percent Reduction (Female Yield) | | | | | | |
|---|---|---|---|---|---|---|---|
| Year | 0% | 5% | 10% | 15% | 20% | 25% | 30% |
| 2018 | 3.90 | 3.90 | 3.90 | 3.90 | 3.90 | 3.90 | 3.90 |
| 2019 | 4.04 | 4.04 | 4.04 | 4.04 | 4.04 | 4.04 | 4.04 |
| 2020 | 3.41 | 3.72 | 3.93 | 4.09 | 4.22 | 4.32 | 4.40 |
| 2021 | 3.17 | 3.86 | 4.39 | 4.84 | 5.21 | 5.54 | 5.82 |
| 2022 | 3.04 | 3.93 | 4.68 | 5.34 | 5.91 | 6.45 | 6.91 |
| 2023 | 2.96 | 3.99 | 4.88 | 5.71 | 6.44 | 7.13 | 7.74 |
| 2024 | 2.90 | 4.02 | 5.02 | 5.97 | 6.83 | 7.66 | 8.39 |
| 2025 | 2.86 | 4.04 | 5.14 | 6.18 | 7.13 | 8.06 | 8.89 |
| 2026 | 2.83 | 4.06 | 5.21 | 6.32 | 7.34 | 8.34 | 9.23 |
| 2027 | 2.81 | 4.07 | 5.26 | 6.42 | 7.48 | 8.53 | 9.47 |
| 2028 | 2.80 | 4.08 | 5.30 | 6.48 | 7.58 | 8.66 | 9.63 |
| 2029 | 2.79 | 4.09 | 5.32 | 6.52 | 7.64 | 8.74 | 9.74 |

| SPR | Percent Reduction (Female Yield) | | | | | | |
|---|---|---|---|---|---|---|---|
| Year | 0% | 5% | 10% | 15% | 20% | 25% | 30% |
| 2018 | 8.5% | 8.5% | 8.5% | 8.5% | 8.5% | 8.5% | 8.5% |
| 2019 | 8.8% | 8.8% | 8.8% | 8.8% | 8.8% | 8.8% | 8.8% |
| 2020 | 7.5% | 8.1% | 8.6% | 9.0% | 9.2% | 9.5% | 9.6% |
| 2021 | 6.9% | 8.4% | 9.6% | 10.6% | 11.4% | 12.1% | 12.7% |
| 2022 | 6.7% | 8.6% | 10.2% | 11.7% | 12.9% | 14.1% | 15.1% |
| 2023 | 6.5% | 8.7% | 10.7% | 12.5% | 14.1% | 15.6% | 16.9% |
| 2024 | 6.3% | 8.8% | 11.0% | 13.1% | 14.9% | 16.8% | 18.4% |
| 2025 | 6.3% | 8.8% | 11.2% | 13.5% | 15.6% | 17.6% | 19.5% |
| 2026 | 6.2% | 8.9% | 11.4% | 13.8% | 16.1% | 18.2% | 20.2% |
| 2027 | 6.2% | 8.9% | 11.5% | 14.0% | 16.4% | 18.7% | 20.7% |
| 2028 | 6.1% | 8.9% | 11.6% | 14.2% | 16.6% | 18.9% | 21.1% |
| 2029 | 6.1% | 8.9% | 11.6% | 14.3% | 16.7% | 19.1% | 21.3% |

Table 2: Fishery savings in terms of female yield (% reductions) for different creel limits, minimum length limits (MLL), and slot limits (SL).

| Creel | Savings (Female Yield) | |
|---|---|---|
| | CSA 1-6 | CSA 7 |
| 5 | 43% | 26% |
| 10 | 20% | 6% |
| 15 | 9% | 0% |
| 20 | 3% | --- |
| 25 | 0% | --- |

| MLL_Inches | Savings (Female Yield) | |
|---|---|---|
| | D=10% | D=25% |
| 12 | 0% | 0% |
| 13 | 7% | 6% |
| 14 | 22% | 18% |
| 15 | 40% | 33% |
| 16 | 57% | 48% |
| 17 | 70% | 58% |
| 18 | 78% | 65% |
| 19 | 83% | 70% |
| 20 | 86% | 72% |

| SL_Inches | Savings (Female Yield) | |
|---|---|---|
| | D=10% | D=25% |
| 12 to 20 | 4% | 3% |
| 13 to 20 | 10% | 9% |
| 14 to 20 | 26% | 21% |
| 15 to 20 | 44% | 36% |
| 16 to 20 | 61% | 51% |

Table 3: Fishery savings in terms of female yield (% reductions) for different combinations of MLL and creel limits (CSA 1-6 creel savings).

| ***MLL_Inches/Creel*** | *Savings (Female Yield, D= 10%)* | | | | | *Savings (Female Yield, D= 25%)* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *5* | *10* | *15* | *20* | *25* | *5* | *10* | *15* | *20* | *25* |
| *12* | *43%* | *20%* | *9%* | *3%* | *0%* | *43%* | *20%* | *9%* | *3%* | *0%* |
| *13* | *47%* | *25%* | *15%* | *10%* | *7%* | *46%* | *25%* | *14%* | *9%* | *6%* |
| *14* | *55%* | *38%* | *29%* | *24%* | *22%* | *53%* | *35%* | *25%* | *21%* | *18%* |
| *15* | *66%* | *52%* | *45%* | *42%* | *40%* | *62%* | *47%* | *39%* | *35%* | *33%* |
| *16* | *76%* | *66%* | *61%* | *59%* | *57%* | *70%* | *58%* | *52%* | *49%* | *48%* |
| *17* | *83%* | *76%* | *72%* | *70%* | *70%* | *76%* | *66%* | *62%* | *59%* | *58%* |
| *18* | *88%* | *83%* | *80%* | *79%* | *78%* | *80%* | *72%* | *68%* | *66%* | *65%* |
| *19* | *91%* | *87%* | *85%* | *84%* | *83%* | *83%* | *76%* | *72%* | *70%* | *70%* |
| *20* | *92%* | *89%* | *88%* | *87%* | *86%* | *84%* | *78%* | *74%* | *73%* | *72%* |

Table 4: Fishery savings in terms of female yield (% reductions) for different combinations of slot limits and creel limits (CSA 1-6 creel savings).

| ***SL_Inches/Creel*** | *Savings (Female Yield, D= 10%)* | | | | | *Savings (Female Yield, D= 25%)* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *5* | *10* | *15* | *20* | *25* | *5* | *10* | *15* | *20* | *25* |
| *12 to 20* | *45%* | *23%* | *12%* | *7%* | *4%* | *45%* | *23%* | *12%* | *6%* | *3%* |
| *13 to 20* | *49%* | *28%* | *18%* | *13%* | *10%* | *48%* | *27%* | *17%* | *11%* | *9%* |
| *14 to 20* | *57%* | *40%* | *32%* | *28%* | *26%* | *55%* | *37%* | *28%* | *24%* | *21%* |
| *15 to 20* | *68%* | *55%* | *49%* | *45%* | *44%* | *64%* | *49%* | *42%* | *38%* | *36%* |
| *16 to 20* | *78%* | *69%* | *64%* | *62%* | *61%* | *72%* | *61%* | *55%* | *52%* | *51%* |

Figures:

Figure 1: Projections of average F, SSB, and SPR.

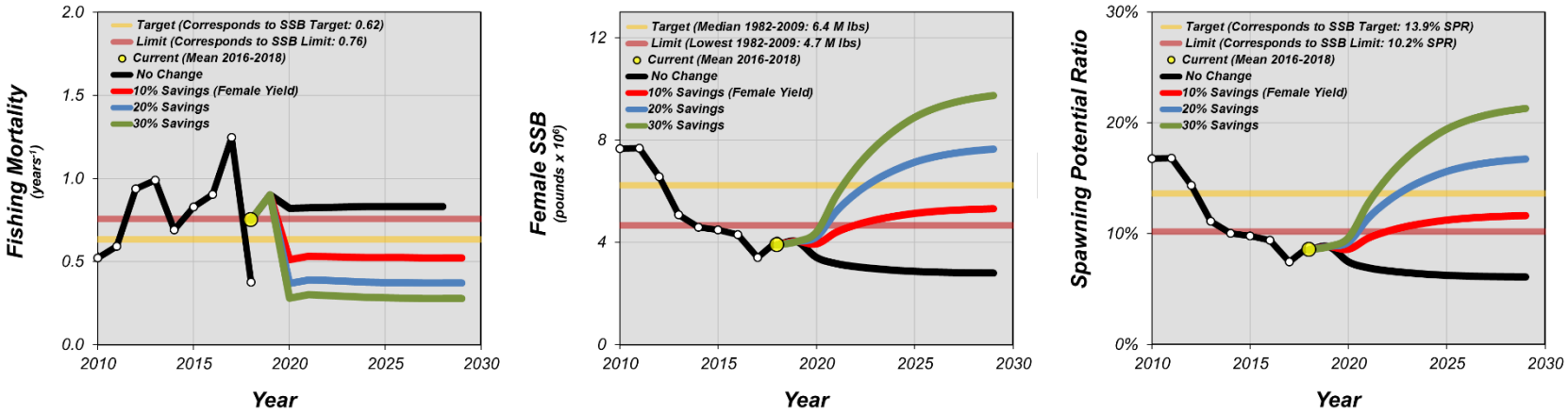

Figure 2: Fishery savings in terms of female yield (% reductions) for different creel limits, minimum length limits, and slot limits.

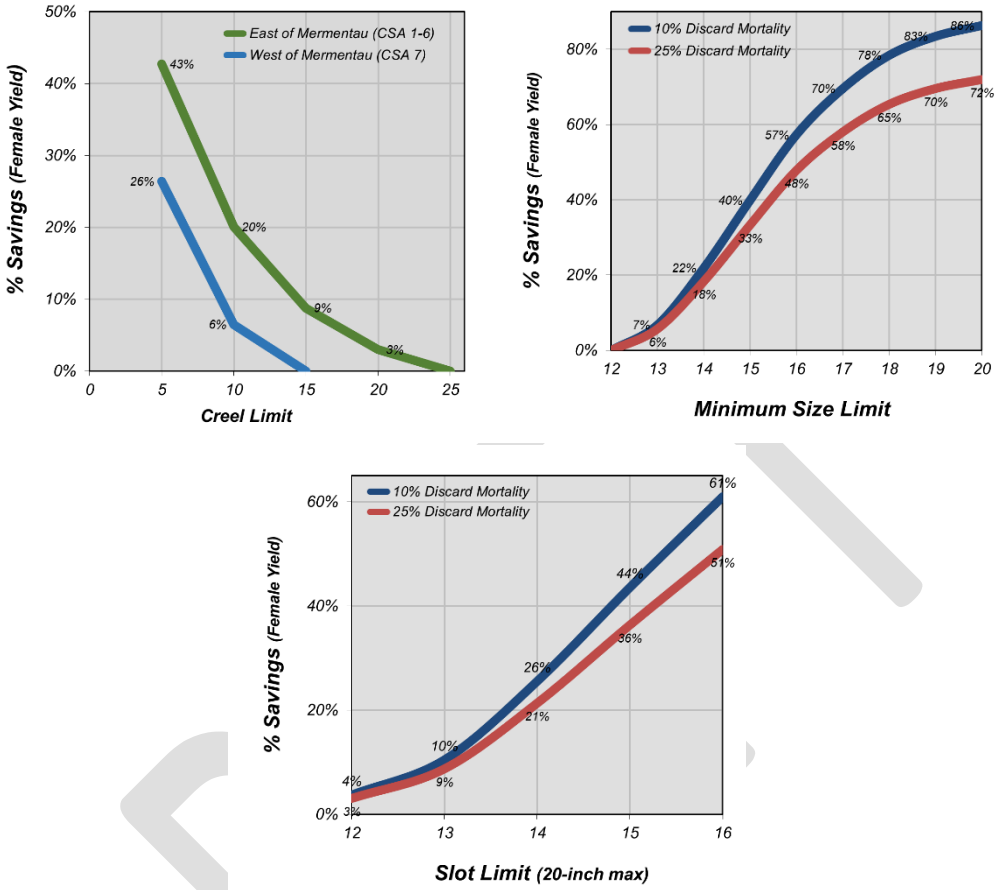


Figure 3: Fishery savings in terms of female yield (% reductions) for different combinations of minimum length limits and creel limits (CSA 1-6 creel savings).

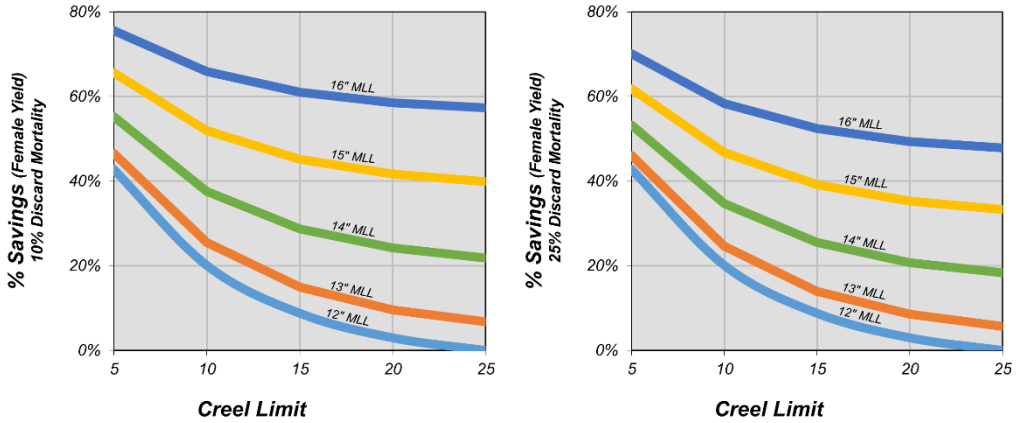

Figure 4: Fishery savings in terms of female yield (% reductions) for different combinations of slot limits and creel limits (CSA 1-6 creel savings).