**Synopsis of the Seventh Annual Louisiana Oyster Stock Assessment Workshop**

**held**

**28 August 2018**

**at the**

**University of New Orleans**

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**Seventh Annual Louisiana Oyster Stock Assessment Workshop**

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**Introduction**

The Seventh Annual Stock Assessment Workshop was held on August 28, 2018 at the University of New Orleans. The purpose of the Workshop is to evaluate the status of the oyster stock in public oyster areas of Louisiana, estimate sustainable harvests for the upcoming oyster season in those public areas and review management and research recommendations.
**Background and Methods**

A shell budget model is applied to estimate the sustainable catch of oysters on public oyster grounds in Louisiana using no-net-cultch-loss as a sustainability reference point. The model simulates oyster growth and mortality, and natural cultch loss. Shell mass is increased when oysters die in place, and diminished when oysters are removed by fishing (Soniat et al. 2012). Oyster density and oyster size from the 2017 Louisiana Department of Wildlife and Fisheries (LDWF) Stock Assessment covering all public oyster areas in all Coastal Study Areas (CSAs) were input using an automated data entry form (Soniat et al. 2013). The model estimates the number of sacks of seed and sack oysters that could be removed during the 2018/19 season without a loss of cultch. In addition to the standard of no-net-cultch loss, simulations were constrained by the (presumed) monthly effort for sack and seed (Table 1) and the proportion of sack to seed previously harvested in each CSA (Table 2).

 Primary model components calculate growth, natural mortality, fishing mortality, cultch density (g/m2), and sacks of seed and sack (market) oysters fished (Figure 1).

 

**Figure 1.** **Schematic of major oyster model processes.**

Oysters that are not lost to natural mortality or removed by fishing grow into new size classes over time. Natural mortality provides new shell to the reef, whereas fishing removes it. Natural cultch loss occurs from taphonomic processes, mostly dissolution and biodegradation. Change in cultch density is thus a function of initial cultch density, initial population numbers, size-class distribution, shell growth, natural mortality, fishing mortality, and natural cultch loss. Fishing rates and times are adjusted to achieve sustainable harvest; that is, the reference point defining sustainable harvest is a harvest that results in no net loss of cultch. (Model details are provided by Soniat et al. 2012, 2015.) The cultch budget model has practical application such as identifying areas for closure, determining total allowable catch (TAC), managing cultch planting and reef restoration, and achieving product certification for sustainability.

The 2012 Stock Assessment (LDWF 2012) included, for the first time, precise measurements on the quality and quantity of the cultch. Brown (surface) and black (muddy, buried) substrate were collected from 1-m2 grids and weighed. These measurements were repeated for the 2013 (LDWF 2013), 2014 (LDWF 2014), 2015 (LDWF 2015), 2016 (LDWF 2016), 2017 and 2018 Stock Assessments. The substrate categories are: muddy oyster shell, brown oyster shell, muddy limestone, brown limestone, muddy clamshell, brown clamshell, muddy concrete, brown concrete, muddy “other” substrate, and brown “other” substrate. All brown cultch types were used as the cultch reference point.

A synopsis of the annual SAW is provided by Soniat (2012, 2013, 2014, 2015, 2016, 2017). The synopsis for 2018 includes a review the status of the stock for the current year, a harvest estimate based on the current stock, and a review of recommendations from the previous year. and proposed recommendations for the coming year.

**Status of the Stock**

 The 2018 stock assessment sampling by LDWF indicates a statewide 34% reduction of seed and a 20% increase in sack oysters, with an overall 6% reduction in combined seed and sack abundance (Figure 2, Table 1), as compared to 2017 (Sabine Lake excluded.). Abundance of seed and sack oysters are about 90% below the long-term average (1982-2017). The overall trend in oyster abundance on the public grounds since 2000/2001 has been downward. The stock has been below the long-term average after 2006, and especially depressed since 2009, with the exception of a minor rebound in 2013 and 2014. The downward trend continues. The 2018 Stock Assessment indicates the lowest abundance of oysters on record (Figure 2) – an abundance lower than that in 2017, the previous historical low.

**Figure 2. Abundance of seed and market oysters on Louisiana Public Oysters Grounds, 1982-2018. Surveys conducted by the LDWF. Data from Sabine Lake, which is not open to fishing, are excluded. LTA= Long Term Average.**

The public oyster resource in Louisiana is sampled and managed by Coastal Study Areas (CSAs). CSAs are large management units (watersheds) designated by LDWF -- from CSA1 in the east to CSA 7 in the west (Figure 3). In CSA 1N, CSA 3, CSA 5E CSA 5W a decrease in seed oyster abundance as compared to 2017 was found, whereas seed abundance in CSA 5W and Lake Calcasieu (in CSA 7) showed an increase as compared to the previous year (Table 1). A stock assessment of Sabine Lake was not conducted in 2018. Sack oyster abundance decreased as compared to last year in CSA 1S and CSA 3, and increased in CSA 1N, CSA 5W and Lake Calcasieu (CSA 7). Total abundance (sack and seed combined) showed a decrease of about 6% as compared to 2017. The LDWF 2018 Oyster Stock Assessment report provides comprehensive information on the status of the stock.



**Figure 3. Boundaries of LDWF Coastal Study Areas (CSAs).**

**Table 1. Seed and Sack oysters (in barrels; 1 barrel = 2 sacks) by CSA and in total from**

**the 2081 Stock Assessment. CSA 6 is omitted. CSA 7 is partitioned as Lakes Calcasieu**

**and Sabine; only Lake Calcasieu was surveyed. Seed % and Sack % are the percent change (increase, + or decrease, -) in seed and sack as compared to 2017. Total is the combined barrels of seed and sack, whereas Total % is the percent change in combined seed and sack as compared to 2017.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Area** | **Seed** | **Seed %** | **Sack** | **Sack %** | **Total** | **Total %** |
| **1N** | **49,320** | **-34.4%** | **30,663** | **+4.7%** | **79,984** | **-23%** |
| **1S** | **674** | **0%** | **0** | **-100%** | **674** | **-90%** |
| **3** | **2,078** | **-41%** | **1,459** | **-73%** | **3,538** | **-60%** |
| **5E** | **452** | **-35%** | **0** | **0%** | **452** | **-35%** |
| **5W** | **48,358** | **-34%** | **22,146** | **+46%** | **70,507** | **-20%** |
| **Calcasieu** | **30,458** | **+35%** | **81,245** | **+56%** | **111,703** | **+50%** |
| **Total** | **131,343** | **-34%** | **135,515** | **+20%** | **283,431** | **-6%** |

**Simulation Strategy**

Initial simulations are conducted without fishing. Reefs that gain shell without fishing are deemed “fishable”. Only “fishable” reefs were considered in subsequent simulations. A single simulation strategy was used. Table 2 shows sack and seed fishing pressures for each month of the season. The proportion (percent) of seed fishing to sack fishing per season in each CSA for Scenario 3 is given in Table 3.

**Table 2. Sack and seed fishing pressures for each CSA, based on recent fishing pressures (percent in effort/month)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CSA** | **Sack/Seed** | **SEP** | **OCT** | **NOV** | **DEC** | **JAN** | **FEB** | **MAR** | **APR** |
| **1N** | Sack | 0 | 0 | 25 | 25 | 25 | 25 | 0 | 0 |
|  | Seed | 0 | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| **1S** | Sack | 0 | 0 | 25 | 25 | 25 | 25 | 0 | 0 |
|  | Seed | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **3** | Sack | 0 | 0 | 25 | 25 | 25 | 25 | 0 | 0 |
|  | Seed | 0 | 0 | 100 | 0 | 0 | 0 | 0 | 0 |
| **5E** | Sack | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Seed | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **5W** | Sack | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | Seed | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **6** | Sack | 0 | 0 | 5 | 5 | 5 | 5 | 80 | 0 |
|  | Seed | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 0 |
| **7** | Sack | 0 | 0 | 25 | 25 | 25 | 25 | 0 | 0 |
|  | Seed | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 3. The proportion (percent) of seed fishing to sack fishing in 2018 for each CSA.**

|  |  |  |
| --- | --- | --- |
| **CSA** | **Seed** | **Sack** |
| 1N | 10 | 90 |
| 1S | 0 | 100 |
| 3 | 10 | 90 |
| 5E | 0 | 0 |
| 5W | 0 | 0 |
| 6 | 90 | 10 |
| 7 | 0 | 100 |

**Sustainable Harvest Estimates**

 Simulations were conducted to estimate sustainable harvests from reefs which showed a positive shell balance in the initial simulations (simulations without fishing). Constraints on the simulations include conserving the percent monthly effort for sack and seed (Table 2) and the proportionality between them (Table 3). By thus constraining fishing, some reefs showed a net cultch gain --even under the no-net cultch loss standard. In these cases, the requirements of the fishing constraints were met before the model was solved by the no-net-loss standard.

The “fishable” reefs for which further simulations were conducted are as follows. In CSA 1N, fishable reefs (stations) included only Grassy Reef and the Round Island 2011 Cultch Plant (Table 4). No reefs in CSA 1S were deemed fishable. In CSA 3, the 2004 North and South Middle Hackberry and the 2014 Cultch Plants in Hackberry Bay were fishable. The CSA 5E station Lake Chien 2009 Cultch Plant was fishable, as were the CSA 5W stations of 2009 Sister Lake Cultch Plant, Buckskin Bayou Junop, Lake Mechant, Mid Sister Lake 1994 Shell Plant, Mid Bay Junop, North 1994 Shell Plant, North 1995 Shell Plant and Sister Lake 2012 Cultch Plant 2. In CSA 6, none of the reefs were fishable. In Lake Calcasieu (in CSA 7), Chenier Reff, Lambert’s Reef, Northwest Rabbit Island and West Rabbit Island were fishable. Note that “fishability” is determined by an interaction of cultch density and oyster density (Table 4). Some reefs with low oyster densities are “fishable’ because cultch density is low. With less cultch available to be lost, fewer oysters are needed to achieve a no-net-cultch-loss reference standard. Such reefs, however, provide little sustainable catch. Furthermore, some reefs (e.g., CSA1N/ Halfmoon, CSA1N/ Petit) had a few oysters, but no measurable cultch (Table 4); in such cases the no-net-loss standard allows all oysters to be removed since there is no cultch to sustain. The (small) contribution to harvest provided by such reefs is not tallied in the estimation of sustainable harvest.

**Table 4. Simulations of sustainable harvest. Stations in each Coastal Study Area (CSA) are on natural reefs, shell plants (SP) and cultch plants (CP). Those reefs that are “Not Fishable” are indicated. No Fishing Occurred indicates that no fishing was allowed. No initial oysters (No Init. Oysters), no initial substrate (No Init. Substrate), and no oysters or substrate (No Resource) are indicated. Simulations can be sustainable with conditions, (Sust. W/Conditions), in which fishing constraints are fulfilled before reaching the no-net- cultch (NNCL) loss standard or Solved, in which the NNCL standard is met. Oyster numbers (O) include all size classes. Initial densities for number of oysters (O/m2 A) and cultch (C/m2 A) are in grams per m2. Corresponding post-simulation values are listed as O/m2 B and C/m2 B. Initial size (mm A) and post-simulation size (mm B) are in millimeters. Percent cultch change is listed as ΔC. Sack and seed harvests (Har.) are in sacks.**

| **Name** | **Status** | **O/m2 A** | **O/m2 B** | **Av. mm A** | **Av. mm B** | **C/m2 A** | **C/m2 B** | **Δ C** | **Sack Har.** | **Seed****Har.** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CSA1N / 3-Mile | Not Fishable | 0.4 | 0.2 | 22 | 69.1 | 345 | 313 | ▼ ≈ 9.2% | 0 | 0 |
| CSA1N / Cabbage Reef | Not Fishable | 0.6 | 0.3 | 5.3 | 59.7 | 2,874 | 2,588 | ▼ ≈ 9.9% | 0 | 0 |
| CSA1N / Drum Bay | Not Fishable | 1.6 | 0.9 | 42.6 | 81.4 | 1,939 | 1,779 | ▼ ≈ 8.3% | 0 | 0 |
| CSA1N / E. Karako | No Init. Oysters | 0 | 0 | N/A | N/A | 2,052 | 1,847 | ▼ ≈ 10% | 0 | 0 |
| CSA1N / Grand Banks | Not Fishable | 12.2 | 5.7 | 12.4 | 64.8 | 4,715 | 4,312 | ▼ ≈ 8.5% | 0 | 0 |
| CSA1N / Grand Pass | No Init. Oysters | 0 | 0 | N/A | N/A | 1,871 | 1,684 | ▼ ≈ 10% | 0 | 0 |
| CSA1N / Grassy | Sust. W/ Conditions | 2 | 0.1 | 83.5 | 86 | 154 | 182 | ▲ ≈ 18% | 19,929 | 4,079 |
| CSA1N / Halfmoon | No Init. Substrate | 0.6 | 0.2 | 52 | 80.4 | 0 | 9 | ▲ ∞ | 1,367 | 345 |
| CSA1N / Holmes | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1N / Johnson Bayou | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1N / Martin | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1N / Millenium Reef | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1N / Morgan Harbor | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1N / Petit | No Init. Substrate | 0.4 | 0 | 72 | N/A | 0 | 8 | ▲ ∞ | 2,983 | 425 |
| CSA1N / Round Island 2011 Cultch Plant | Sust. W/ Conditions | 10.4 | 3.7 | 45.1 | 76.4 | 619 | 634 | ▲ ≈ 2.4% | 6,077 | 2,562 |
| CSA1N / Shell Point | Not Fishable | 6.6 | 3.9 | 40.3 | 79.8 | 5,546 | 5,542 | ▼ ≈ 0.1% | 0 | 0 |
| CSA1N / Turkey Bayou | No Init. Oysters | 0 | 0 | N/A | N/A | 43 | 30 | ▼ 30% | 0 | 0 |
| CSA1N / W. Karako | No Init. Oysters | 0 | 0 | N/A | N/A | 1,076 | 929 | ▼ ≈ 13.6% | 0 | 0 |
| CSA1S / 2009 Lonesome CP | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1S / Battledore Reef | No Init. Oysters | 0 | 0 | N/A | N/A | 559 | 502 | ▼ ≈ 10.2% | 0 | 0 |
| CSA1S / Bay Crabe | No Init. Oysters | 0 | 0 | N/A | N/A | 2 | 1 | ▼ 30% | 0 | 0 |
| CSA1S / Bay Gardene | No Init. Oysters | 0 | 0 | N/A | N/A | 103 | 82 | ▼ ≈ 20.1% | 0 | 0 |
| CSA1S / Bay Long | No Init. Oysters | 0 | 0 | N/A | N/A | 110 | 99 | ▼ ≈ 10% | 0 | 0 |
| CSA1S / Bayou Lost | No Init. Oysters | 0 | 0 | N/A | N/A | 48 | 42 | ▼ ≈ 11.7% | 0 | 0 |
| CSA1S / Black Bay | No Init. Oysters | 0 | 0 | N/A | N/A | 21 | 19 | ▼ 10% | 0 | 0 |
| CSA1S / California Bay | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1S / Curfew | No Init. Oysters | 0 | 0 | N/A | N/A | 451 | 400 | ▼ ≈ 11.3% | 0 | 0 |
| CSA1S / E. Bay Crabe | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1S / E. Bay Gardene | No Init. Oysters | 0 | 0 | N/A | N/A | 129 | 111 | ▼ ≈ 14% | 0 | 0 |
| CSA1S / E. Pelican | No Init. Oysters | 0 | 0 | N/A | N/A | 101 | 90 | ▼ ≈ 10.7% | 0 | 0 |
| CSA1S / E. Stone | No Init. Oysters | 0 | 0 | N/A | N/A | 55 | 50 | ▼ 10% | 0 | 0 |
| CSA1S / Elephant Pass | No Init. Oysters | 0 | 0 | N/A | N/A | 422 | 380 | ▼ ≈ 10% | 0 | 0 |
| CSA1S / Horseshoe Reef | No Init. Oysters | 0 | 0 | N/A | N/A | 152 | 137 | ▼ ≈ 10% | 0 | 0 |
| CSA1S / Jessie | No Init. Oysters | 0 | 0 | N/A | N/A | 473 | 426 | ▼ 10% | 0 | 0 |
| CSA1S / Lonesome | No Init. Oysters | 0 | 0 | N/A | N/A | 23 | 18 | ▼ ≈ 21.3% | 0 | 0 |
| CSA1S / Mangrove Point | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1S / N. Black Bay | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1S / N. California Bay | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1S / N. Lake Fortuna | No Init. Oysters | 0 | 0 | N/A | N/A | 97 | 87 | ▼ 10% | 0 | 0 |
| CSA1S / S. Black Bay | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1S / S. Lake Fortuna | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1S / Snake | No Init. Oysters | 0 | 0 | N/A | N/A | 9 | 8 | ▼ 10% | 0 | 0 |
| CSA1S / Stone | No Init. Oysters | 0 | 0 | N/A | N/A | 372 | 324 | ▼ ≈ 13% | 0 | 0 |
| CSA1S / Sunrise Point | No Init. Oysters | 0 | 0 | N/A | N/A | 4 | 4 | ▼ 10% | 0 | 0 |
| CSA1S / Telegraph | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1S / W. Bay Crabe | No Init. Oysters | 0 | 0 | N/A | N/A | 20 | 15 | ▼ ≈ 23% | 0 | 0 |
| CSA1S / W. Pelican | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA1S / Wreck | No Init. Oysters | 0 | 0 | N/A | N/A | 341 | 305 | ▼ ≈ 10.5% | 0 | 0 |
| CSA3 / 2004 Barataria Bay Cultch Plant | Not Fishable | 0.2 | 0.1 | 57 | 88.9 | 1,760 | 1,743 | ▼ ≈ 1% | 0 | 0 |
| CSA3 / 2004 N. Hackberry Shell Plant | No Init. Oysters | 0 | 0 | N/A | N/A | 76 | 68 | ▼ ≈ 10% | 0 | 0 |
| CSA3 / 2004 S. Hackberry Shell Plant | No Init. Oysters | 0 | 0 | N/A | N/A | 1,074 | 1,017 | ▼ ≈ 5.3% | 0 | 0 |
| CSA3 / 2008 Cultch Plant | Not Fishable | 1.2 | 0.7 | 43.7 | 81.3 | 1,435 | 1,402 | ▼ ≈ 2.3% | 0 | 0 |
| CSA3 / 2012 Cultch Plant | Not Fishable | 1.2 | 0.7 | 60.3 | 90.7 | 2,056 | 1,977 | ▼ ≈ 3.8% | 0 | 0 |
| CSA3 / Hackberry 2014 | Solved | 6.2 | 3 | 49.4 | 80.3 | 3,229 | 3,229 | ▲ ≈ 0% | 402 | 171 |
| CSA3 / Lower Hackberry | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA3 / Middle Hackberry | Solved | 1.8 | 0.1 | 105.9 | 87.9 | 600 | 600 | ▲ ≈ 0% | 154 | 30 |
| CSA3 / Upper Hackberry | Sust. W/ Conditions | 1.8 | 0.6 | 62.6 | 81.3 | 151 | 168 | ▲ ≈ 11.4% | 40 | 13 |
| CSA5E / Lake Chien 2004 | Not Fishable | 3.6 | 2.1 | 30.3 | 74 | 2,055 | 2,044 | ▼ ≈ 0.5% | 0 | 0 |
| CSA5E / Lake Chien 2009 | No Fishing Occurred | 1.6 | 1 | 38.3 | 78.3 | 456 | 469 | ▲ ≈ 2.9% | 0 | 0 |
| CSA5E / Lake Felicity | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA5W / 09 SL Cultch Plant | No Fishing Occurred | 10.2 | 6.1 | 51.4 | 85.7 | 2,985 | 3,092 | ▲ ≈ 3.6% | 0 | 0 |
| CSA5W / Buckskin Bayou Junop | No Fishing Occurred | 1.6 | 1 | 76.4 | 99.8 | 128 | 197 | ▲ ≈ 54.1% | 0 | 0 |
| CSA5W / Grand Pass | Not Fishable | 1.6 | 0.9 | 47.6 | 83.8 | 1,087 | 975 | ▼ ≈ 10.3% | 0 | 0 |
| CSA5W / Junop Bayou DeWest | Not Fishable | 0.2 | 0.1 | 27 | 72 | 664 | 599 | ▼ ≈ 9.7% | 0 | 0 |
| CSA5W / Lake Mechant | No Fishing Occurred | 24.8 | 13.6 | 21.4 | 69.1 | 3,033 | 3,127 | ▲ ≈ 3.1% | 0 | 0 |
| CSA5W / Mid 94 Shell Plant | No Fishing Occurred | 1.4 | 0.8 | 37.7 | 78.3 | 100 | 108 | ▲ ≈ 8.3% | 0 | 0 |
| CSA5W / Mid Bay Junop | No Fishing Occurred | 1.2 | 0.7 | 38.7 | 79 | 185 | 187 | ▲ ≈ 1% | 0 | 0 |
| CSA5W / Mid Sister Lake | No Init. Oysters | 0 | 0 | N/A | N/A | 142 | 129 | ▼ ≈ 8.9% | 0 | 0 |
| CSA5W / N. 94 Shell Plant | No Fishing Occurred | 21 | 12.5 | 70 | 97 | 393 | 1,429 | ▲ ≈ 263.7% | 0 | 0 |
| CSA5W / N. 95 Shell Plant | No Fishing Occurred | 3.4 | 2 | 60.8 | 91.1 | 366 | 429 | ▲ ≈ 17.3% | 0 | 0 |
| CSA5W / Old Camp | No Init. Oysters | 0 | 0 | N/A | N/A | 729 | 656 | ▼ ≈ 10% | 0 | 0 |
| CSA5W / Rat Bayou | Not Fishable | 0.2 | 0.1 | 27 | 72 | 134 | 122 | ▼ 8.7% | 0 | 0 |
| CSA5W / S. 94 Shell Plant | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA5W / SL 2004 Cultch Plant | Not Fishable | 1.2 | 0.6 | 17 | 66.4 | 1,641 | 1,555 | ▼ ≈ 5.3% | 0 | 0 |
| CSA5W / Sister Lake 2012 Cultch Plant 2 | No Fishing Occurred | 12 | 7.1 | 41.8 | 80.5 | 3,739 | 3,843 | ▲ ≈ 2.8% | 0 | 0 |
| CSA5W / Walkers Point | Not Fishable | 1.4 | 0.8 | 40.6 | 79.6 | 593 | 546 | ▼ ≈ 7.9% | 0 | 0 |
| CSA6 / Bayou Blanc | Not Fishable | 3.4 | 1.9 | 23.5 | 70 | 4,267 | 3,713 | ▼ ≈ 13% | 0 | 0 |
| CSA6 / Big Charles | Not Fishable | 2 | 1.2 | 35.5 | 76.9 | 2,543 | 2,300 | ▼ ≈ 9.6% | 0 | 0 |
| CSA6 / Dry Reef | No Init. Oysters | 0 | 0 | N/A | N/A | 851 | 748 | ▼ ≈ 12% | 0 | 0 |
| CSA6 / Highspot | Not Fishable | 4.6 | 2.7 | 31.3 | 74.7 | 2,218 | 2,046 | ▼ ≈ 7.8% | 0 | 0 |
| CSA6 / Indian Point | Not Fishable | 1.6 | 0.9 | 40.8 | 79.8 | 3,186 | 2,893 | ▼ ≈ 9.2% | 0 | 0 |
| CSA6 / Lighthouse Point | Not Fishable | 3.6 | 2.1 | 40.3 | 79.7 | 3,466 | 3,154 | ▼ ≈ 9% | 0 | 0 |
| CSA6 / Middle Reef | Not Fishable | 2.2 | 1.3 | 31.5 | 74.6 | 326 | 317 | ▼ ≈ 2.9% | 0 | 0 |
| CSA6 / N. Reef | Not Fishable | 2.4 | 1.4 | 27 | 72.1 | 1,308 | 1,167 | ▼ ≈ 10.8% | 0 | 0 |
| CSA6 / Nickle Reef | Not Fishable | 13 | 7.6 | 35.7 | 77 | 3,062 | 2,938 | ▼ ≈ 4% | 0 | 0 |
| CSA6 / Rabbit | No Init. Oysters | 0 | 0 | N/A | N/A | 2,360 | 1,962 | ▼ ≈ 16.8% | 0 | 0 |
| CSA6 / Sally Shoals | No Init. Oysters | 0 | 0 | N/A | N/A | 2,059 | 1,583 | ▼ ≈ 23.1% | 0 | 0 |
| CSA7 / 09 Cultch Plant | Not Fishable | 0.2 | 0.1 | 42 | 80.4 | 1,474 | 1,462 | ▼ ≈ 0.8% | 0 | 0 |
| CSA7 / 9 Mile | No Resources | 0 | 0 | N/A | N/A | 0 | 0 | ■ 0% | 0 | 0 |
| CSA7 / Big Washout | Not Fishable | 1.2 | 0.7 | 62.8 | 92.1 | 1,532 | 1,416 | ▼ ≈ 7.6% | 0 | 0 |
| CSA7 / Chenier Reef | Sust. W/ Conditions | 17 | 5.1 | 61.5 | 79.6 | 4,137 | 4,336 | ▲ ≈ 4.8% | 871 | 0 |
| CSA7 / Lamberts Reef | Solved | 2.6 | 0.3 | 88.5 | 88.9 | 914 | 914 | ▲ ≈ 0% | 7,326 | 0 |
| CSA7 / Little Washout | Not Fishable | 2.8 | 1.6 | 48.1 | 84.2 | 826 | 807 | ▼ ≈ 2.3% | 0 | 0 |
| CSA7 / Mid Lake | Not Fishable | 1 | 0.6 | 72 | 97.3 | 932 | 879 | ▼ ≈ 5.7% | 0 | 0 |
| CSA7 / N.E. Rabbit | Not Fishable | 1.4 | 0.8 | 82.7 | 103.4 | 1,378 | 1,221 | ▼ ≈ 11.4% | 0 | 0 |
| CSA7 / NW Rabbit Is. | Sust. W/ Conditions | 1.6 | 0.1 | 100.1 | 77.6 | 345 | 385 | ▲ ≈ 11.7% | 19,641 | 0 |
| CSA7 / S.E. Rabbit | Not Fishable | 0.2 | 0.1 | 37 | 77.6 | 718 | 649 | ▼ ≈ 9.6% | 0 | 0 |
| CSA7 / W. Cove Trans | No Init. Oysters | 0 | 0 | N/A | N/A | 902 | 809 | ▼ ≈ 10.3% | 0 | 0 |
| CSA7 / W. Rabbit | Solved | 7.2 | 2.1 | 77.6 | 88.7 | 1,800 | 1,800 | ▲ ≈ 0% | 42,373 | 0 |
| CSA7 / West Cove Central | Sust. W/ Conditions | 3 | 0.1 | 89.7 | 86 | 405 | 459 | ▲ ≈ 13.4% | 26,999 | 0 |

**Table 5. Sustainable harvest estimates. Area refers to a CSA (or sub-region). Seed fishing was not allowed in Lake Calcasieu. Market (Sack) and Seed harvests in sacks. Results are a summation of harvests from Table 3, excluding reefs that had no initial substrate.**

|  |  |  |
| --- | --- | --- |
| **CSA(Area)** | **Sack** | **Seed** |
| 1N | 26,006 | 6,641 |
| 1S | 0 | 0 |
| 3 | 596 | 214 |
| 5E | 0 | 0 |
| 5W | 0 | 0 |
| 6 | 0 | 0 |
| 7 (Calcasieu) | 97,210 | N/A |
| **Total** | **123,812** | **6,855** |

 Table 5 provides a summary of harvest results from Table 3; reefs which had no initial substrate are excluded from the estimate. Sustainable sack resource was found in Lake Calcasieu (in CSA7), CSA 1N and CSA3. Sustainable harvest of seed was available in CSA1N and CSA3.

 The 2018 simulations indicate an increase in the sustainable harvest of sack oysters (123,812 sacks, 2018; 48,926 sacks, 2017), a decrease in the sustainable harvest of seed oysters (6,855 sacks, 2018; 10,308 sacks, 2017), with an overall (sack + seed) increase in sustainable harvest compared to 2017 (130,67 sacks vs. 59,234 sacks). Thus, while the 2018 stock assessment shows a record low abundance in 2018, the 2018 sustainable harvest estimate was greater than that in 2017, due to differences in the constraints (e.g. fishing effort, proportion of sack to seed fishing) placed on the simulations in the two years. continues.

**Review of SAW Recommendations for 2017/2018**

**Recommendation 1**. Complete upgrades to the model/database environment. **Status**: Significant progress was made on the upgrade to the model/database environment. A rewrite was performed of the entire shell budget system, including the back-end database, the web components, and model logic. Data was imported from the old database to be used with the new platform. Critical parts of the model were redesigned using a modular system so that configuration options, parameterizations, and other aspects of running simulations can be changed easily in the future. Some remaining works needs to be done before the new version is ready for public launch, but the upgrades were mature enough to be used in-house for the SAW7 simulations.

**Recommendation 2**. Incorporate new equations for growth and mortality (old equations maintained for spat and seed mortality). **Status:** An error was detected in the equations of Lowe et al (2017). The correction was not made in time for SAW7. The simulations for 2018 therefore used the standard growth and mortality equations.

**Recommendation 3**. Incorporate the impact of seed fishing on sack oysters harvested.

**Status**: The recommendation was accomplished with the 2018 simulations. The fishing removal algorithm was changed so that sack oysters are affected by seed fishing. The seed fishing removal is performed first, removing the same fraction of cultch, sack, and seed. Sacking is then applied on the remaining sack oysters

**Recommendation 4.** Construct a lookup table for salinity. Use historic data and a quartile approach to characterize low, moderate and high salinity years. Capture monthly variation in salinity. **Status:** The table was completed (see below), but not incorporated into the simulations because of its dependence on the revised growth and mortality equations.

|  |  |  |  |
| --- | --- | --- | --- |
| **Month** | **Low Salinity Year** | **Moderate Salinity Year** | **High Salinity Year** |
| J | 9.8 | 18.3 | 18.8 |
| F | 9.0 | 15.0 | 21.8 |
| M | 7.3 | 15.3 | 20.5 |
| A | 6.5 | 13.8 | 22.3 |
| M | 7.3 | 12.8 | 21.8 |
| J | 9.0 | 12.8 | 17.8 |
| J | 5.5 | 11.3 | 16.3 |
| A | 7.3 | 11.0 | 18.5 |
| S | 9.0 | 14.0 | 19.3 |
| O | 11.8 | 16.0 | 23.0 |
| N | 12.3 | 16.3 | 23.8 |
| D | 11.5 | 16.0 | 25.0 |
| **Annual Mean** | **8.8** | **14.4** | **20.7** |

**Recommendation 5**. Determine sustainable harvest at low (8 annual mean), moderate (14 annual mean) and high (20 annual mean) salinity. **Status:** A lookup table was constructed for low, moderate and high salinity (Recommendation 4), but not used in 2018 simulations pending

resolution of new growth and mortality equations (Recommendation 2).

**Recommendation 6.** Use long-term data to determine if the summer high mortality season is becoming extended. **Status**: *Dermo* data from all Gulf of Mexico stations were extracted from Oyster Sentinel. The analysis of the data has not been completed.

**Recommendation 7.** Develop a multiple year model to evaluate model parameters such as growth, mortality and shell loss. **Status**: The new database (Recommendation 1) will accommodate multi-year simulations, if developed

**Recommendation 8**. Deploy spat collectors where recruitment is expected. **Status:** LDWF deployed spat collectors in CSA 2 at 2017 Lake Fortuna 2017 Cultch Plant 2018 Lake Fortuna 2018 Cutch Plant, as well as new site in the mid Breton Sound. Spat collectors were deployed in CSA3 at the: 2018 Barataria Bay 2018 Cultch Plant.

**Recommendation 9**. Use stock assessment data to ground truth side scan sonar in CSA 3. **Status**: Side scan sonar surveys were conducted in Hackberry and Barataria Bays in CSA3. The stock assessment data has not yet been used for ground-truthing the side scan sonar survey.

**Recommendation 10**. Add another Industry representative to the SAW committee. **Status:** A second Oyster Industry representative was invited to SAW7.

**Recommendation 11.** Schedule SAW7 for August 2018. **Status:** The SAW7 was held on August 28, 2018 at the University of New Orleans.

**Recommendations for 2018/2019**

The LDWF Stock Assessment Workshop process concludes with the Seventh Annual SAW. No recommendations were made for 2018/2019.

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