How do carryover and payback provisions impact stock status and rebuilding timelines?

Nathan R. Vaughan, John F. Walter, Shannon Cass-Calay

Southeast Fisheries Science Center

Sustainable Fisheries Division

Miami, FL

Gulf of Mexico SSC

May 8th, 2019

Council Request to SEFSC

Provide recommendations on the **percentage of unharvested quota that can be carried over and percentage of overharvested quota that must be repaid** to avoid negatively impacting stock status and rebuilding plans for red snapper, greater amberjack, and king mackerel.

- **Goal**: Demonstrate that 1:1 carryover and payback provisions can be applied without negative consequences.
- **Assume**: Underages and overages between ±50% across all directed fleets.

Methods

- Used base projection models (SS3) from SEDAR 33 update, SEDAR 38, and SEDAR 52.
  - Maintained all projection assumptions with no update to input data.
    - Utilized 49 : 51 commercial : recreational allocation for red snapper.
    - Bycatch rates fixed at values for red snapper.
    - Utilized 27 : 73 commercial : recreational allocation greater amberjack.

Methods

- Conducted twelve projection scenarios for each example species:
  - 2 - Base scenarios.
  - 3 - fixed single year overage scenarios.
  - 2 - 10 year randomized over/underage sequences beginning with an overage.
  - 3 - fixed single year underage scenarios.
  - 2 - 10 year randomized over/underage sequences beginning with an underage.

Methods

- Base projections (1-2):

  Base 1: Landings fixed at OFL projected levels.

  Base 2: Landings fixed at ABC projected levels.

Methods

- Single year perturbation projections (3-8):
  a) 2019 landings were increased/decreased by 10%, 25%, or 50% for all directed fleets.
  b) 2020 landings were decreased/increased by fleet-specific 2019 overage/underage.
  c) 2021-2030 landings were held at the ABC projected weight/numbers for each fleet.

Methods

- 10 year repeated perturbation projections (9-12):
  a) 2019 landings were changed by ±50%.
  b) 2020-2028 landings were modified by a random change between ±50% and the carryover/payback from the previous year.
  c) 2029 landing were modified by the fleet-specific 2028 underage/overage
  d) 2030 landings were fixed at ABC.

Results – Landings/ABC

Red snapper

Year	OFL	Overage Random 1	Overage Random 2	50% Overage	25% Overage	10% Overage	ABC	10% Underage	25% Underage	50% Underage	Underage Random 1	Underage Random 2
2017	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2018	1.07	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2019	1.05	1.50	1.50	1.50	1.25	1.10	1.00	0.90	0.75	0.50	0.50	0.50
2020	1.04	0.62	0.70	0.45	0.72	0.89	1.00	1.11	1.28	1.56	1.74	1.82
2021	1.03	0.46	0.48	0.99	1.00	1.00	1.00	1.00	1.00	1.01	0.46	0.48
2022	1.02	1.54	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.55	0.82
2023	1.02	1.31	1.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.31	1.84
2024	1.02	0.12	0.22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.22
2025	1.03	1.35	1.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.34	1.86
2026	1.03	1.23	0.64	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.23	0.64
2027	1.03	0.37	0.74	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.37	0.74
2028	1.02	1.32	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.31	0.78
2029	1.02	1.14	1.37	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.14	1.37
2030	1.02	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

- Landings perturbations much greater than OFL-ABC buffer.
- Over a multi-year period landings track ABC.
- Slight deviations <1% due to allocations by number in recreational fleets.

Greater amberjack

Year	OFL	Overage Random 1	Overage Random 2	50% Overage	25% Overage	10% Overage	ABC	10% Underage	25% Underage	50% Underage	Underage Random 1	Underage Random 2
2017	1.30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2018	1.28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2019	1.25	1.49	1.49	1.49	1.24	1.09	1.00	0.89	0.75	0.50	0.50	0.50
2020	1.21	0.75	0.83	0.57	0.78	0.91	1.00	1.08	1.21	1.42	1.60	1.68
2021	1.18	0.49	0.53	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.49	0.53
2022	1.15	1.51	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.51	0.80
2023	1.13	1.33	1.81	1.01	1.01	1.01	1.00	1.01	1.01	1.01	1.33	1.81
2024	1.12	0.15	0.25	1.01	1.01	1.01	1.00	1.01	1.01	1.01	0.15	0.25
2025	1.11	1.34	1.86	1.01	1.01	1.01	1.00	1.01	1.01	1.01	1.34	1.86
2026	1.10	1.23	0.66	1.01	1.01	1.01	1.00	1.01	1.01	1.01	1.23	0.66
2027	1.10	0.38	0.75	1.00	1.01	1.01	1.00	1.01	1.01	1.01	0.38	0.75
2028	1.09	1.31	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.31	0.79
2029	1.09	1.14	1.37	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.14	1.37
2030	1.09	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01

King mackerel

Year	OFL	Overage Random 1	Overage Random 2	50% Overage	25% Overage	10% Overage	ABC	10% Underage	25% Underage	50% Underage	Underage Random 1	Underage Random 2
2017	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2018	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2019	1.04	1.50	1.50	1.50	1.25	1.10	1.00	0.90	0.75	0.50	0.50	0.50
2020	1.04	0.67	0.75	0.49	0.75	0.90	1.00	1.10	1.25	1.51	1.69	1.77
2021	1.04	0.47	0.49	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.47	0.50
2022	1.04	1.54	0.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.54	0.82
2023	1.04	1.31	1.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.31	1.83
2024	1.04	0.12	0.22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.22
2025	1.04	1.35	1.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.35	1.86
2026	1.04	1.23	0.64	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.23	0.64
2027	1.04	0.37	0.74	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.37	0.74
2028	1.04	1.31	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.31	0.78
2029	1.04	1.14	1.37	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.14	1.37
2030	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Results – SSB/ABC

Red snapper

Year	OFL	Overage Random 1	Overage Random 2	50% Overage	25% Overage	10% Overage	ABC	10% Underage	25% Underage	50% Underage	Underage Random 1	Underage Random 2
2017	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2018	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2019	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2020	0.97	0.95	0.95	0.95	0.98	0.99	1.00	1.01	1.02	1.05	1.05	1.05
2021	0.97	0.98	0.97	0.99	1.00	1.00	1.00	1.00	1.00	1.01	0.99	0.98
2022	0.96	1.02	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.03	1.02
2023	0.96	0.99	1.03	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.04
2024	0.96	0.96	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.98
2025	0.96	1.02	1.03	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.02	1.03
2026	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97
2027	0.95	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99
2028	0.95	1.03	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.03	1.00
2029	0.95	1.02	1.03	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.02
2030	0.95	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

- SSB deviated minimally from ABC even under large ±50% overages/underages.
- Carryover/payback at 1:1 returned stock to within 1% of ABC in the following years.
- Slight deviations <1% due to allocations by number in recreational fleets.

Greater amberjack

Year	OFL	Overage Random 1	Overage Random 2	50% Overage	25% Overage	10% Overage	ABC	10% Underage	25% Underage	50% Underage	Underage Random 1	Underage Random 2
2017	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2018	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2019	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2020	0.95	0.90	0.90	0.90	0.95	0.98	1.00	1.02	1.05	1.10	1.10	1.10
2021	0.94	0.96	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.01	0.97	0.95
2022	0.93	1.08	1.05	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.08	1.05
2023	0.91	0.97	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.10
2024	0.90	0.89	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.92
2025	0.88	1.07	1.07	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.08	1.08
2026	0.86	1.01	0.89	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.01	0.90
2027	0.85	0.96	0.96	0.99	0.99	1.00	1.00	1.00	1.00	1.00	0.96	0.97
2028	0.84	1.09	1.02	0.99	0.99	0.99	1.00	0.99	1.00	1.00	1.09	1.03
2029	0.83	1.02	1.07	0.99	0.99	0.99	1.00	0.99	0.99	0.99	1.03	1.08
2030	0.82	0.99	1.00	0.99	0.99	0.99	1.00	0.99	0.99	0.99	0.99	1.00

King mackerel

Year	OFL	Overage Random 1	Overage Random 2	50% Overage	25% Overage	10% Overage	ABC	10% Underage	25% Underage	50% Underage	Underage Random 1	Underage Random 2
2017	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2018	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2019	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2020	0.97	0.92	0.92	0.92	0.96	0.98	1.00	1.02	1.04	1.08	1.08	1.08
2021	0.96	0.97	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.96
2022	0.96	1.06	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.03
2023	0.95	0.98	1.08	1.01	1.00	1.00	1.00	1.00	1.00	0.99	0.97	1.07
2024	0.95	0.93	0.95	1.01	1.00	1.00	1.00	1.00	1.00	0.99	0.91	0.93
2025	0.94	1.07	1.07	1.01	1.00	1.00	1.00	1.00	1.00	0.99	1.05	1.05
2026	0.94	1.02	0.93	1.01	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.92
2027	0.94	0.98	0.98	1.01	1.00	1.00	1.00	1.00	1.00	0.99	0.97	0.97
2028	0.94	1.08	1.03	1.01	1.00	1.00	1.00	1.00	1.00	0.99	1.07	1.02
2029	0.93	1.03	1.06	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.02	1.05
2030	0.93	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Conclusions

- Both carryover and payback provisions at 1:1 ratios are expected to maintain stock long term stock status at ABC projected levels.
- No negative impact on SSB or rebuilding timelines is expected from carryover or payback up to ±50% ABC.
- The small buffers between ABC and OFL means no substantial carryover is possible.
- Calculation of OFL levels as a multi-year total would allow large carryovers to be implemented and maintain sustainability. However, this is currently forbidden under NS1 guidelines.
- Results suggest that these large carryovers do meet SSB and rebuilding targets.

Important Assumptions/Caveats

- Results are hypothetical and are **not meant as the basis for management advice**
- Results are expected to hold for underages and overages up to ±50%.
- Results only hold if carryover is applied to the fleet for which the underage occurred
  - Differing selectivities by fleet imply that **carryovers/paybacks are non-transferable across fleets**

Results – Landings/ABC – Red snapper

Year	OFL	Overage Random 1	Overage Random 2	50% Overage	25% Overage	10% Overage	ABC	10% Underage	25% Underage	50% Underage	Underage Random 1	Underage Random 2
2017	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2018	1.07	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2019	1.05	1.50	1.50	1.50	1.25	1.10	1.00	0.90	0.75	0.50	0.50	0.50
2020	1.04	0.62	0.70	0.45	0.72	0.89	1.00	1.11	1.28	1.56	1.74	1.82
2021	1.03	0.46	0.48	0.99	1.00	1.00	1.00	1.00	1.00	1.01	0.46	0.48
2022	1.02	1.54	0.82	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.55	0.82
2023	1.02	1.31	1.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.31	1.84
2024	1.02	0.12	0.22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.22
2025	1.03	1.35	1.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.34	1.86
2026	1.03	1.23	0.64	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.23	0.64
2027	1.03	0.37	0.74	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.37	0.74
2028	1.02	1.32	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.31	0.78
2029	1.02	1.14	1.37	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.14	1.37
2030	1.02	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Results – Landings/ABC – Greater amberjack

Year	OFL	Overage Random 1	Overage Random 2	50% Overage	25% Overage	10% Overage	ABC	10% Underage	25% Underage	50% Underage	Underage Random 1	Underage Random 2
2017	1.30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2018	1.28	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2019	1.25	1.49	1.49	1.49	1.24	1.09	1.00	0.89	0.75	0.50	0.50	0.50
2020	1.21	0.75	0.83	0.57	0.78	0.91	1.00	1.08	1.21	1.42	1.60	1.68
2021	1.18	0.49	0.53	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.49	0.53
2022	1.15	1.51	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.51	0.80
2023	1.13	1.33	1.81	1.01	1.01	1.01	1.00	1.01	1.01	1.01	1.33	1.81
2024	1.12	0.15	0.25	1.01	1.01	1.01	1.00	1.01	1.01	1.01	0.15	0.25
2025	1.11	1.34	1.86	1.01	1.01	1.01	1.00	1.01	1.01	1.01	1.34	1.86
2026	1.10	1.23	0.66	1.01	1.01	1.01	1.00	1.01	1.01	1.01	1.23	0.66
2027	1.10	0.38	0.75	1.00	1.01	1.01	1.00	1.01	1.01	1.01	0.38	0.75
2028	1.09	1.31	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.31	0.79
2029	1.09	1.14	1.37	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.14	1.37
2030	1.09	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01

Results – Landings/ABC – King mackerel

Year	OFL	Overage Random 1	Overage Random 2	50% Overage	25% Overage	10% Overage	ABC	10% Underage	25% Underage	50% Underage	Underage Random 1	Underage Random 2
2017	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2018	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2019	1.04	1.50	1.50	1.50	1.25	1.10	1.00	0.90	0.75	0.50	0.50	0.50
2020	1.04	0.67	0.75	0.49	0.75	0.90	1.00	1.10	1.25	1.51	1.69	1.77
2021	1.04	0.47	0.49	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.47	0.50
2022	1.04	1.54	0.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.54	0.82
2023	1.04	1.31	1.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.31	1.83
2024	1.04	0.12	0.22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.12	0.22
2025	1.04	1.35	1.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.35	1.86
2026	1.04	1.23	0.64	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.23	0.64
2027	1.04	0.37	0.74	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.37	0.74
2028	1.04	1.31	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.31	0.78
2029	1.04	1.14	1.37	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.14	1.37
2030	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Results – SSB/ABC – Red snapper

Year	OFL	Overage Random 1	Overage Random 2	50% Overage	25% Overage	10% Overage	ABC	10% Underage	25% Underage	50% Underage	Underage Random 1	Underage Random 2
2017	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2018	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2019	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2020	0.97	0.95	0.95	0.95	0.98	0.99	1.00	1.01	1.02	1.05	1.05	1.05
2021	0.97	0.98	0.97	0.99	1.00	1.00	1.00	1.00	1.00	1.01	0.99	0.98
2022	0.96	1.02	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.03	1.02
2023	0.96	0.99	1.03	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.04
2024	0.96	0.96	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.98
2025	0.96	1.02	1.03	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.02	1.03
2026	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97
2027	0.95	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99
2028	0.95	1.03	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.03	1.00
2029	0.95	1.02	1.03	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.01	1.02
2030	0.95	1.01	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Results – SSB/ABC – Greater amberjack

Year	OFL	Overage Random 1	Overage Random 2	50% Overage	25% Overage	10% Overage	ABC	10% Underage	25% Underage	50% Underage	Underage Random 1	Underage Random 2
2017	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2018	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2019	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2020	0.95	0.90	0.90	0.90	0.95	0.98	1.00	1.02	1.05	1.10	1.10	1.10
2021	0.94	0.96	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.01	0.97	0.95
2022	0.93	1.08	1.05	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.08	1.05
2023	0.91	0.97	1.10	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	1.10
2024	0.90	0.89	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.89	0.92
2025	0.88	1.07	1.07	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.08	1.08
2026	0.86	1.01	0.89	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.01	0.90
2027	0.85	0.96	0.96	0.99	0.99	1.00	1.00	1.00	1.00	1.00	0.96	0.97
2028	0.84	1.09	1.02	0.99	0.99	0.99	1.00	0.99	1.00	1.00	1.09	1.03
2029	0.83	1.02	1.07	0.99	0.99	0.99	1.00	0.99	0.99	0.99	1.03	1.08
2030	0.82	0.99	1.00	0.99	0.99	0.99	1.00	0.99	0.99	0.99	0.99	1.00

Results – SSB/ABC – King mackerel

Year	OFL	Overage Random 1	Overage Random 2	50% Overage	25% Overage	10% Overage	ABC	10% Underage	25% Underage	50% Underage	Underage Random 1	Underage Random 2
2017	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2018	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2019	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2020	0.97	0.92	0.92	0.92	0.96	0.98	1.00	1.02	1.04	1.08	1.08	1.08
2021	0.96	0.97	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.96
2022	0.96	1.06	1.04	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.03
2023	0.95	0.98	1.08	1.01	1.00	1.00	1.00	1.00	1.00	0.99	0.97	1.07
2024	0.95	0.93	0.95	1.01	1.00	1.00	1.00	1.00	1.00	0.99	0.91	0.93
2025	0.94	1.07	1.07	1.01	1.00	1.00	1.00	1.00	1.00	0.99	1.05	1.05
2026	0.94	1.02	0.93	1.01	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.92
2027	0.94	0.98	0.98	1.01	1.00	1.00	1.00	1.00	1.00	0.99	0.97	0.97
2028	0.94	1.08	1.03	1.01	1.00	1.00	1.00	1.00	1.00	0.99	1.07	1.02
2029	0.93	1.03	1.06	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.02	1.05
2030	0.93	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00