Old moms with new tricks: modeling the effects of age-specific spawning behaviors in Pacific Ocean perch

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In commercially exploited, long-lived fish species, age structure plays an important role in determining population stability and resilience to human and environmental impacts. The often observed increase in energy allocation per offspring by older females can improve larval survival through an increased time to starvation and higher likelihood of encountering favorable environmental conditions once released. Females of different age and size may also spawn earlier or over a more protracted season. Thus, populations with broader age structure can contribute to population stability through an increase in both the quantity and quality of larvae, and by increasing the range of spawn timing and locations. Data collected on Pacific ocean perch in the Gulf of Alaska suggest that older POP females spawn earlier than younger females, that older females provision their larvae with larger oil globules, and older females have less variable oil globule size. In addition, independent of female age, oil globule volume declines through the spawning season for both young and old females. We parameterized an individual-based model with these age-specific spawning behaviors to explore the effects of age structure and spatio-temporal variability in environmental conditions on POP dynamics in the Gulf of Alaska.