Population model estimates for oysters (Crassostrea virginica) in the Choptank and Little Choptank Rivers

Website: https://www.bco-dmo.org/dataset/808879
Data Type: model results
Version: 1
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Project
» Coastal SEES Collaborative Research: Oyster fisheries in the Chesapeake Bay: Integrating stakeholder objectives with natural system models to promote sustainable policy (Chesapeake Bay Oyster Fisheries)

Contributors	Affiliation	Role
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Abstract
This data set contains estimates derived from a population model of oysters in the Choptank and Little Choptank Rivers. The methods and data used in the model are described in Damiano et al. (2019).

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Coverage

Temporal Extent: 1989 - 2015

Dataset Description

This data set contains estimates derived from a population model of oysters in the Choptank and Little Choptank Rivers. The methods and data used in the model are described in Damiano et al. (2019).

Terms beginning with "obs" e.g. obs_spat, small, mk, etc. Refer to "observed" log-scale indices of abundance from the MD DNR Fall Dredge Survey; values were obtained from MD DNR data for fitting in the standardization model.
Terms beginning with "log_pred" e.g. log_pred_spat, small, mk, etc. Refer to standardized "predicted log scale indices of relative density that have been estimated using the standardization model.
Terms containing "_mil" suffix e.g. sp_mil, sm_mil, mk_mil contain abundance estimates from the population dynamics model in millions of oysters .

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Data Files

File
oyster_pop_model_estimates.csv(Comma Separated Values (.csv), 82.83 KB)   MD5:eb69eb3e73aa412e4cc3a4aa542fed41   Primary data file for dataset ID 808879

[ ]

Related Publications

Damiano, M. D., & Wilberg, M. J. (2019). Population dynamics of eastern oysters in the Choptank River Complex, Maryland during 1989–2015. Fisheries Research, 212, 196–207. doi:
Results

[ ]

Parameters

Parameter	Description	Units
location_name	Name of location/model run. "open" and "closed" refer to whether the model included closures from the implementation of oyster sanctuaries	unitless
year	Year; format: yyyy	unitless
obs_spat	"observed" log-scale index of abundance of young of the year (YOY) oysters	unitless
obs_small	"observed" log-scale index of abundance of small, sexually mature oysters	unitless
obs_mk	"observed" log-scale index of abundance of market-sized, sexually mature oysters	unitless
obs_sm_b	"observed" log-scale index of abundance of the oyster shell "box" left behind when small oysters die	unitless
obs_mk_b	"observed" log-scale index of abundance of the oyster shell "box" left behind when market-sized oysters die	unitless
log_pred_spat	"predicted" log scale index of relative density of young of the year (YOY) oysters	unitless
log_pred_small	"predicted" log scale index of relative density of small, sexually mature oysters	unitless
log_pred_mk	"predicted" log scale index of relative density of market-sized, sexually mature oysters	unitless
log_pred_sm_b	"predicted" log scale index of relative density of the oyster shell "box" left behind when small oysters die	unitless
log_pred_mk_b	"predicted" log scale index of relative density of the oyster shell "box" left behind when market-sized oysters die	unitless
spat	population dynamics model estimate of 1000s of spat	unitless
small	population dynamics model estimate of 1000s of small oysters	unitless (count)
mk	population dynamics model estimate of 1000s of market oysters	unitless (count)
sp_mil	abundance estimate of YOY oysters from the population dynamics model in millions of oysters	unitless (count)
sm_mil	abundance estimate of small, sexually mature oysters from the population dynamics model in millions of oysters	unitless (count)
mk_mil	abundance estimate of market-sized, sexually mature oysters from the population dynamics model in millions of oysters	unitless (count)

adult_mil	Total estimated abundance, in millions, of small and market oysters	unitless (count)
harvest_sm	Estimated catch of small oysters	unitless (count)
harvest_mk	Estimated catch of small oysters	unitless (count)
M	Estimated instantaneous rate of natural mortality	unitless
A	Estimated annual rate of natural mortality	unitless
u	Estimated rate of exploitation	unitless
HT_CPUE_b	Observed (calculated) catch-per-unit-effort for hand tong gear at the beginning of the oyster fishing season	unitless
pred_HT_CPUE_b	Standardized estimates of catch-per-unit-effort for hand tong gear at the beginning of the oyster fishing season	unitless
HT_CPUE_a	Observed (calculated) catch-per-unit-effort for hand tong gear at the end of the oyster fishing season	unitless
pred_HT_CPUE_a	Standardized estimates of catch-per-unit-effort for hand tong gear at the end of the oyster fishing season	unitless
PD_CPUE_b	Observed (calculated) catch-per-unit-effort for power dredge gear at the beginning of the oyster fishing season	unitless
pred_PD_CPUE_b	Standardized estimates of catch-per-unit-effort for power dredge gear at the beginning of the oyster fishing season	unitless
PD_CPUE_a	Observed (calculated) catch-per-unit-effort for power dredge gear at the end of the oyster fishing season	unitless
pred_PD_CPUE_a	Standardized estimates of catch-per-unit-effort for power dredge gear at the end of the oyster fishing season	unitless
Hab	Estimated amount of oyster habitat in meters	meters
km_Hab	Estimated amount of oyster habitat in kilometers	kilometers
A_upper	95% upper confidence interval for the estimated annual rate of natural mortality	unitless
A_lower	95% lower confidence interval for the estimated annual rate of natural mortality	unitless
r_upper	95% upper confidence interval for the estimated recruitment (YOY;spat)	unitless
r_lower	95% lower confidence interval for the estimated recruitment (YOY;spat)	unitless
N_upper	95% upper confidence interval for the estimated adult abundance (smalls, markets)	unitless (count)
N_lower	95% lower confidence interval for the estimated adult abundance (smalls, markets)	unitless (count)
u_upper	95% upper confidence interval for the estimated rate of exploitation	unitless
u_lower	95% lower confidence interval for the estimated rate of exploitation	unitless
hab_upper	95% upper confidence interval for the estimated amount of habitat	meters
hab_lower	95% lower confidence interval for the estimated amount of habitat	meters

Project Information

Coastal SEES Collaborative Research: Oyster fisheries in the Chesapeake Bay: Integrating stakeholder objectives with natural system models to promote sustainable policy (Chesapeake Bay Oyster Fisheries)

Website: https://oysterfutures.wordpress.com/

Coverage: Chesapeake Bay

NSF Award Abstract:
Researchers will use the oyster fisheries in the Chesapeake Bay as a test case for collaborative policy development that is grounded in sound science. Environmental policies often create controversy and can be difficult to enforce, particularly when people do not understand the reason for the rules or do not consider the rules to be fair. Natural resources can be better sustained by policies developed cooperatively among all affected stakeholders, scientists, and government representatives. In a systematic approach, the project team will hold a series of workshops in which a full set of stakeholders will work with scientists to guide development of a model, select policy objectives, and apply the model to make policy recommendations. A collaborative modeling approach will ensure that stakeholders have an opportunity to incorporate their values, objectives, and knowledge into the model of the estuarine ecosystem which will include many benefits from the natural system such as commercial and recreational fishing, safe swimmable water, and other ecosystem services. Researchers will study the sociology and economics that influence stakeholder involvement and policy formation in order to better understand the human dimensions, improve the process, and enhance the implementation success of recommended policies. The lessons learned regarding the oyster ecosystem and fishery will advance the tools and practices of sustainable management of shellfisheries. The policy recommendations from the stakeholder workshops will be evaluated by state and federal agencies, and if implemented, would be an outcome that would directly enhance coastal sustainability. One Ph.D. student, two masters students, and one postdoctoral researcher will be trained in the science of coupled natural-human systems. This project is supported as part of the National Science Foundation's Coastal Science, Engineering, and Education for Sustainability program - Coastal SEES.

This research aims to improve the utility of predictive models for shaping natural resource policy and management. The research team will build an innovative natural systems model that integrates three-dimensional hydrodynamic, water quality and larval transport models with oyster demographics, human uses, and economics at a scale that is applicable to restoration and management. The modeling system developed will substantially advance methods for investigating, and understanding, natural systems with complex feedbacks between physical conditions, vital rates of organisms, and humans. Researchers will include stakeholder values, objectives, and knowledge in the model design process. Through a series of workshops, stakeholders will select the policy objectives and the integrated model will project how well policies are expected to meet these objectives. This iterative process will ensure that the natural system model will incorporate the complex human uses of the ecosystem. A targeted effort will be made to study the socioeconomic drivers of stakeholder involvement, information flow, use and influence, and the policy formation in order to improve the process and enhance the implementation success of recommended policies. By doing so, this research will advance understanding of the human dimensions needed to create sustainable policy as well as provide important new strategies for integrating natural and social sciences, and scientists, in sustainable resource management. This generalizable research component provides an important complement to the research on oysters, both of which will advance the tools and practices of sustainable management of shellfisheries.

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1427019