R A í _

H _ . U W _ . . S . W _ -W . S . . : E . E . m . A . . S . A . .

RAMUNAS ZYDELIS,[1,2] C i_ j E _ , Si F i í , D _ , BC _4K 3N2, C
DANIEL ESLER, C i_ j E _ , Si F i í , D _ , BC _4K 3N2, C
W. SEAN BOYD, C i i_ j S i , D _ , BC _4K 3N2, C
DEBORAH L. LACROIX, C i_ j E _ , Si F i í , B , BC _5A 1S6, C
MOLLY KIRK, C i_ j E _ , Si F i í , B , BC _5A 1S6, C

A . .

*Shellfi h a ac lt e i an e panding ind t in coa tal B iti h Col mbia, Canada, and occ in impo tant inte ing a ea fo f cote (*Melanitta perspicillata*) and hite- inged cote (*M. fusca*). We antified habitat e b cote in elation to nat al en i onmental att ib te and habitat modification a ociated ith hellfi h a ac lt e. We fo nd that, de pite the e ten i e clam and o te fa ming in o t d a ea, den itie of inte ing f cote and hite- inged cote e e elated p ima il to nat al en i onmental att ib te , pa tic la l inte tidal a ea, clam den it , and ediment t pe; hellfi h a ac lt e a iable e e gene all poo p edicto of bi d den itie . We concl de that c ent le el and fo m of hellfi h a ac lt e in o t d ite e e not an impo tant dete minant of cote di t ib tion and ab ndance, gge ting that inte cote pop lation and the hellfi h a ac lt e ind t ma be m t all tainable. We ca tion that inten ification o f the ind t iali ation of hellfi h a ac lt e in B iti h Col mbia co ld e ent all lead to det imental effect if ome th e hold le el of habitat modification i e ceeded.*
(JOURNAL OF WILDLIFE MANAGEMENT 70(6):1754–1762; 2006)

K . .

B i i C _ í , i , Melanitta fusca*,* Melanitta perspicillata*, _i _ , , , í - í .*

In coastal British Columbia, Canada, some nearshore habitats have been modified for the benefit of the commercial shellfish aquaculture industry. This industry is expanding, leading to questions about potential effects on wildlife populations, as well as other environmental impacts. Previous research has suggested that a different form of commercial shellfish exploitation, harvest of wild shellfish stocks, can have deleterious effects on bird populations. For example, overharvesting of bivalves in the Dutch Wadden Sea was thought to be the main cause of starvation, mass mortality, and reduced reproductive output of common eiders (*Somateria mollissima*), and reduced condition and survival of oystercatchers (*Haematopus ostralegus*; Camphuy-

numbers. Because scoters spend most of their annual cycle on nonbreeding areas, understanding the key factors associated with their winter habitat use is particularly relevant.

Given the overlapping distributions and high densities of both scoters and shellfish aquaculture activities, there is significant potential for interaction, both positive and negative. The presence of shellfish aquaculture could be

respective model in the set. We also calculated Akaike weights to compare the relative likelihood of each model in the candidate set (Burnham and Anderson 2002), and we presented R^2 values to describe overall model fit. To determine the relative importance of each explanatory variable within a candidate model set, we summed Akaike weights for all candidate models containing the explanatory variable under consideration, providing a parameter likelihood value, which is a measure of the strength of the variable for explaining variation in the response. Because we included or excluded BASE variables as a group, the parameter likelihood values for these variables are constrained to be the same. Finally, we calculated model-averaged parameter estimates and unconditional SE for each

had a positive association with white-winged scoter density, but our data did not support a relationship with density of Manila and Pacific littleneck clams (Table 3). Parameter estimates and associated SE of other natural environmental attributes indicated that their values and 95

the event of industry expansion. Similarly, studies of other aspects of wintering ecology would be valuable for fully understanding potential effects of shellfish aquaculture on scoter populations. For example, studies of foraging ecology, movement, and survival of scoters in areas modified by shellfish aquaculture would provide important insights into effects of the industry, beyond habitat use described here. Finally, shellfish aquaculture may affect many other wildlife species. We chose scoters because of the overlap between the shellfish industry and important wintering sites, as well as the plausible mechanisms that might disproportionately affect scoters in comparison to other species. However, attention to other wildlife species, as well as other aspects of environmental quality, structure, and function is necessary.

M . . m . . lm . . .

We demonstrated that current intensities and practices of shellfish aquaculture in Baynes Sound do not strongly affect habitat use by surf scoters and white-winged scoters. This is encouraging, as there is strong pressure for economic development in coastal British Columbia that is environmentally sustainable. Because researchers have documented habitat alterations associated with wild shellfish harvesting to have effects on waterbirds (Camphuysen et al. 2002, Oosterhuis and Van Dijk 2002, Atkinson et al. 2003, Verhulst et al. 2004), managers should recognize that intensification or further industrialization of shellfish aquaculture in British Columbia could eventually lead to detrimental effects if the level of habitat change approaches that associated with wild shellfish harvest. Careful consideration and planning of industry activities is necessary to ensure that managers maintain carrying capacity for scoters in a working landscape.

A . . . . . m . .

The Canadian Wildlife Service of Environment Canada and National Science and Engineering Research Council strategic grant STPGP246079-01 funded this study. We also thank the Centre for Wildlife Ecology, Simon Fraser University for providing scientific and logistic support. The following people provided field assistance: E. Anderson, B. Bartzen, T. Bowman, S. Coulter, R. Dickson, G. Grigg, S. Iverson, R. Lis, A. McLean, E. Sellentin, and S. Wallace. We also thank all leaseholders within Baynes Sound who granted us access to their property. We appreciate constructive comments by the *Journal* editors and 2 anonymous reviewers.

L . . . . C .

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