CORKWING WRASSE

Stock name: Corkwing wrasse
Latin name: *Symphodus melops*
Geographical area: Coast of Norway (ICES subarea 2 and 4)
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Stock Sensitivity Attributes

HABITAT SPECIFICITY: The corkwing wrasse (*Symphodus melops*, Labridae) is a common species along rocky shores from Southern Portugal to Mid-Norway. During the spawning season, males build complex nests of specific macroalgae, including coralline algae, and require hard substrate for nesting at depths between 0-10 meters (Potts, 1985). Stretches of predominantly sandy bottoms seems to hinder/reduce geneflow, and there is a strong genetic barrier between populations north and south of Jæren in Norway (Faust et al., 2018; Halvorsen et al., 2016; Knutsen et al., 2013).

PREY SPECIFICITY: Corkwing wrasse feeds on broad ranges of invertebrates, including molluscs, gastropods, polychaetas and crustaceans (Alvsvåg, 1993; Deady & Fives, 1995a, 1995b; Sayer et al., 1996). Larval and juvenile feeding is poorly known.

SPECIES INTERACTION: The diet and habitat of corkwing wrasse overlaps with several other fish species, such as other wrasses, gobies, and juvenile gadoids (Deady & Fives, 1995b; Sayer et al., 1996; Thangstad, 1999). Other wrasses have been observed feeding inside the nest, probably consuming eggs, and antagonistic behaviours with other wrasse species are common (Potts, 1974, 1985).

ADULT MOBILITY: Corkwing wrasse has high site fidelity. Ongoing multiyear tagging surveys shows that adult corkwing does not cross deep waters (>20 m) and that males return to the nesting territory of the previous season (Halvorsen, Sørdalen, et al., 2017; Potts, 1985).

DISPERSAL OF EARLY LIFE STAGES: The benthic eggs are guarded by the nesting male until hatching (Potts, 1985). The behaviour of newly hatched larvae is poorly studied. The duration of pelagic larvae phase has been reported in the range of 14-25 days (Knutsen et al., 2013).

EARLY LIFE HISTORY SURVIVAL AND SETTLEMENT REQUIREMENTS: Requirements of corkwing larvae in the wild is poorly known.

COMPLEXITY IN REPRODUCTIVE STRATEGY: Corkwing wrasse shows a highly complex reproductive strategy; two different fixed male morph: (i) Territorial males which grow fast and mature late (Halvorsen et al., 2016; Potts, 1985). These males build nests in up to 2 weeks and guard the clutch for up to 10 days after spawning. (ii) Male sneakers are indistinguishable from females in appearance, grow slow and mature early (up to 2 years before the nesting males). Male sneakers try to fertilize the eggs in a nest of the territorial males. The factors regulating the proportion and relative fitness of territorial and sneaking males may be affected by environmental and/or genetic factors (Uglem et al., 2000, 2001). Corkwing wrasse can spawn multiple times per lifetime and show clear spatial differences in life history traits (maturation, growth, life span, sexual size dimorphism).

SPAWNING CYCLE: Corkwing wrasse spawns once per year; over approximately 6-8 weeks between May and July (Bussmann, 2017; Halvorsen, Sørdalen, et al., 2017; Skiftesvik et al., 2015). The relatively long duration of the nesting period may reduce the risk of being severely affected by climate change.

SENSITIVITY TO TEMPERATURE: The species is found over a relatively large temperature range (Faust et al., 2018; Knutsen et al., 2013; Robalo et al., 2012). As it is restricted to shallow waters, nests may have the capacity for elevated temperature exposure (Potts, 1985).

SENSITIVITY TO OCEAN ACIDIFICATION: A study on the related *Symphodus ocellatus* (Labridae) found that higher CO_2 concentrations reduces spawning rates for dominant nesting males (Hofmann et al., 2012, 2013; Milazzo et al., 2016). *S. melops* has a strong preference for coralline algae for nest building, which may be strongly affected by increased CO_2 levels.

POPULATION GROWTH RATE: Relatively short life span (4-9 years), early maturity (1-4 years, spatially variable), small maximum size (25 cm) and high von Bertalanffy K (0.33, females Western Norway) (Darwall et al., 1992; Halvorsen et al., 2016).

STOCK SIZE/STATUS: Corkwing wrasse should be considered data poor: the abundance and mean size of corkwing is generally higher within marine protected areas compared to adjacent fished areas. A tagging study in Western Norway found that 31-41% of tagged corkwing specimens were fished over a two-month period (Halvorsen, Larsen, et al., 2017; Halvorsen, Sørdalen, et al., 2017).

OTHER STRESSORS: We are not aware of any additional stressors.

Scoring of the considered sensitivity attributes

Sensitivity attributes, climate exposure based on climate projections allowing the evaluations of impacts of climate change, and accumulated directional effect scoring for Corkwing wrasse (*Symphodus melops*) stock in ICES subareas 2 and 4. L: low; M: moderate; H: high; VH: very high, $Mean_w$: weighted mean; N/A: not applicable. Usage: this column was used to make ad hoc notes, including considerations about the amount of relevant data available: 1 = low, 2 = moderate; 3 = high. N/A = not applicable.

Corkwing wrasse (*Symphodus melops*) in ICES subareas 2 and 4

SENSITIVITY ATTRIBUTES	L	M	H	VH	$Mean_w$	Usage	Remark
Habitat Specificity	0	0	4	1	**3.2**		
Prey Specificity	3	2	0	0	**1.4**		
Species Interaction	0	2	2	1	**2.8**		
Adult Mobility	0	0	3	2	**3.4**		
Dispersal of Early Life Stages	0	2	2	1	**2.8**		
ELH Survival and Settlement Requirements	1	2	1	1	**2.4**		
Complexity in Reproductive Strategy	0	0	3	2	**3.4**		
Spawning Cycle	0	0	4	1	**3.2**		
Sensitivity to Temperature	3	2	0	0	**1.4**		
Sensitivity to Ocean Acidification	1	1	2	1	**2.6**		
Population Growth Rate	3	2	0	0	**1.4**		
Stock Size/Status	2	3	0	0	**1.6**		
Other Stressors	1	2	1	1	**2.4**		
Grand mean					**2.46**		
Grand mean SD					**0.78**		

CLIMATE EXPOSURE	L	M	H	VH	$Mean_w$	Usage	*Directional Effect*
Surface Temperature	2	2	1	0	**1.8**	2	1
Temperature 100 m	0	0	0	0		N/A	
Temperature 500 m	0	0	0	0		N/A	
Bottom Temperature	0	0	0	0		N/A	
O_2 (Surface)	4	1	0	0	**1.2**	1	-1
pH (Surface)	1	1	2	1	**2.6**	2	-1
Gross Primary Production	5	0	0	0	**1.0**	2	0
Gross Secondary Production	2	2	1	0	**1.8**	2	1
Sea Ice Abundance	0	0	0	0		N/A	
Grand mean					**1.68**		
Grand mean SD					**0.63**		
Accumulated Directional Effect					**–**		**-0.2**

***Accumulated Directional Effect*: NEUTRAL**	**-0.2**

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