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**Improving compliance of recreational fishers with Rockfish Conservation Areas:
Community-academic partnership to achieve and evaluate conservation**

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Abstract

Compliance is a key factor in ensuring success of marine conservation. We describe a community-academic partnership that seeks to reduce non-compliance of recreational fishers with Rockfish Conservation Areas (RCAs) around Galiano Island in British Columbia, Canada. Previous work showed mostly unintentional non-compliance by recreational fishers. From 2015-2018 we developed and implemented outreach and public education activities. We distributed information at community events, and installed 46 metal signs with maps of nearby RCAs at marinas, ferry terminals, and boat launches. During the summers of 2015, 2017, and 2018, we interviewed 86 recreational fishers to gauge their compliance with RCAs. Compared to a baseline in 2014, there was a reduction of 22% (from 25% to 3%) of people who unintentionally fished in RCAs with prohibited gears. In 2018, 67% of participants had seen our outreach

materials. We used trail cameras overlooking RCAs to assess non-compliance in six locations on Galiano Island. Illegal fishing incidents within RCAs declined from 42% of days monitored in 2014 to 14% in 2018. While our outreach efforts were limited in scale and scope, they appear to be making a difference. Our activities and findings can provide guidance for other regions seeking to improve compliance by recreational fishers.

Introduction

Over the past several decades, there has been mounting concern for the state of the world's fish populations, with overfishing as a key driver (Pauly et al., 2003; Halpern et al., 2012; Costello et al., 2016; Pauly and Zeller, 2016). Spatial management strategies have been implemented around the globe in an attempt to protect marine biodiversity and sustain fisheries (Vandeperre et al., 2011; Edgar et al., 2014; Gnanalingam and Hepburn, 2015). Such strategies involve identifying an area to rebuild and sustain an ecosystem or a specific species within that area, and include fisheries closures and marine protected areas (MPAs) (Walters and Martell, 2004; Douvère, 2008). The success of spatial management strategies depends on several factors, including the nature of restrictions, size of the area, characteristics of targeted marine species, and the compliance of fishers (Edgar et al., 2014; Arias et al., 2015; Sciberras et al., 2015).

Compliance is essential for spatial conservation measures to be successful (Arias et al., 2015; Bergseth et al., 2015; Bergseth et al., 2017). With global recognition of problems with illegal fishing, efforts are underway to understand the nature of the problem and reduce non-compliance (Agnew et al., 2009; Cabral et al., 2018). For example, international collaborations have formed between many organizations in the Southern Ocean to help reduce illegal, unreported, and unregulated fishing activity (Österblom and Bodin, 2012). In other regions, changes in regulations have reduced illegal fishing. For example, in California illegal take of abalone decreased after the introduction of tagging regulations and marine protected areas (Lewis, 2015). In many cases, however, information is limited about the extent of illegal fisheries (e.g., Pita et al., 2017).

Achieving compliance is particularly difficult for fisheries that do not have advanced monitoring requirements (e.g. vessel monitoring systems, onboard observers). Marine recreational fisheries are a case in point. While globally marine recreational fisheries comprise a small portion of catches (<1% of global catches) (Pauly and Zeller, 2016), they contribute a large proportion of catches in some regions and for some species (Cooke and Cowx, 2004; Lewin et al., 2006). For instance, recreational fisheries account for 89% of total annual catch of rockfish in the Strait of Georgia, Canada (Haggarty, 2014), 43% of Atlantic pollack in the Celtic Seas and English Channel (Radford et al., 2018), and 92% of pollack in France (Herfaut et al., 2013). Marine recreational fisheries are varied, encompassing multiple gears (e.g. hook-and-line, trap, spearfish) and motivations for fishers (e.g. fishing for food, catch-and-release), and diverse regulations (Pita et al., 2018). In developed nations, one in ten people are estimated to fish for pleasure (Arlinghaus et al., 2019). With many individuals involved in recreational fisheries, ensuring knowledge of, and compliance with rules, is a challenge. For instance, in 83% of Rockfish Conservation Areas studied in the Strait of Georgia, recreational fishing activity remained the same as before the implementation of the conservation measure (Haggarty et al., 2016). Similarly, in the same area, approximately 60% of recreational fishers could not identify the location of closures in places they fished (Lancaster et al., 2015).

The purpose of this project was to develop strategies to improve recreational fisher compliance with a spatial management tool, Rockfish Conservation Areas (RCAs), in the southern Gulf Islands of British Columbia (BC), Canada. Our study was inspired by previous research that found that recreational fishers were largely unaware of the existing rules and boundaries of

RCAs, and saw a need for increased outreach and education (Lancaster et al., 2015). Here we report on our collaborative effort to increase awareness of RCAs among recreational fishers, while monitoring the effectiveness of these outreach strategies. This case study provides insight into the potential of partnerships between non-governmental organizations (NGOs) and educational institutions, with support by government, to act towards conservation of a group of species at a local level.

Methods

Case study background

Our case study focused on rockfish (*Sebastes* spp.) in the Strait of Georgia, British Columbia (BC) (Figure 1) because conservation efforts are underway to recover depleted populations, and because recreational fishing contributes to the majority of rockfish mortality in the region (Haggarty, 2014). Rockfish are susceptible to overfishing because of their long lifespan (Munk, 2001), long maturation rate, and stationary lifestyle (Love et al., 2002; Berkeley et al., 2004a; Berkeley et al., 2004b). Furthermore, as with other physoclistic and deep-dwelling species, they experience severe barotrauma from the expansion of swim bladder gases as the fish are brought to the surface (Hannah et al., 2008). Several rockfish species are listed as special concern, threatened, or endangered (Table 1). Rockfish Conservation Areas (RCAs) were implemented off the coast of BC to protect and recover populations of rockfishes, especially inshore rockfish (Yamanaka and Logan, 2010). Permitted recreational fishing activities within RCAs are hand picking or diving for invertebrates; crab by trap; shrimp/prawn by trap; and smelt by gillnet (Fisheries and Oceans Canada, 2005). Commercial groundfish fisheries in BC have vessel

monitoring systems and 100% observer coverage, and thus good compliance. Yet whilst RCAs have been in place for more than a dozen years, they have shown limited, if any, recovery of rockfish (Haggarty, 2014). Non-compliance by recreational fishers is a likely factor, especially in regions where commercial groundfish fisheries are limited and recreational fisheries are the dominant source of rockfish mortality (Lancaster et al., 2015; Haggarty et al., 2016).

Table 1. Conservation status of rockfishes in Pacific Canada as assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and listed under the Species at Risk Act (SARA)

Species Common and Latin Name	COSEWIC Status	SARA Status
Canary rockfish; <i>S. pinniger</i>	Threatened	None
Darkblotched rockfish; <i>S. crameri</i>	Special concern	None
Quillback rockfish; <i>S. maliger</i>	Threatened	None
Rougheye rockfish; <i>S. aleutianus</i> <i>type I</i> and <i>S. aleutianus type II</i>	Special concern	Special concern
Yelloweye rockfish; <i>S. ruberrimus</i>	Special concern	Special concern
Yellowmouth rockfish; <i>S. reedi</i>	Threatened	None

Galiano Island, the location of our study, is located in the heart of the Salish Sea, in the midst of one of BC's most biologically productive areas (Beamish and McFarlane, 2014). The waters surrounding the island are popular with recreational fishers (Haggarty, 2014), and the island is just a short ferry ride from the urban centres of Victoria and Vancouver. Since the 1980s, rockfish have been a focus of sport fishing despite growing conservation concerns (Beamish and McFarlane, 2014).

Methods

This project had two components: (1) Public outreach and education activities to increase awareness of RCAs; and (2) measuring the effectiveness of these activities at reducing non-compliance by interviewing recreational fishers and monitoring RCAs with trail cameras.

Public outreach and education activities

We created a strategy for improving compliance with RCAs based on recommendations obtained by Lancaster et al. (2015) from recreational fishers. Fishers' recommended that "rockfish conservation could be improved through increased knowledge and awareness through signage, education campaigns, and general advertising as well as permanent or temporary rockfish fishing moratoriums" (Lancaster et al., 2015). We developed a three-pronged outreach and education strategy: (1) develop and distribute posters, maps, and signs; (2) in-person engagement at community events; and (3) other outreach. First, we (led by the Galiano Conservancy Association (GCA) and Valdes Island Conservancy (VIC)) created and distributed ~1680 rockfish conservation posters and signs, and 2500 newsletters to raise awareness about rockfish conservation and RCAs (e.g. Figure 2). Forty-six permanent, metal, 2 x 3 foot signs were a key part of the strategy to create awareness about the locations of RCAs. These signs display a map of each specific region and all RCAs within it, and many include a marker to indicate where the sign is located (see Figure 3 for an example). We phased in the signs as funding allowed, targeting locations that recreational fishers frequent such as marinas, boat launches, ferry terminals, and docks (Figure 4). Each of the signs also provide information about local rockfish

species, permitted activities within RCAs, and rockfish conservation facts. Second, we had in-person presence and materials at various community events around Galiano Island, Vancouver Island, and other Southern Gulf Islands to reach out to the general public (~4000 people reached, Appendix B). Finally, other outreach included the creation of a Rockfish Conservation Project Facebook page to provide a widely accessible platform for current news articles, project and event updates, photos, and resources. In 2015, GCA and VIC published an insert in the local newspaper Island Tides, which services the southern Gulf Islands, that included information about RCAs and a map with locations.

Measuring effectiveness of outreach

While the public outreach and education activities are important on their own, we wanted to assess their effectiveness at reaching recreational fishers, and at affecting compliance with RCAs. We followed and slightly adapted methods developed by Lancaster et al. (2015, 2017) for recreational fisher surveys and camera monitoring.

Recreational fisher surveys

We used a slightly adapted version of the survey developed by Lancaster et al. (2015) to assess knowledge about and compliance with RCAs. Prior to starting interviews, we told participants that the survey was strictly for research purposes, and that their names would not be recorded (i.e., responses would be anonymous). The structured survey included closed and open-ended questions (Appendix A). For example, we asked if fishers had heard of RCAs prior to our

survey, and if they felt confident of RCA boundary locations. When surveying fishers, we attempted to reduce any social desirability bias in their non-compliance reporting by allowing individuals to complete some survey questions by hand without having to answer verbally to the interviewer. We explained all permitted fishing activities to participants, and used charts of RCA locations as a visual aid when asking respondents if they had accidentally fished using prohibited techniques in an RCA in the past 2 years. We also asked whether they personally know anyone who has intentionally fished in RCAs using prohibited techniques, a non-sensitive direct question about non-compliance (Arias and Sutton, 2013). Lancaster et al. (2015) also used the randomized response technique to gauge personal intentional non-compliance. Respondents found this approach confusing, and appeared to be comfortable answering direct questions about unintentional and deliberate non-compliance. We thus only asked the direct questions. We added a question about familiarity with our outreach and education activities. We conducted the in-person surveys on Galiano Island (2015: n=25; 2017: n=31; 2018: n=30) during July and August, the busiest times of the year for recreational fishing activity in the region. A notice of implied consent printed at the top of the surveys was shown to all participants (University of Victoria Ethic Protocol Number 14-142). Each survey took approximately 10-15 minutes to complete. We compared our results to surveys conducted in 2014 by Lancaster et al. (2015) on Galiano Island (i.e., a subset of the surveys conducted in that study, n=40). We used the `fmsb` package in R (3.5.3) (R Core Team, 2019) to calculate odds ratios, 95% confidence intervals, and hypothesis testing to ascertain whether there was a significant change between 2014, prior to any outreach, and 2018, the last year of our data. Odds ratios of below one indicate lower responses in 2018 compared to 2014 (e.g., fewer admissions of illegal fishing); confidence intervals that encompass one indicate no significant responses.

Camera monitoring

We also wanted to assess any changes in compliance on the water. Lancaster et al. (2017) innovated a method of using land-based trail cameras to monitor RCA locations, and we followed those protocols. We set up six Bushnell HD Trail Cameras to overlook RCAs around Galiano Island (Trincomali Channel RCA, Galiano Island North RCA, and Mayne Island North RCA) during the summers of 2016, 2017, and 2018 (Figure 5). Cameras have a field of view (FOV) of 50° with resolution to 1 km. Cameras were placed to maximize ocean coverage in the FOV (Figure 2); total ocean cover varied from location to location (min = ~60% coverage, max =100% coverage). We estimate that a line could be seen in the water when boats were within 50m of the camera. Locations were selected to maximize RCA ocean coverage across all Galiano RCAs while maintaining a small number of cameras and streamlined fieldwork structure. Where possible, cameras were placed on protected lands (Provincial Park or lands held by GCA) to ensure long-term access to these monitoring sites. In the absence of protected lands, private waterfront properties were used upon owner permission. We monitored 3 locations in the Trincomali Channel RCA due to the size of this RCA, geographic variability in fishing effort across the RCA, and due to community concerns and reports of targeted fishing effort around Retreat Island specifically. The exact locations shifted minimally year-to-year based on landholder permissions and local conditions (such as a tree falling down that was previously used); the fields of view of the cameras were similar over the years. The only major change was that one location used in 2014 was discontinued because it was too high on a ridge and thus too far from the ocean. Cameras were mounted on trees or human infrastructure (deck railings) in

close proximity to the water. Installation sites were chosen to be as close as possible to the water, while maintaining ideal ocean coverage and reducing any risk of falling into the water during deployment and retrieval.

We programmed the cameras to take pictures every 5 minutes during daylight hours. Cameras did not take pictures from dusk to dawn due to several factors: 1) we based monitoring hours on the assumption that most recreational fishing will take place during daylight hours; and 2) the photographic detail required to capture fishing incidents (such as a visible rod, or seeing the trolling pattern of a boat) would be difficult at night without infrared photography (a feature our cameras did not have). It is possible that we might have missed some night-time illegal fishing, but based on comments during the interviews, we do not get the sense that such night-time activity is common (it was never mentioned). Vessels that appeared in three consecutive frames or more (i.e., on-site for over 10 minutes with minimal movement) or with clearly identifiable fishing equipment were labelled as ‘suspected fishing,’ while vessels visibly using their fishing gear during the frame were labelled as ‘confirmed fishing’ (i.e. we could see a fishing line in the water). We calculated the percent of suspected fishing incidents, normalized by days monitored. We then compared findings to Lancaster et al.’s data (2017), which was collected in 2014 prior to our outreach and education efforts. We again used odds ratios to ascertain whether there was a statistically significant change between 2014, prior to any outreach, and 2018, the last year of our data.

Results

Measuring effectiveness of outreach

236

237 *Recreational fisher surveys*

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239 We completed 86 surveys in total in 2015, 2017, and 2018; Lancaster et al. (2015) sampled 40
240 people on Galiano Island in 2014 (baseline data prior to outreach and education efforts) (Table
241 2). The number of participants who had heard of RCAs before completing the survey increased
242 from 78% in 2014 to 90% in 2018 (but was highest in 2017 at 97%). Participants who were
243 confident in RCA boundaries in areas they commonly fished increased from 48% (2014) to 67%
244 (2018). Those who identified they had accidentally fished in RCAs in the past 2 years decreased
245 from 25% (2014) to 3% (2018), but was highest in 2017 (35%); the change in unintentional non-
246 compliance was statistically significant between 2014 and 2018 (odds ratio hypothesis test,
247 $p=0.014$, Table 2). Similarly, intentional non-compliance also decreased from 8% in 2014 to 3%
248 in 2018, although was not statistically significant. Lack of awareness or ignorance were often
249 identified as primary reasons for recreational fishers fishing in RCAs, and more so in 2018
250 (2014: 55%; 2018: 80%; odds ratio hypothesis test $p=0.030$). Public education and outreach were
251 consistently identified as effective measures for improving rockfish conservation (2014: 45%;
252 2018: 50%).

Table 2. Percent responses from structured surveys with recreational fishers around Galiano Island during peak fishing season (June-August) in 2015 (n=25), 2017 (n=31), and 2018 (n=30). The 2014 (n=40) baseline data is the subset of data collected by Lancaster et al. (2015) on Galiano Island in Montague Harbour. Odds ratios shown with the lower and upper 95% confidence interval (CI) and p-value, comparing the 2014 (the baseline year prior to any outreach) and 2018.

Participants who...	2014 (%)	2015 (%)	2017 (%)	2018 (%)	Odds ratio	Lower 95% CI	Upper 95% CI	p-value
Heard of RCAs before beginning the survey	78	80	97	90	0.383	0.094	1.559	0.173
Had seen GCA rockfish outreach materials	N/A	24	52	67	(not applicable – no 2014 baseline)			
Correctly identified legal rockfish catch per day in the Salish Sea	28	61	35	30	0.885	0.311	2.516	0.820
Responded with recreational fishing activities <u>not</u> permitted in RCAs	50	68	58	37	0.579	0.220	1.523	0.270
Were confident in their knowledge of RCA boundaries in the areas they fish	48	52	42	67	0.452	0.170	1.206	0.113
Intentionally fished illegally in RCAs in the past 2 years	8	12	3	3	0.426	0.042	4.305	0.461
Accidentally fished illegally in RCAs in the past 2 years	25	28	35	3	0.103	0.012	0.860	0.014
Personally knows someone who intentionally fished illegally in RCAs in the past 2 years	14	28	13	3	0.241	0.027	2.184	0.178
Identified public education and outreach as effective tools for rockfish conservation	45	32	35	50	0.708	0.268	1.865	0.487
Identified lack of awareness as a primary reason recreational fishers fish in RCAs	55	36	45	80	0.306	0.103	0.909	0.030

Camera monitoring

Results from six trail cameras monitoring three RCAs around Galiano Island (Mayne Island North, Trincomali Channel, and Galiano North) illustrated some non-compliance, but less than in 2014 (Table 3). The 2016 fishing season had 74 recorded incidents of suspected fishing (suspected fishing incidents normalized by days monitored was 15.6%), compared to 32 incidences of suspected fishing and 2 incidences of confirmed fishing in 2017 (11.8%). In 2018 there were 54 suspected and 2 confirmed illegal fishing events inside RCAs (13.7%), compared to 42.0% in 2014. The change from 2014 to 2018 was statistically significant (odds ratio estimate 0.217, 95% confidence intervals 0.128 to 0.367, $p < 0.0001$).

Table 3. Results of trail camera monitoring of RCAs around Galiano Island during peak fishing season in 2016, 2017, and 2018. The 2014 baseline data was the subset of data collected on Galiano Island by Lancaster et al. (2017). Percentage of confirmed or suspected fishing incidents were normalized by days monitored.

Year	Percentage of confirmed or suspected fishing incidents (%)	Total number of camera days monitored	Number of sites monitored
2014	42.0	81.5	10
2016	15.6	473	6
2017	11.8	287	6
2018	13.7	392	6

Discussion

Compliance is a factor in the success of spatial fisheries management efforts (Arias et al., 2015; Bergseth et al., 2015). After four years of outreach, education, and monitoring efforts, the Rockfish Conservation Project appears to be successful in increasing awareness and reducing non-compliance. Cooperation between different organizations has been crucial to the success of the project, bringing together expertise on community engagement, outreach and education, with research approaches to monitor the effectiveness of those efforts. It is a model that can be mirrored or adapted by other multi-disciplinary groups attempting to work towards the conservation of species at risk around the world.

Ours is one study among a growing literature on innovative approaches to measure non-compliance. For example, a recent report by the Working Group on Recreational Fisheries Surveys (ICES, 2018) summarized novel approaches as including digital cameras and passive acoustic monitoring of recreational fishing effort. Text and data mining of social media are also being used to understand recreational fishing activities (ICES, 2018; Monkman et al., 2018). Other regions have explored the use of harvest tags to assess compliance (Ryan et al., 2016), whereas others have found diary surveys to be cost-effective (Bellanger and Levrel, 2017). Monitoring non-compliance is important, but ultimately the challenge lies in effectively governing recreational fisheries (Arlinghaus et al., 2019).

While there are numerous studies that attempt to assess non-compliance by recreational fishers (e.g., Smallwood and Beckley, 2012; Arias and Sutton, 2013; Arias et al., 2015; Haggarty et al., 2016), to date there is limited research on specific approaches that can improve their compliance. We focused on outreach and education efforts because those were recommended by recreational

fishers in our region (Lancaster et al., 2015) and were within our abilities, whereas we did not have the authority to carry out enforcement. Other studies (e.g., Read et al., 2011) illustrate that an increase in enforcement (e.g., visibility of fisheries officers on the water, citations issued, boats stopped and checked for compliance) can also lead to improved voluntary compliance. Indeed, fishers we interviewed wanted to see an increased presence of fisheries officers. Furthermore, apps could provide opportunities to collect data and can also assist with compliance by providing easy access to regulations and warning fishers when they enter conservation areas (Venturelli et al., 2017).

While we saw a decrease in stated and observed non-compliance, our monitoring efforts focused only on the study region, and did not include a control region where we did not have outreach and education efforts. Also, only some of the trends were statistically significant, likely because of the relatively small sample sizes. While we hypothesize that our outreach and education activities have contributed to increasing compliance, we are unable to demonstrate causation, and other factors may also be contributing. One important change that happened in early 2018 is that the main digital chart company used in the region by recreational fishers, Navionics, added RCA boundaries to digital charts (Navionics, 2018). However, RCAs are denoted by a thin red line, and only recreational fishers looking for RCA boundaries are likely to take note.

Our study had several additional limitations. Our geographic scope meant that our reach was limited. Many recreational fishers come from afar (especially the Canadian province of Alberta, and the United States of America) to fish in the southern Strait of Georgia, and only an unknown but likely minor proportion stop on Galiano Island. Our outreach and education efforts were thus

not reaching many of the recreational fishers in the area, although the signs have been set up around the region in Canada (but not in the USA). Furthermore, our limited capacity to interview fishers on Galiano Island meant that our sample was relatively small each year, and we do not know if it represents recreational fishers. The trail cameras also had limitations. They were useful in identifying possible fishing with illegal gears inside RCAs, but often boats were too far away to identify whether active fishing was happening. Cameras were also unable to take photos throughout the night, and although it is unlikely there was a high volume of recreational fishing taking place in the dark, this may have resulted in missing data from any night activity. Having six cameras limited the geographic coverage of the cameras, with each only capturing a small portion of RCAs. Likewise, the cameras cannot distinguish between recreational fishers with illegal gears fishing inside RCAs, and First Nations fishers who are allowed to fish for food, social, and ceremonial purposes inside RCAs (see Lancaster et al., 2017 for a more extensive discussion about the trail cameras). Finally, funding limitations constrained the scope, and finding ongoing funds to continue the project is a challenge.

That we saw improvement in compliance indicates a hopeful tale that small organizations and partnerships can make a tractable difference. Time will tell whether the improvement in compliance will persist, and if it will allow local rockfish populations to increase. Given the long-lived nature of rockfish, it will take decades for their recovery. Thus, it is crucial for recreational fishers to continue to comply with RCAs if they are to be successful, and for the geographic scope of compliance to include all areas in BC. Other conservation measures that are important include a review of the locations and allowable uses of RCAs, which is currently being conducted by Fisheries and Oceans Canada. Similarly, encouraging or mandating the use of re-

descenders to return rockfish caught as bycatch outside of RCAs to depth, and thereby reduce the effects of barotrauma, could help the recovery of rockfish populations (DFO, 2018).

Supplementary material

The following supplementary material is available at ICESJMS online: Appendix A, Structured Surveys with Recreational Fishers (2015, 2017, 2018); and Appendix B, Outreach activities for increasing RCA public awareness carried out from June-August in 2015, 2016, 2017, and 2018.

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Figure 1. Regional map of the southern Gulf Islands, with Rockfish Conservation Areas in green.

Figure 2. Rockfish conservation awareness poster.

Photo: Peter Luckham

ROCKFISH VANISH IN STRAIT OF GEORGIA

SURPRISED BY THIS HEADLINE?

Our region's marine environments are experiencing unsustainable levels of fishing and use pressures. With every passing day, they are one step closer to collapse. The ecosystems around us are incredibly diverse and vibrant, but have been in continual decline following decades of intense human use and activity. **They can't bounce back if we don't give them a chance.**

Rockfish Conservation Areas (RCAs) have been implemented throughout the Strait of Georgia to help protect sensitive rockfish populations, but these areas remain under pressure.

Boating: Dropping anchor or emptying bilge tanks can cause significant damage to underwater ecosystems. Know what's under you before you drop anchor, and bring waste to disposal facilities.

Recreational Fishing: Stay informed, and stay alert to where you are fishing and know what the rules are. Plan your next fishing trip with this in mind.

Some rockfish populations have **dropped by over 75% within a generation** - let's bring them back so that our children and their children can experience these creatures beyond a photograph.

Project funded by the Habitat Stewardship Program

For more information about this project, contact us at development@galianoconservancy.ca or go to www.valdes-island-conservancy.org/

Rockfish Conservation Area (RCA)

Absolutely no hook and line fishing permitted in RCAs

Il est strictement interdit de pêcher avec ligne et hameçon dans les RCA

Quillback rockfish
Sebastes maliger

Copper rockfish
Sebastes caurinus

Yelloweye rockfish
Sebastes ruberrimus

Tiger rockfish
Sebastes nigrocinctus

Image: Department of Fisheries and Oceans Canada - Ministère des Pêches et Océans Canada (MPO)

Closest Rockfish Conservation Area (RCA) is the Trincomali Channel RCA

Aboriginal right to fish is not infringed upon

Permitted recreational fishing activity

invertebrates by hand picking or dive
crab, shrimp or prawn by trap
smelt by gillnet

Permitted commercial fishing activity

invertebrates by hand picking or dive
crab and prawn by trap
scallops by trawl
salmon by seine or gillnet
herring by gillnet, seine and spawn-on-kelp
sardine by gillnet, seine and trap
smelt by gillnet
euphasiid (krill) by mid-water trawl
opal squid by seine
groundfish by mid-water trawl

Why are they at risk?

- Inshore rockfish species grow slowly, stay in the same areas, mature late, and have long lifespans, taking between 6-12 years to fully mature
- Older rockfish are able to produce larger quantities of eggs, making them a critical aspect of population resilience
- Such characteristics make rockfish extremely vulnerable to overfishing, with populations slow to recover and rebuild following decline
- This matters because rockfish play important roles within the coastal food web as both predators and food for others, and they serve as indicators of the overall health of the system

Source: www.pac.dfo-mpo.gc.ca

La zone de conservation du sébaste (de l'anglais Rockfish Conservation Area, ou RCA) la plus proche est le RCA du chenal Trincomali

Ceci ne porte pas atteinte au droit de pêche ancestral des peuples autochtones

Activités de pêche récréative autorisées

Capture à la main ou en plongée des invertébrés
Capture au casier des crabes, crevettes ou crevettes nordiques
Capture de l'éperlan au filet maillant

Activités de pêche industrielle autorisées

Capture à la main ou en plongée des invertébrés
Capture du crabe au casier
Récupération des crevettes nordiques au casier
Récupération des pétoncles par chalut
Capture du saumon au sein ou au filet maillant
Capture du hareng au filet maillant, au sein ou récolte d'œufs de hareng ou varech
Capture de sardines au filet maillé, sein ou au casier
Capture de l'éperlan au filet maillant
Capture des euphausiacés (krill) au chalut pélagique
Capture du calmar opale au sein
Capture des poissons de fond au chalut pélagique

Pourquoi sont-ils considérés en péril ?

- Les espèces de sébaste en zones côtières ont une très longue durée de vie, demeurent dans le même secteur et ont une maturité tardive, prenant entre 6 et 12 ans à se développer pleinement
- Les sébastes plus âgés peuvent produire une plus grande quantité d'œufs, ce qui fait d'eux un élément essentiel de la résilience de l'espèce.
- Ces caractéristiques font du sébaste une espèce particulièrement vulnérable à la surpêche et les populations se rétablissent lentement suite à un déclin
- Les sébastes jouent un rôle important au sein des réseaux trophiques côtiers, aussi bien à titre de prédateur que de proie pour les autres espèces. Ils servent également d'indicateurs de la santé globale de l'écosystème

Source: www.pac.dfo-mpo.gc.ca

Inform others and report violations to DFO at 1-800-465-4336
Project funded by the Habitat Stewardship Program
For more information about this project, go to: valdes-island-conservancy.org or galianoconservancy.ca

Informez les autres et signalez toute violation au MPO au numéro suivant : 1-800-465-4336
Un projet financé par le Programme d'intendance de l'habitat (de l'anglais « Habitat Stewardship Program »)
Pour obtenir de plus amples renseignements à ce sujet, veuillez visiter le site Web
valdes-island-conservancy.org ou galianoconservancy.ca

Figure 4. Locations of RCA signage installed in 2015-2017.

Figure 5. RCA camera monitoring sites (yellow circles) in 2016-2018 on Galiano Island. Six cameras were set up to monitor the Trincomali Channel RCA (Retreat Island, Retreat Cove, Montague Harbour, District Lot 57), Mayne Island North RCA (Cain Beach) and Galiano Island North RCA (Pebble Beach). RCAs are displayed in green.

● RCA Monitoring Site
■ Rockfish Conservation Area