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Natural Resource Stewardship and Science

Glacier Bay National Park Selected Fisheries Effort and Harvest

2000-2015

Natural Resource Report NPS/GLBA/NRR—2018/1598





ON THIS PAGE
Photograph of Pacific halibut caught in Glacier Bay National Park
Photograph courtesy of the National Park Service

ON THE COVER
Photograph of a commercial vessel fishing for Tanner crab in Glacier Bay National Park
Photograph courtesy of the National Park Service

Glacier Bay National Park Selected Fisheries Effort and Harvest

2000-2015

Natural Resource Report NPS/GLBA/NRR—2018/1598

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Executive Summary

This report summarizes the amount of fishing effort and fish harvest that has occurred in the marine waters of Glacier Bay National Park for select fisheries from 2000 to 2015. Documenting the removal of fish and invertebrates from GBNP waters is an important step in understanding and evaluating potential impairment of these important resources and the ecosystems in which they exist. While many different marine species are harvested, this report focuses on Pacific halibut (*Hippoglossus stenolepis*), Tanner crab (*Chionoecetes bairdi*) and rockfish (*Sebastes* spp.).

In summarizing halibut, Tanner crab, and rockfish data the most important results are: 1) While commercial fishing has been curtailed in Glacier Bay Proper (GBP), recreational harvest, particularly of halibut, has been on the rise (Fig. 6); 2) There has been a long-term decline in estimated Tanner crab stock abundance and a continued harvest over guideline harvest levels in Glacier Bay Proper (Fig. 10); 3) Rockfish harvest by guided anglers on the OC has increased considerably since the 2000-2006 period (Fig. 15). and commercial harvest of non-pelagic rockfish has declined over the period of record and is now 5-10 times less than harvests in 2001 and 2002 (Fig 16); 4) Confidentiality constraints of state data consistently prohibit our ability to accurately report the amount of commercial rockfish harvest as well as specific measurements of effort that can be helpful in monitoring fisheries.

Data for this report were gathered from Alaska Department of Fish and Game, the International Pacific Halibut Commission, and the National Park Service. It is our intent in the future to include weathervane scallop, lingcod and Pacific salmon as this document evolves to better characterize fisheries effort and harvest in Glacier Bay National Park.

List of Terms

ADFG Alaska Department of Fish and Game

IS/CS Icy Strait/Cross Sound portion of GBNP (see Figure 1)

GBNP Glacier Bay National Park

GBP Glacier Bay Proper (see Figure 1)

IPHC International Pacific Halibut Commission

LAP Lifetime Access Permit

NPS National Park Service

SWHS Statewide Harvest Survey

OC Outer coast portion of GBNP (see Figure 1)

Introduction

The mission of the National Park Service (NPS) is "…to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations" (1916 Organic Act). One of the underlying principles that dictate management policies is that conservation predominates when there is a conflict between the protection and the use of resources (NPS 2006). Managers are mandated to identify the threshold for unacceptable use and to prevent impairment. Unique to Glacier Bay National Park (GBNP), this mandate applies to the marine waters within GBNP as determined by the Supreme Court Special Master decision which found that the federal government has jurisdiction over park waters (State of AK v. USA 2006). Documenting the removal of fish and invertebrates from GBNP waters is an important step in understanding and evaluating potential impairment of these vital species and the ecosystems they inhabit and shape. More specifically, it puts current levels of harvest and effort into historical context where over time patterns or trends can be understood by park managers. The purpose of this report is to describe the fishing effort and harvest of Pacific halibut (*Hippoglossus stenolepis*), Tanner crab (*Chionoecetes bairdi*) and rockfish (*Sebastes* spp.) from park waters.

Methods

There are many complexities in reporting fisheries effort and fish harvest from GBNP including, but not limited to: 1) the multiplicity of governing agencies (Alaska Department of Fish and Game (ADFG), International Pacific Halibut Commission (IPHC), and the National Park Service (NPS); 2) the many fishery sectors involved (commercial, guided recreational, unguided recreational); 3) the different fish harvest reporting metrics (pounds or net pounds of fish vs. number of fish); 4) the State of Alaska confidentially statute (AS 16.05.815); 5) the alignment of numerous statistical areas comprising the three spatial areas of interest relative to the park boundary. The compilation of these challenges precludes us from providing a complete account of effort and harvest from the entirety of GBNP. Rather, we have summarized the most readily available and comparable fishing effort and harvest for select areas of the park. Glacier Bay Proper (GBP) and the outer coast (OC) areas of GBNP are the focus of this report because fishery statistical areas align with the park boundary (Fig. 1). Icy Strait, Cross Sound (IS/CS) and Excursion Inlet areas of the park are only portions of larger reporting areas and thus we are unable to attribute harvest or effort to these areas.

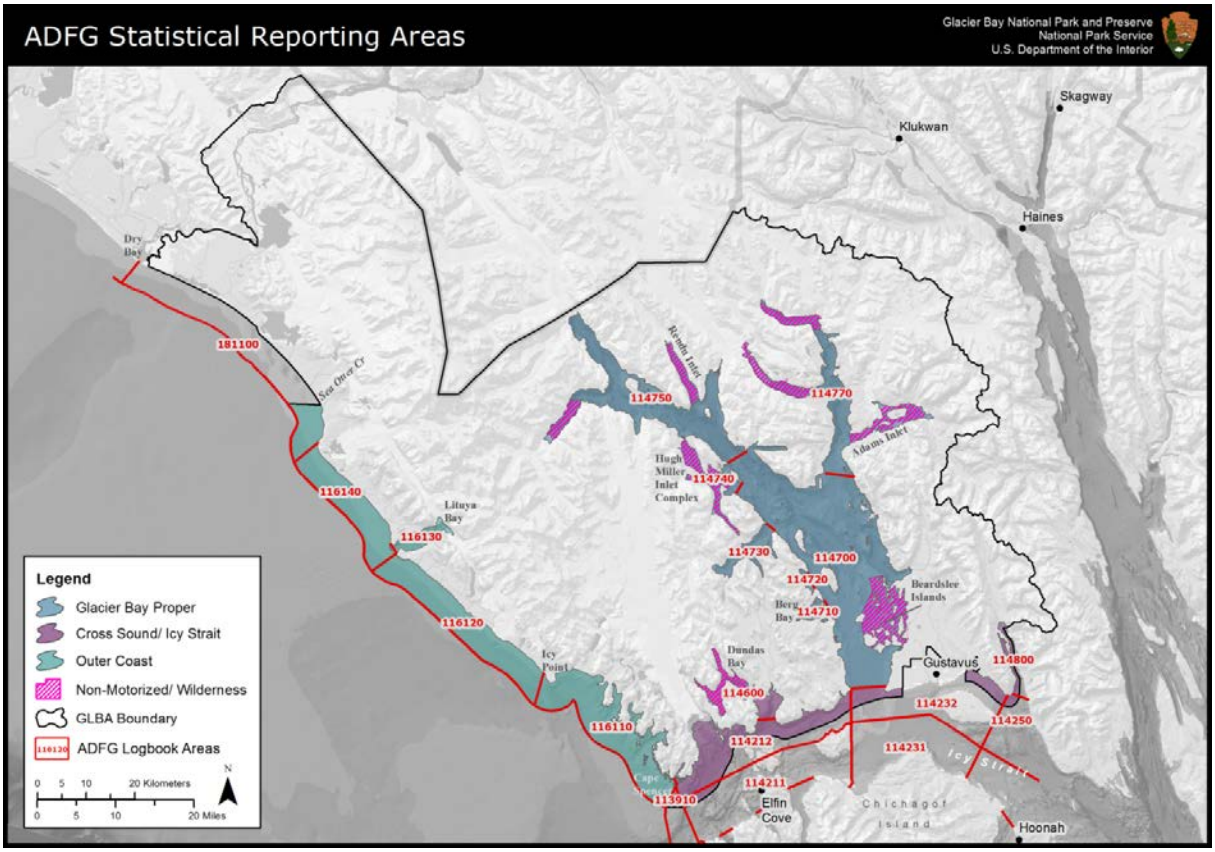


Figure 1. Glacier Bay National Park waters as defined by the geographical areas: Glacier Bay Proper (GBP), Icy Strait/Icy Strait (IS/CS), and Outer Coast (OC). ADFG charter logbook statistical areas are overlaid in red.

Though it is beyond the scope of this report, other species that are harvested from GBNP waters include weathervane scallop (*Patinopecten caurinus*), Chinook salmon (*Oncorhynchus tshawytscha*) coho salmon (*O. kisutch*), sockeye salmon (*O. nerka*), chum salmon (*O. keta*) pink salmon (*O. gorbuscha*) lingcod (*Ophiodon elongatus*), Pacific cod (*Gadus macrocephalus*), salmon shark (*Lamna ditropis*), Pacific sleeper shark (*Somniosus microcephalus),* Dungeness crab (*Metacarcinus magister*), king crab (*Paralithodes camtschaticus*) and various species of shrimp (*Pandalus sp*.).

We used fisheries data from the Alaska Department of Fish and Game (ADFG), the International Pacific Halibut Commission (IPHC) and GBNP to quantify effort and the biomass removals of halibut, Tanner crab and rockfish from select park waters.

Multiple data collection methods are used to quantify fishing harvest and effort. Table 1 summarizes the different data sources used and the associated agency. Charter logbooks detail the species of fish kept and released along with the locations and time fished. Logbooks are filled out by professional angler guides and submitted to the respective agency (ADFG or NPS). The Statewide Harvest Survey (SWHS) is a mail-survey that ADFG sends out to a randomly selected number of licensed recreational anglers each year to ascertain information related to species caught, location and effort. The SWHS survey sample data are expanded to estimate total effort and harvest for each area. The SWHS statistics display standard error as a measure of variability in each estimate. Creel surveys, are conducted seasonally on Gustavus and Elfin Cove docks by ADFG. ADFG employees enumerate catch and effort and identify and measure the length of a sample of harvested fish. Fish tickets and eLandings are required forms of commercial fishery reporting critical for management purposes.

Table 1. Data sources used to compile fisheries effort and harvest statistics.

Agency	Data Source	Fishing Sector	Species of Interest
Alaska Department of Fish and Game (ADFG)	Charter logbooks	Guided	Halibut, rockfish
Alaska Department of Fish and Game (ADFG)	Statewide Harvest Survey (SWHS)	Guided, unguided	Halibut, rockfish
Alaska Department of Fish and Game (ADFG)	Fish tickets, eLandings	Commercial	Tanner crab
Alaska Department of Fish and Game (ADFG)	Creel (dock) surveys	Guided, unguided	Halibut
International Pacific Halibut Commission (IPHC)	eLandings	Commercial	Halibut
National Park Service (NPS)	Charter logbooks	Guided	Halibut, rockfish

Fisheries data from all non NPS sources were received in Microsoft Excel files. Annual estimates from non NPS sources were summarized by year and area of interest, but no further analysis or calculations were conducted. Data sources were not combined except for in the case where ADFG creel data for GBP halibut were used to estimate the poundage of GBP halibut harvested from the reported number of halibut harvested by recreational anglers in the ADFG SWHS and ADFG charter fishing logs. Pounds of halibut reported in this case are the product of the number of halibut reported harvested in the SWHS and ADFG charter fishing logbooks and the mean weight of GBP halibut reported in ADFG creel surveys each year. Annual estimates of standard error for recreational pounds of halibut harvested are combined for the estimates of the annual number of halibut caught and the annual mean weight [1]. All other standard error estimates and associated error bars were calculated by the provider of the data (ADFG).

$$SE_x = \sqrt{(A^2 * b^2) + (B^2 * a^2) - (a^2 * b^2)} \qquad [1]$$

Where:

SE_x = Standard error for recreational halibut harvest

A = Annual halibut harvest (fish)

a = SE of annual halibut harvest (fish)

B = Mean annual weight of halibut harvest (lbs.)

b = SE of mean annual weight of halibut harvest (lbs.)

Glacier Bay National Park charter fishing logs were used only for comparative purposes for certain halibut and rockfish areas. Data from the parks charter fishing logbook program were compiled using Microsoft Access queries to summarize values by year for halibut and rockfish.

Data Limitations

The state of Alaska confidentiality statute (AS 16.05.815) prohibits NPS access to harvest data when a limited number (typically ≤ 3) of permit holders or processors report harvest or landings within a specific statistical area. Within this report, confidentiality issues have been most limiting for Excursion Inlet Tanner crab harvest and the commercial rockfish harvest. As the number of Lifetime Access Permit LAP holders in GBP decreases, we anticipate an increase in confidential state fisheries data in GBP.

Fisheries effort and harvest statistics are estimates that depends on accurate reporting by boat captains, guides and anglers. Murdoch and Soiseth 2013 estimated that nearly 50% of charter fishing trips in park waters were not reported in charter fishing logbooks to the NPS from 2011-2013.

The unguided recreational harvest data used in this report are exclusively from the ADFG SWHS. This source has associated recall bias limitations because anglers are asked to recall their harvest often months after fishing activity occurred. Additionally, sample sizes are sometimes limited and the

information is self-reported and spatially associated by anglers, some of which, especially non-residents, may not be familiar with surrounding waters, park boundaries and landmarks.

Two major issues exist with ADFG charter fishing logbook statistics when trying to estimate effort and harvest in park waters: 1) state statistical reporting areas do not align with park boundaries in all areas of the park (especially IS/CS and Excursion Inlet) and 2) logbooks specify only one statistical area be reported for salmon and groundfish during each trip. Charter fishing trips often occur in multiple statistical areas. At times calling into question the accuracy of attributing specific effort and harvest within or outside of park waters.

Results and Discussion

Fishing Effort

Fishing effort in GBNP is attributed to three sectors: commercial, guided recreational anglers, and unguided recreational anglers. Commercial effort is reported by the number of vessel permits participating in the respective fishery (e.g. halibut, Tanner crab) within each geographic area (e.g. GBP) and is not displayed in this section. Though it is a very coarse measure of effort, it currently is the only metric available to the NPS. Angler days are used to measure the fishing effort expended by guided and unguided recreational anglers and is discussed in this section.

According to ADFG's SWHS and charter logbooks, recreational angling fishing effort in both the guided and unguided sectors precipitously increased in 2005 over previous years in GBP (Fig. 2). Between 2005 and 2015 recreational fishing effort varied greatly, from a high of 8,000 angler days in 2005, to a low of less than 2,000 angler days (Fig. 2). Some of the variation in the guided sector effort is likely due to regulation changes that have capped the number of guiding businesses that can fish for halibut as well as reduced halibut bag limits (Table 2). It is currently unclear what factors have influenced the overall variation in unguided recreational fishing effort within GBP, but year to year variation compares closely to regional patterns in fishing effort (Fig. 3). On average unguided recreational angler days comprised 90% of all recreational angler days for the period of record within GBP (Fig. 2).

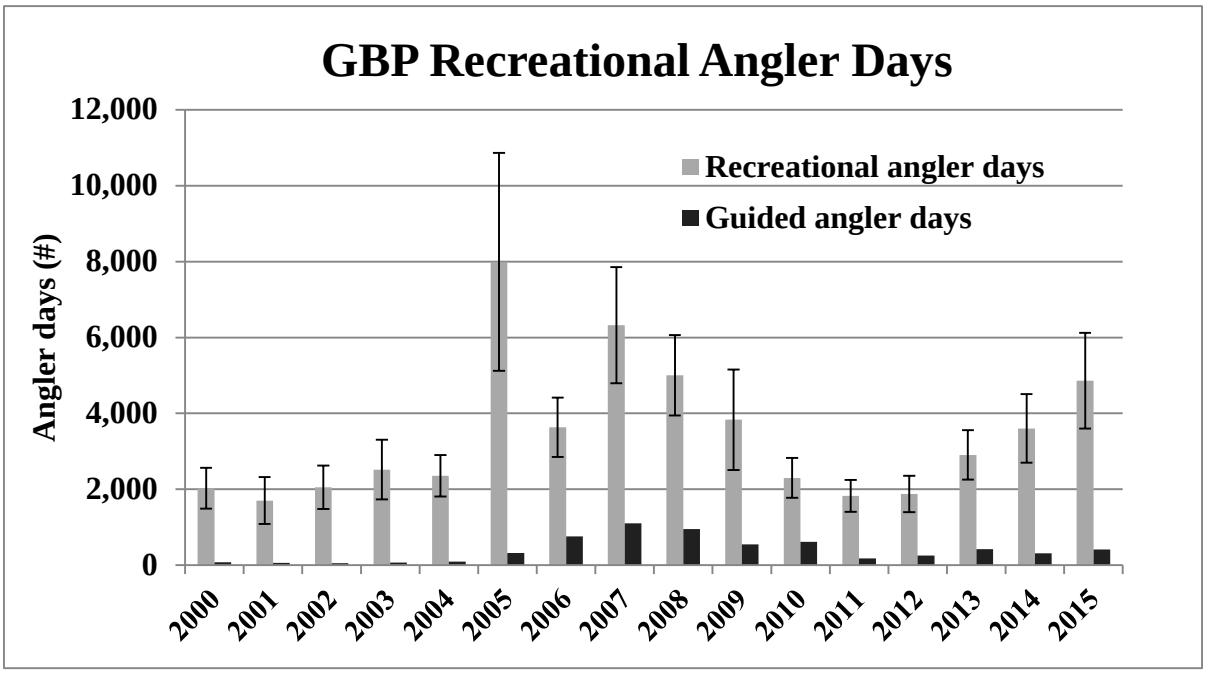


Figure 2. Fishing effort measured by the number of angler days reported fished in GBP. Recreational angler days (guided and unguided) from SWHS (SE bars) (ADFG 2015b). Guided angler days are from ADFG charter logbooks (ADFG 2016b).

Table 2. Charter fishing regulation changes by year in statistical area 2C (all Southeast Alaska waters south of Cape Spencer) and 3A (Gulf of Alaska northwest to Kodiak Island).

Year	2C Charter Halibut Regulations	3A Charter Halibut Regulations
1995-2005	Charter fishing bag limits the same as non-guided	Charter fishing bag limits the same as non-guided
2006	Charter guides and crew prohibited from retaining halibut	Charter fishing bag limits the same as non-guided
2007	Halibut size restriction (1 under 32" and 1 any size)	Charter fishing bag limits the same as non-guided
2008	One halibut bag limit (June 1- 10 but halted by injunction)	Charter fishing bag limits the same as non-guided
2009	One halibut bag limit - no size restriction	Charter fishing bag limits the same as non-guided
2011	Limited Access Charter Halibut Permits initiated and One halibut bag limit (maximum size limit of 37")	Limited Access Charter Halibut Permits fishing bag limits the same as non-guided
2012	One halibut, under 45 inches or over 68 inches	Charter fishing bag limits the same as non-guided
2014	One halibut, under 44 inches or over 76 inches	Two halibut, one under 29 inches, no crew harvest
2015	One halibut, under 42 inches or over 80 inches	Two halibut, one under 29 inches, no crew harvest, Thursday closed 6/15-8/31, 5 fish halibut annual limit
2016	One halibut, under 43 inches or over 80 inches	Two halibut, one no more than 28 inches, no crew harvest, Thursday closed 6/15-8/31, 5 fish halibut annual limit

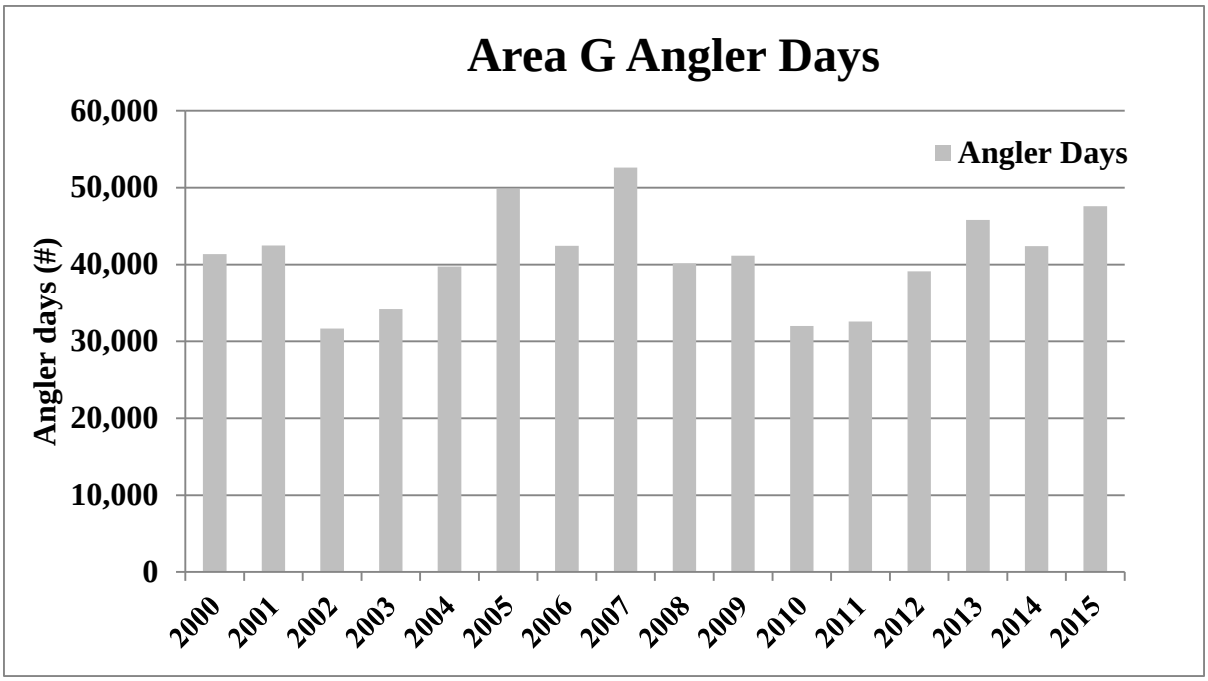


Figure 3. Recreational angler days for the ADFG statistical area G (GBP, IS/CS, and OC waters from Yakobi Island north to Cape Fairweather) for the years 2000-2015. Changes in fishing effort in this larger area generally correspond with year to year changes exhibited in GBNP.

Recreational fishing effort is only available for the guided sector for the OC. As few unguided anglers fish the OC of GBNP, accurate estimates from the SWHS survey are unavailable. With the exception of three years, ADFG charter logbook data indicates an increasing pattern of guided angler effort on the OC since 2004 (Fig. 4). 2015 exhibited the highest effort, with over 600 guided angler days over the 16 year period of record. Increasing guided fishing effort on the OC is likely partially explained by differences in halibut bag limits between halibut reporting areas (Table 2). The OC is in a statistical area that has not experienced the same restrictions to halibut bag limits as other areas. Regulations for the OC currently allow guided anglers to harvest two halibut; one of any size and one less than or equal to 28 inches, while guided anglers in the rest of the park can only keep one halibut within annual reverse slot limit lengths. This creates an incentive for guided anglers to fish for halibut in the OC area where bag limits are less restrictive.

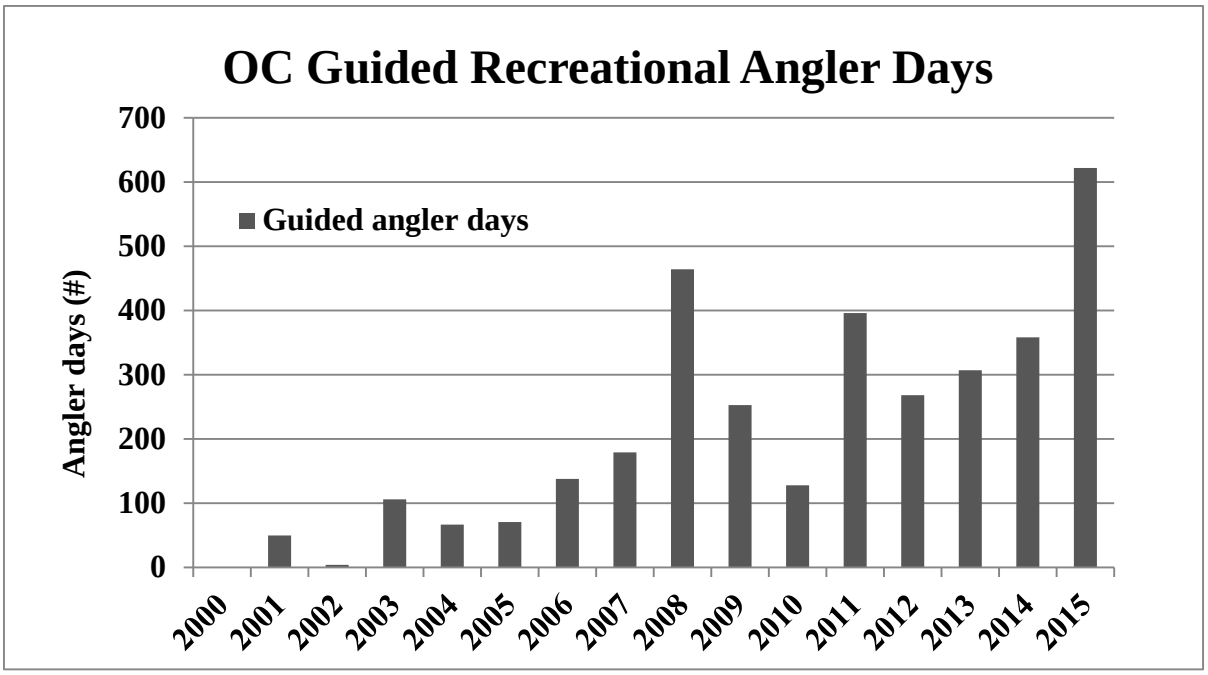


Figure 4. Guided fishing effort in the OC portion of GBNP as measured by the number of days fished reported by guided anglers. From ADFG charter logbooks (ADFG 2016b).

As a result of the poor alignment of the park boundary in IS/CS with ADFG statistical areas, NPS charter logbook data is the only source for effort in this geographic area (Fig. 5). In comparison to GBP and the OC, the greatest number of guided angler days was reported in 2010 in IS/CS. This is likely directly related to the NPS conducting a spring meeting in 2010 with Gustavus and Elfin Cove charter companies, where the NPS explicitly reminded companies of their obligation to report fishing in all park waters including IS/CS. A 2011-2013 assessment of NPS charter fishing reporting compliance found that nearly 50% of charter fishing trips occurring in park waters went unreported to the NPS (Murdoch and Soiseth 2013). This under reporting of charter fishing trips reduces estimates of charter harvest and effort within park waters. This lack of reporting severely limits the parks ability to understand and appropriately manage use of park resources.

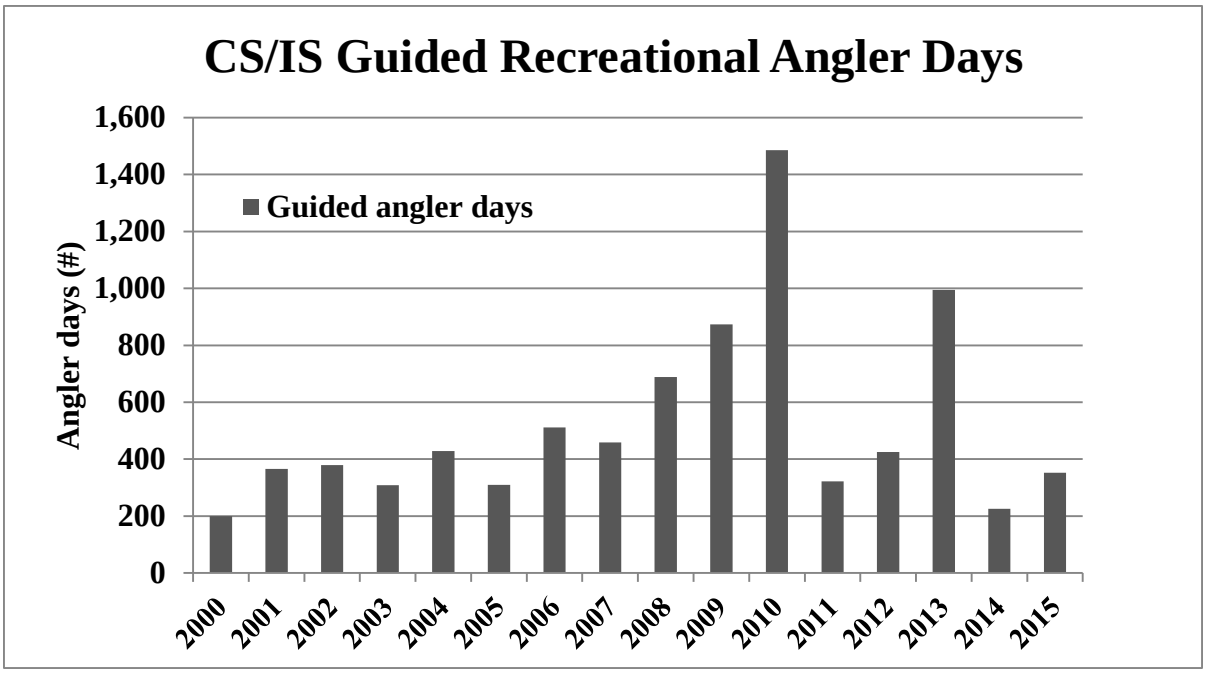


Figure 5. Guided fishing effort in the IS/CS portion of GBNP (see Fig. 1 for map) as measured by the number of days fished reported by guided anglers. From NPS charter logbooks (GBNP 2016).

Halibut Harvest

The Pacific halibut stock is managed under the 1923 Halibut Treaty between the United States and Canada. The Halibut Treaty formed The International Pacific Halibut Commission (IPHC) to jointly manage and preserve Pacific Halibut in US and Canadian waters. The National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA NMFS) and the North Pacific Fishery Management Council (NPFMC) also participate in establishing laws and allocating harvest among fishing sectors. ADFG provides annual sportfishing halibut harvest estimates within the state and has some limited halibut fishery regulatory authority.

In GBP a Lifetime Access Permit (LAP) fishery allows qualifying commercial fishers to continue fishing until they are no longer able. Once these permits are no longer used, no commercial fisheries will be permitted in GBP. All other park waters, except wilderness waters in Dundas Bay, are open to commercial halibut fishing without the need for an LAP. Halibut are harvested by recreational anglers in all park waters.

Glacier Bay proper commercial halibut harvest by LAP holders increased to over 500,000 pounds in 2006 but precipitously declined to less than 100,000 pounds in 2012 (Fig. 6). This reduction is primarily due to stock declines that preempted precipitous cuts in commercial harvest quotas established by the IPHC in statistical area 2C (Southeast Alaska) and later in 3A (Northern Gulf of Alaska). Commercial effort (number of vessels) also declined between 2005 and 2010 from 43, but stabilized between 11 and 14 vessels from 2010 to 2014.

In 2013, recreational harvest of halibut in GBP surpassed commercial harvest (Fig. 6). For GBP, between the years 2000-2006 recreational harvest accounted for 12% of halibut harvest annually on

average while the average for 2007-2013 was 39%. This change is explained more by a decline in commercial harvest than an increase in recreational harvest.

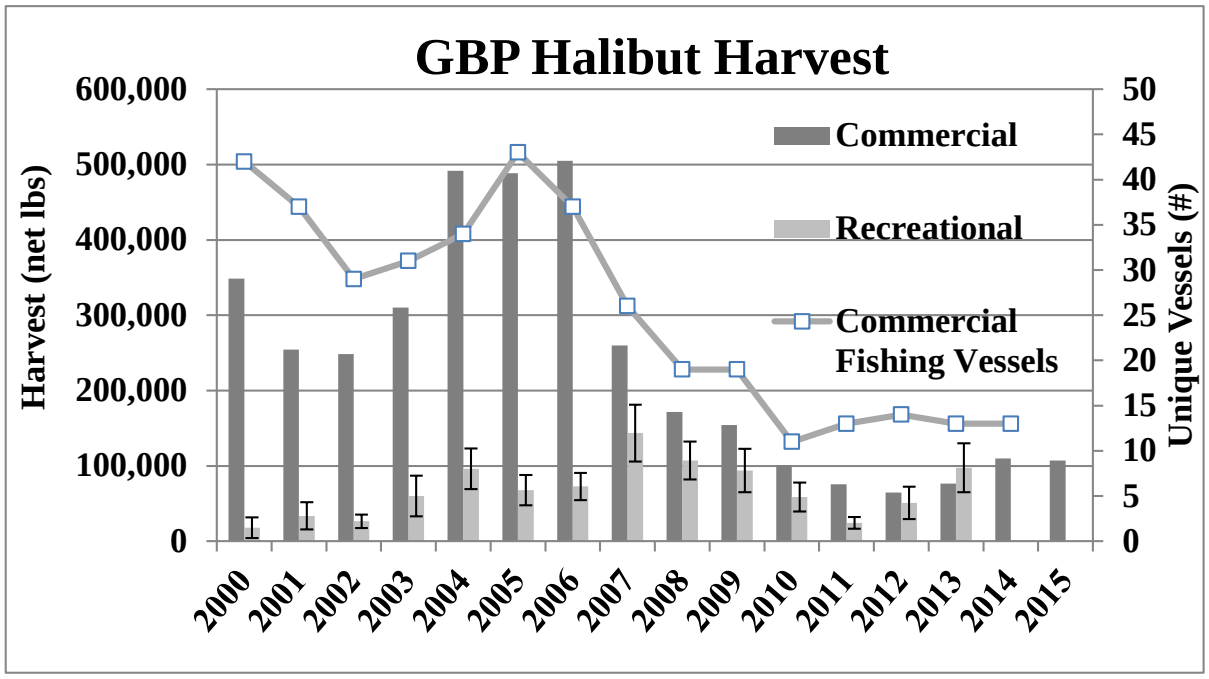


Figure 6. Net pounds of halibut (head and viscera removed) harvested in GBP by the commercial and recreational fishing sectors (IPHC 2016, ADFG 2015b). Recreational data is derived from the SWHS and is not available from 2014-2015 (SE bars). Commercial effort is displayed by the number of commercial fishing vessels.

Since 2011, guided recreational halibut harvest in GBP has remained fairly constant, while unguided recreational harvest has been on the rise (Fig. 7). Unguided harvest has accounted for an increasingly greater proportion of recreational harvest since 2011, rising from an overall annual average of 71% for the years 2006-2010, to 88% of total recreational harvest for 2011-2014.

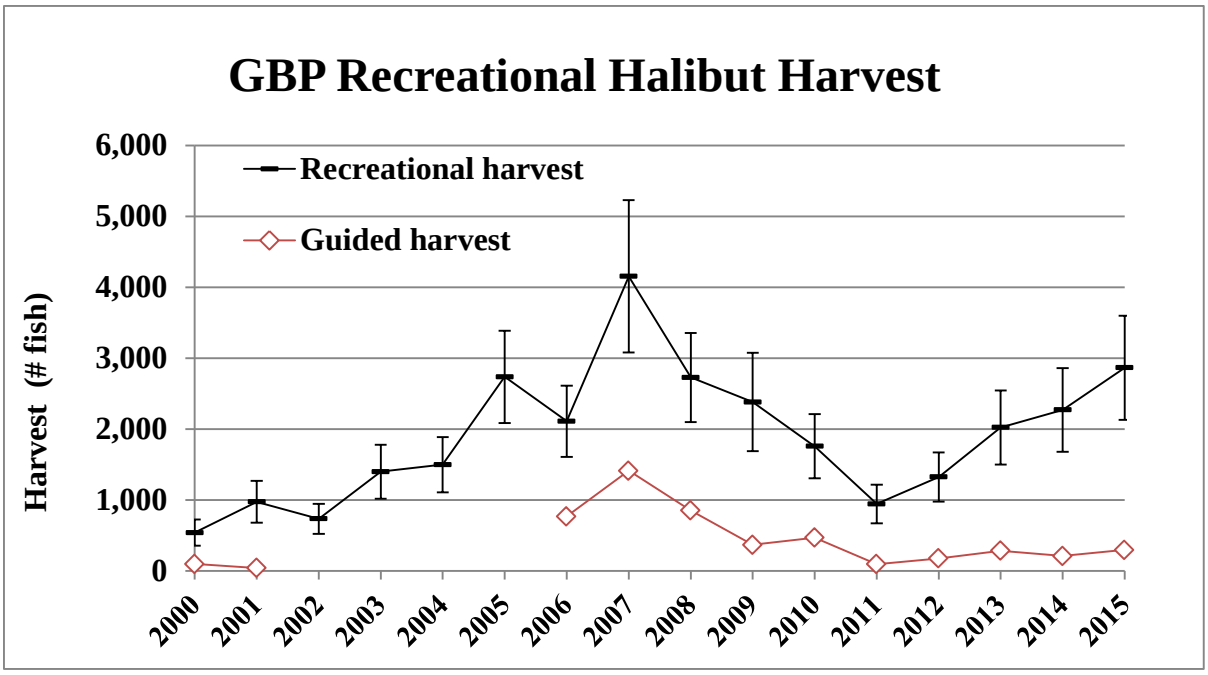


Figure 7. Number of halibut harvested from GBP by recreational anglers (guided + unguided)(SE bars) and guided anglers only (ADFG 2015b, ADFG 2016b).

Commercial halibut harvest in the OC portion of GBNP has decreased since 2005 to approximately 25% of 2002-2005 levels (Fig 8). Vessels reporting harvest in the OC have also declined from 48 in 2004 to 15 in 2015. This decline in fishing effort likely explains to a large extent the similar decline in harvest. In addition, the 3A (northern Gulf of Alaska) harvest allocation fell by 72% between 2006 and 2014. Combined total commercial halibut harvest was 1,709,300 net pounds from 2000-2015.

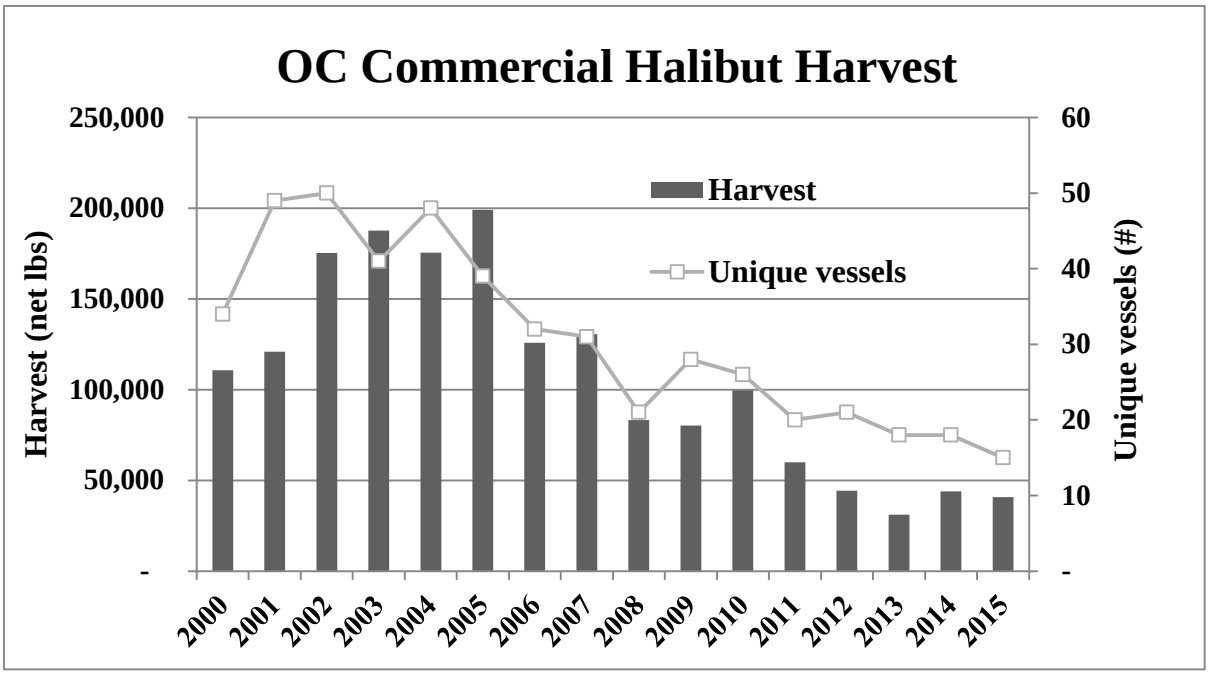


Figure 8. Net pounds of commercial halibut harvested along the OC portion of GBNP. The number of commercial vessels reporting halibut harvest is displayed on the secondary axis (IPHC 2016).

The number of halibut caught by guided anglers on the OC rose from an annual average of 25 halibut for the years 1998-2005, to nearly 250 halibut per year for 2006-2015 (Fig. 9, ADFG logbook data). Though there are considerable discrepancies between OC halibut harvest reported to ADFG and the NPS, NPS logbook data between 2006 and 2015 demonstrates a 10 fold increase in average annual halibut harvest over the years 2000 through 2005.

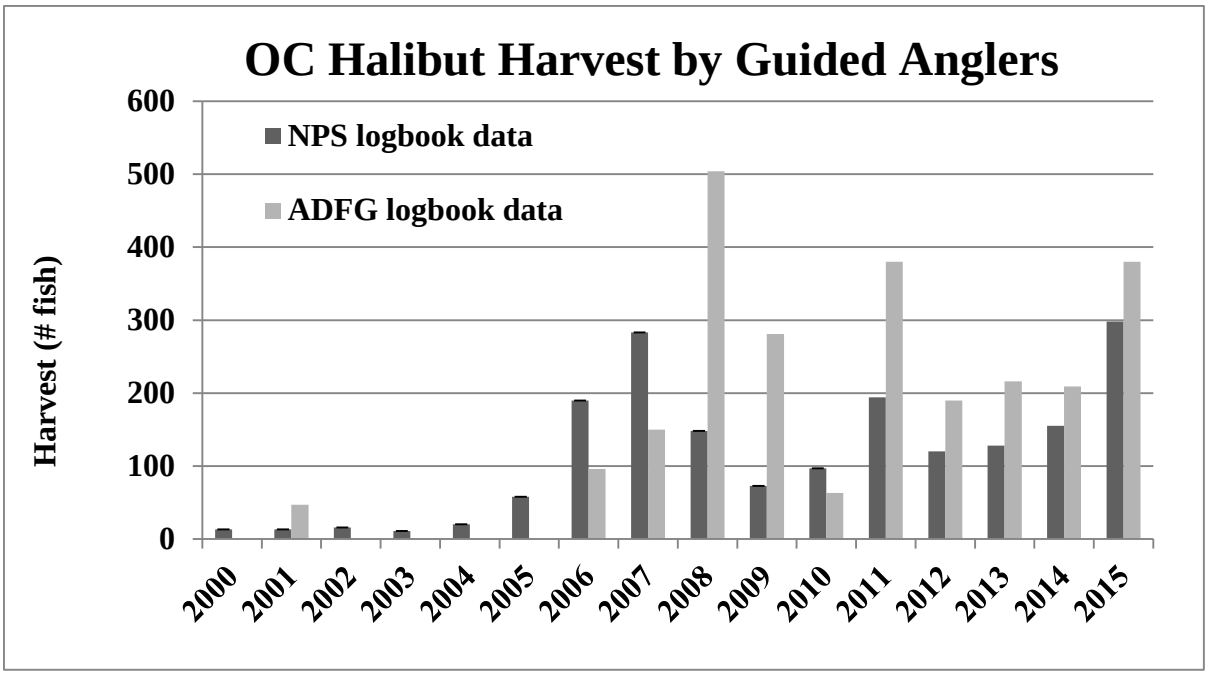


Figure 9. Number of halibut harvested by guided anglers from the OC of GBNP. Data from two different sources are displayed: ADFG and NPS charter logbooks (ADFG 2016b, GBNP 2016). Logbook data from ADFG is not available for 2002-2005.

Tanner Crab Harvest

ADFG manages the Tanner crab fishery and conducts annual surveys to assess Tanner crab stock health and estimate biomass by CPUE of four size and sex classes and on female reproductive potential (Siddon et al 2009) . Stock health in each of the 14 core areas within southeast Alaska is characterized as either poor, below average, average, above average or healthy. The recommended exploitation rate under the 5 categories of stock health are 0%, 5%, 10%, 15% and 20% of the estimated mature male biomass, respectively.

Within GBNP, Tanner crab is only harvested in appreciable numbers by the commercial fishing sector. Harvest in IS, with the exception of Excursion Inlet, occurs primarily outside the park boundary. Little recreational Tanner crab fishing occurs in park waters outside GBP (Fig. 10) or Excursion Inlet and is therefore not reported here. The recommended harvest in GBP has been surpassed in five out of six years, sometimes by over threefold as seen in the 2009/10 and 2013/14 seasons. Realized exploitation rates reached as high as 43% of the estimated mature male biomass in the 2013/14 season when the stock was categorized as in below average health. Additionally, the estimate of mature Tanner crab biomass from fishery independent ADFG pot surveys for GBP have decreased by 75% from 1,384,180 pounds in the 2008/09 season to 323,113 pounds in the 2013/14 season (Stratman et al 2011, Wood et al 2014). Despite the decline in GBP Tanner crab biomass, catch per unit effort (lbs /vessel) has been stable or increased in recent years (Fig. 11).

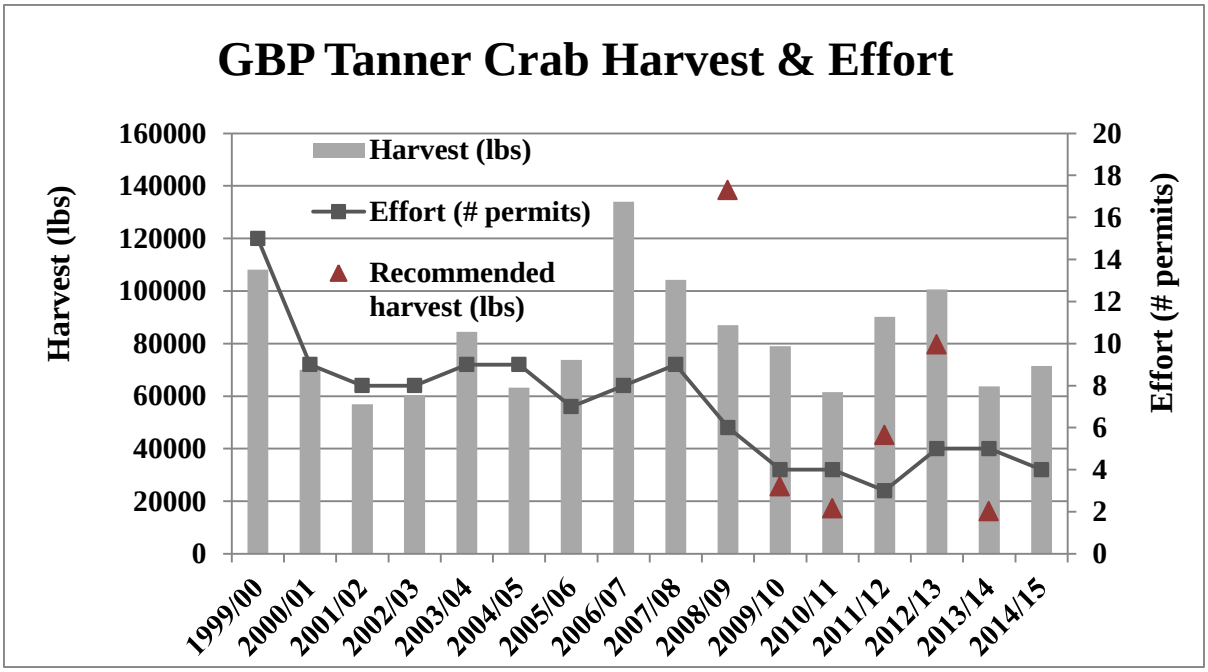


Figure 10. Pounds of Tanner crab commercially harvested from GBP (ADFG 2015c). ADFG recommended harvest is available for 2008-2014 only (Stratman et al 2011, Wood et al 2014). Fishing effort magnitude (number of permits fished) is displayed along the secondary y-axis (ADFG 2015c).

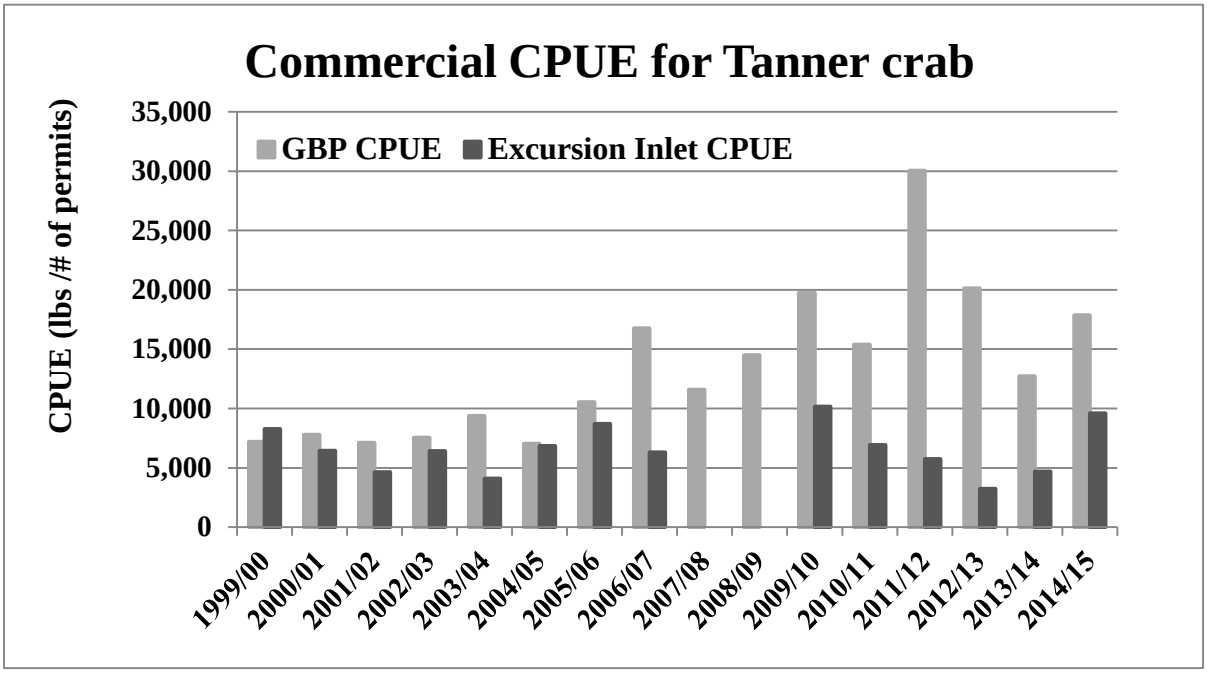


Figure 11. Pounds of Tanner crab caught per fishing permit for GBP and Excursion Inlet (ADFG 2015c).

Patterns in stock health are not consistent between GBP and Excursion Inlet. This contrasting pattern is evident in most years, but particularly apparent in 2008/09 season where survey results characterize GBP Tanner crabs at moderate health (Fig. 10), while Excursion Inlet was characterized

in poor health and the recommended harvest level was 0 (Fig. 12). These contrasting patterns may indicate the Tanner crab metapopulation in GBP is isolated from Tanner crab in IS and Excursion Inlet. In Excursion Inlet, recommended harvest has been surpassed in two out of six seasons where recommended harvest levels were established (Fig. 12). Commercial Tanner crab harvest rates (CPUE) have been comparatively higher and more variable in GBP compared with Excursion Inlet for the period of record (Fig. 11).

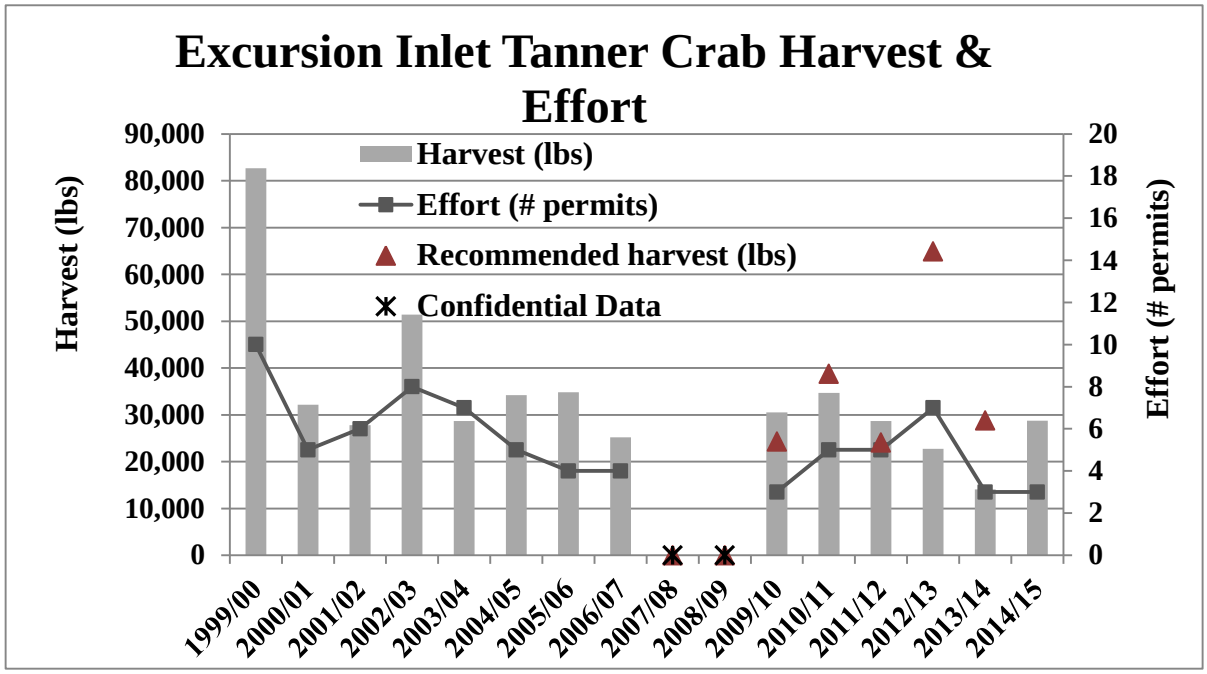


Figure 12. Pounds of Tanner crab commercially harvested from Excursion Inlet (Fig. 1 statistical area 114800). Note that ADFG recommended harvest is available for 2008-2014 only (Stratman et al 2011, Wood et al 2014). The number of permits as a measure of effort is displayed on the secondary axis (ADFG 2015c). The park boundary lies mid-channel so approximately half of the Excursion Inlet statistical area lies within park waters. Data gaps (2007/08 & 2008/09) represent confidential data when three or fewer permits were fished.

Although ADFG acknowledges the Southeast Alaska Tanner crab stock is likely comprised of many isolated sub populations, currently it manages this limited entry fishery by regulating the length of the season and the number of pots each participant can use for the entire southeast Alaska region (Stratman et al 2011). ADFG estimates the available biomass and the health of the stock for each of the 12 core areas, but it does not restrict harvest levels within each core area. According to an ADFG Tanner crab manager, with such a short season (5-7 d) crab fishermen tend not to fish areas where the stock is in poor condition and catch rates are low (Adam Mesmer, ADFG, written communication January 10, 2017). The Alaska Department of Fish and Game also acknowledges that a long term sustainable fishery at current exploitation levels could be tenuous (Siddon et al 2009). Despite Glacier Bay being limited to LAP fishers, this pattern of stock decline and much higher than recommended harvest is concerning.

Rockfish Harvest

There is no directed commercial rockfish harvest in GBP; however some rockfish are caught as bycatch (fish caught that are not the direct target of the fishing effort) in the halibut longline fishery. Except for 2013, all rockfish harvest in 2010-2014 was unknown due to confidentiality. This is not surprising given that the average annual number of halibut commercial fishers reporting rockfish harvest was sixteen from 2005-2007, while from 2008-2015 the annual average was less than four. Commercial rockfish bycatch harvest in GBP was highest from 2005 to 2007 when there were more fishers reporting (Fig. 13)

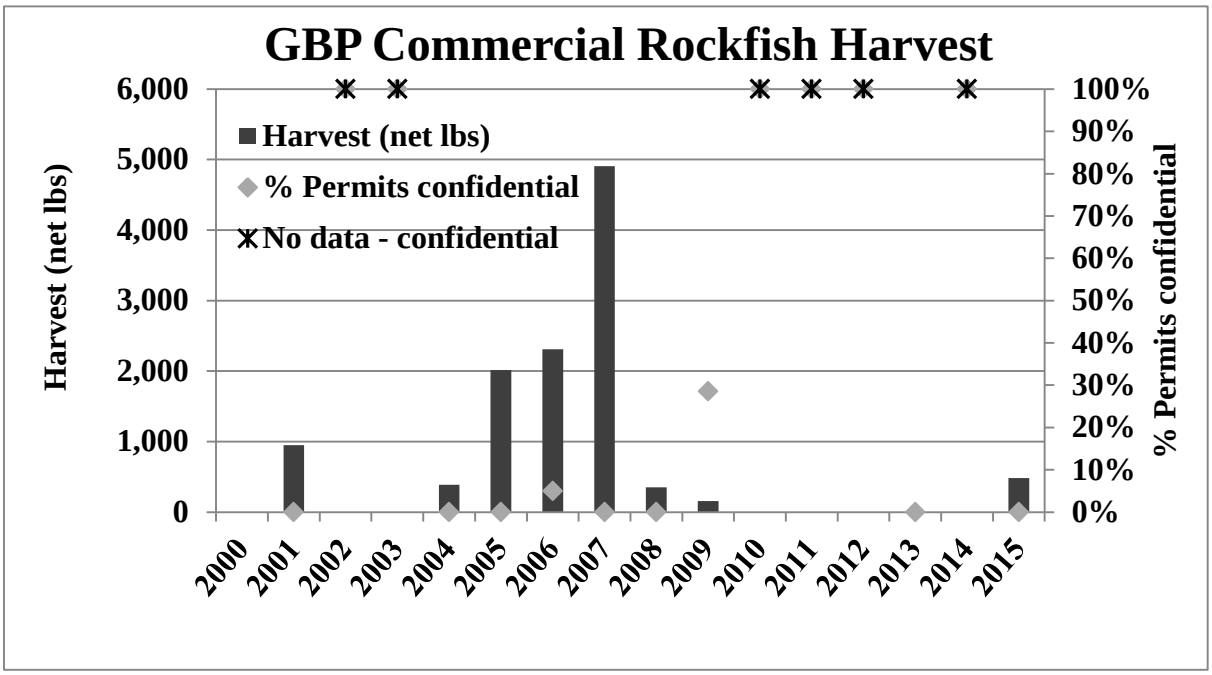


Figure 13. Net pounds of rockfish commercially harvested from GBP as bycatch in the halibut fishery. The percentage of permits that reported harvest in GBP that is deemed confidential is displayed on the secondary y-axis (ADFG 2016c).

Alaska Department of Fish and Game classifies six rockfish species as pelagic while the rest are considered non-pelagic. Non-pelagic or demersal rockfish live at or near the bottom in rocky environments and tend to be long lived K selected species. For instance, yelloweye rockfish can live to at least 118 years and in southeast Alaska only 50% reach reproductive age by 22 years. Rougheye rockfish are thought to live at least 205 years (Love et al 2002).

Figure 14 demonstrates considerable variability between years in rockfish removals from GBP by recreational anglers. Unguided harvest accounts for the majority of recreational harvest. State Wide Harvest Survey estimates of recreational rockfish harvest have high error associated due to small Glacier Bay sample sizes for most years.

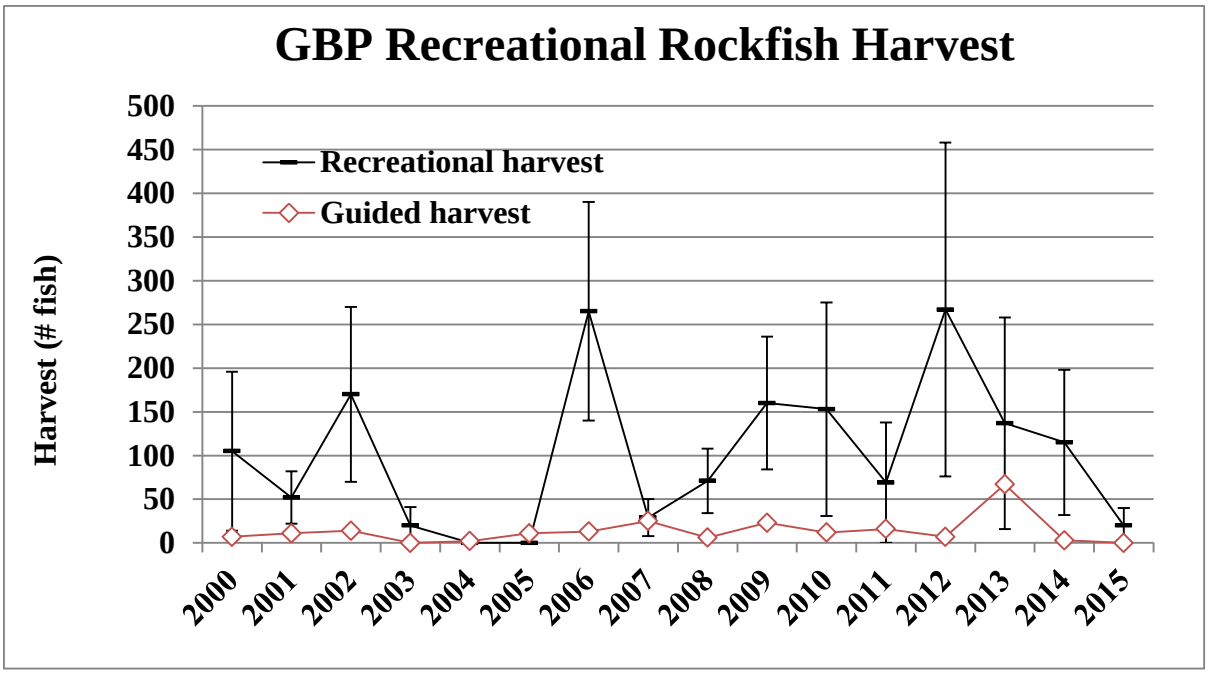


Figure 14. Rockfish harvested in Glacier Bay Proper by recreational (guided and unguided)(SE bars) and guided anglers. Guided harvest statistics are comprised from the high-end estimates from ADFG charter logbooks (ADFG 2016b). Recreational harvest is from the SWHS (ADFG 2015a).

Figure 15 displays high (H) and low (L) estimates of reported rockfish harvest from ADFG charter logbooks on the OC. High and low estimates were reported for each year because ADFG charter logbooks require that only one statistical area be reported for salmon and groundfish for each trip. As a result, it can be unclear from which statistical area a rockfish was taken. In general rockfish harvest by guided anglers in the OC portion of the park has increased from quite low harvest between 2000 and 2006 (high of 61) to a relatively higher harvest of 538 - 1128 fish in 2015 (Fig.15). The considerable differences between high and low estimates are due to a large number of trips where it was unclear if the harvest had occurred in park waters. Pelagic rockfish comprise on average 60-70% of charter reported rockfish harvest on the OC.

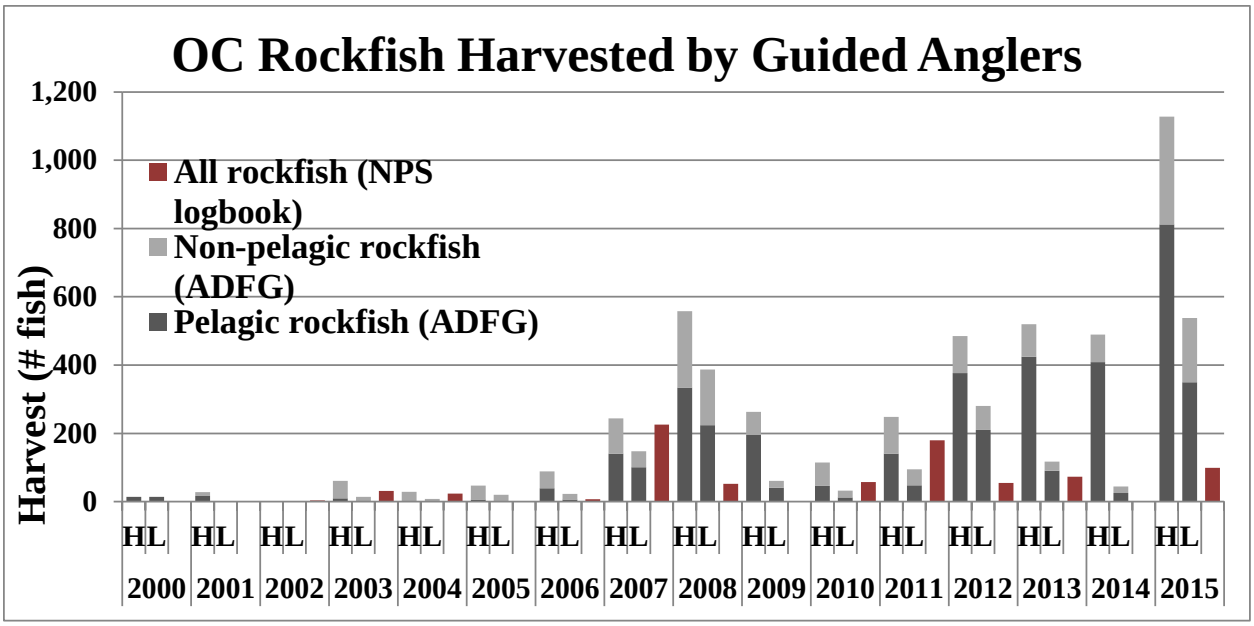


Figure 15. Rockfish harvested by guided anglers from the OC of GBNP. Data from ADFG charter logbooks is presented as pelagic and non-pelagic rockfish, while NPS charter logbook data is a total of all rockfish (ADFG 2016b, GBNP 2016). Two ADFG values are reported for each year (H=high-estimate, L=low-estimate), due to the requirement that charters only report harvest to one statistical area. Often it isn't clear which statistical area the reported rockfish were harvested. High estimates assume rockfish occurred in park waters when it isn't clear, while low estimates assume rockfish harvest occurred outside the park boundary (see Data Limitations section).

Outer coast commercial rockfish harvest, similar to Glacier Bay consists mostly of bycatch from the halibut longline and salmon troll fisheries. There are two directed rockfish fisheries for non-pelagic rockfish and black rockfish that occur in northern Southeast Alaska outside waters. The non-pelagic rockfish directed fishery has been closed since 1994, when stock assessment survey results indicated a low abundance of fish (Green et al 2014). Figure 16 displays, with the exception of 2012, that far more non-pelagic than pelagic rockfish are harvested by commercial fishers. This is in contrast with the guided recreational harvest where pelagic rockfish harvest is greater than non-pelagic (Fig. 15).

Commercial harvest of non-pelagic rockfish has declined over the period of record. As most non-pelagic rockfish are harvested as bycatch in the halibut longline fishery, it is likely that recent cuts in 3A commercial halibut quota explain reductions in non-pelagic rockfish harvest. Current bycatch regulations require that all non-pelagic rockfish be kept and recorded. Commercial halibut fishers are allowed to sell 10% rockfish by round weight of the total landing.

Periodic fishery independent monitoring of non-pelagic rockfish populations along the OC would help ensure stocks are not depleted. However, the last independent survey was conducted in 1994.

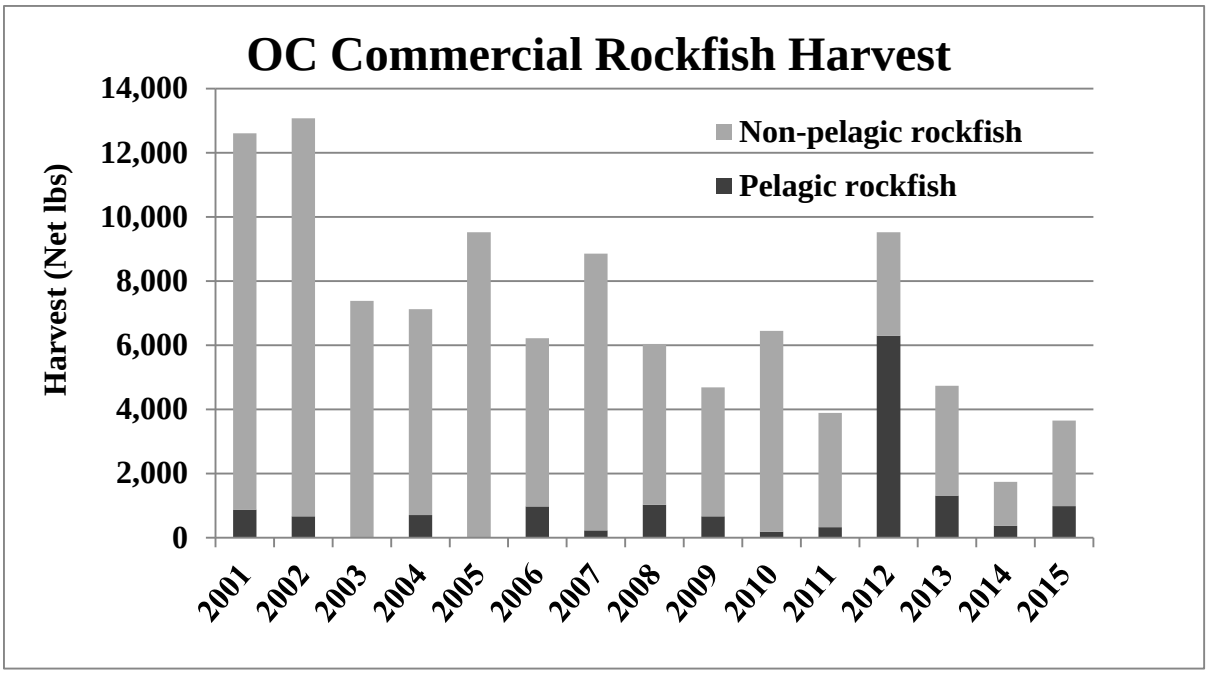


Figure 16. Net pounds of rockfish commercially harvested on the OC of GBNP (ADFG 2016c).

Conclusions

The purpose of this report is to summarize the numbers of pounds of halibut, Tanner crab and rockfish harvested from GBNP. Data limitations are a barrier to reporting fisheries effort and harvest for the entirety of GBNP, but based on the data displayed in this report, 3,927,000 net pounds of halibut, 1,308,800 pounds of Tanner crab, and more than 11,557 pounds of rockfish were harvested out of GBP from 2000-2015. The information summarized here will help managers, visitors and other park constituents better understand fishing effort and harvest from GBNP marine waters. We hope to expand this information to include other species in the future. In order to obtain a better, more comprehensive perspective on fishing effort and harvest, we would require access to confidential fisheries data and better geographic alignment of statistical areas with the park unit boundary.

In summarizing halibut, Tanner crab, and rockfish data the most important results are: 1) While commercial fishing has been curtailed in GBP, recreational harvest, particularly of halibut, has been on the rise (Fig. 6); 2) There has been a long-term decline in estimated Tanner crab stock abundance and a continued harvest over guideline harvest levels in Glacier Bay Proper (Fig. 10); 3) Rockfish harvest by guided anglers on the OC has increased considerably since the 2000-2006 period (Fig. 15) and commercial harvest of non-pelagic rockfish has declined over the period of record and is now 5-10 times less than harvests in 2001 and 2002(Fig 16); 4) Confidentiality constraints of state data consistently prohibit our ability to accurately report the amount of commercial rockfish harvest as well as specific measurements of effort that can be helpful in monitoring fisheries.

A concerted effort to improve the accuracy of reported fisheries effort and harvest estimates would require NPS managers to achieve the following goals:

(1) Meet with charter anglers each spring to promote consistent compliance with logbook entries and more comparable data in future years.

(2) Gain access to confidential fisheries data occurring in the park by petitioning the state of Alaska or obtaining data directly from fishers.

(3) Partner with the ADFG to obtain better estimates of effort and harvest in park waters via changing reporting requirements and statistical area boundaries.

Conduct dockside creel surveys in Bartlett Cove and roving surveys to better estimate guided and unguided sport harvest and effort for Glacier Bay National Park waters.

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