M E M O R A N D U M

Date: March 7, 2023

To: Chris Moore

From: Jason Didden, staff

Subject: Ocean City, MD Video Project Summary for Scientific and Statistical Committee (SSC)

This memo supports an informational discussion at the March 2023 SSC meeting regarding a pilot project to use a video camera to count boats going through the ocean inlet in Ocean City, Maryland ("OC Inlet" hereafter). Full results will be presented at the Council's April 2023 meeting. The OC Inlet creates an observation point for all of Maryland's ocean recreational fishing effort. Using the back bays to the south or north to reach other ocean inlets is possible but not practicable. Likewise, running down the Chesapeake to the ocean is not practicable.
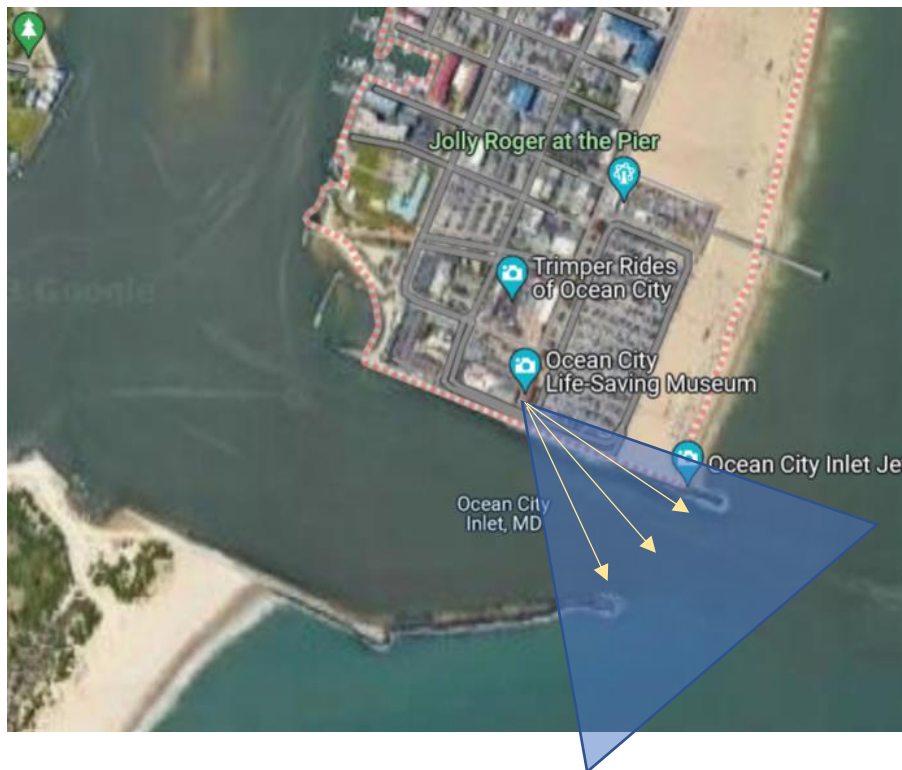

Figure 1. Project Location – OC Inlet, Google Maps

The Ocean City Life-Saving Station Museum allowed use of their tower (and power) for mounting the camera and housing equipment. COVID-19 delayed installation of the camera system until July 5, 2020 (so July 6, 2020 was the first full day). It was quickly evident that there

was sufficient light from the inlet parking lot and/or lights on vessels to reasonably discern night passage. Periods of fog do not appear to have been excessive, and have been tracked and the counts in the morning or evening expanded based on the missing time.[1] Recording continued into 2021 with the intent of obtaining a full calendar year of recording. Unfortunately the camera suffered damage from water intrusion and ceased operation on March 3, 2021. While replaced under warranty, troubleshooting, supply issues, and refurbishment of the lifesaving tower delayed deployment of a new camera until August 4, 2021. Recording continued until April 26, 2022, when the recorder was retrieved. Staff had planned to download videos remotely, but connection issues corrupted all but very short video downloads despite a hardline connection to the recording system. Staff periodically exchanged 6-8 terabyte hard drives as they filled. Due to a proprietary recording format, the recorder was retrieved in April 2022 so that the videos could be reviewed, but even that was more challenging than anticipated (see lessons learned below). Staff and a contractor have been reviewing the videos to create fishing boat and angler trip range estimates.

The OC Inlet is incredibly busy in the summer months. To simplify counting for this project, only vessels that might reasonably be engaged in recreational fishing were counted. Counting is segregated by am and pm. Once it became clear that almost no activity occurred between 9:30 and 2:30, these times generally stopped being counted to save time (except for some occasional re-checking), and the activity before and after was also noted (for example there might have been zero boats from 8:30-9:30 and zero boats from 2:30-3). Vessels not counted included government vessels, commercial fishing vessels, thrill rides, parasailing boats, jet skis, and kayaks. Jet skis are very prevalent and go back and forth across the inlet threshold, but minimal fishing on jet skis was observed. Minimal kayaking was observed to leave the inlet. The inlet is too busy to simultaneously count in both directions – only outbound vessels were recorded.

One camera was utilized with its view arc approximated in Figure 1. Most vessels turn left/north departing the inlet due to shoals to the southeast, but some will turn south behind a jetty or cross the shoals. Based on a meeting in Ocean City, MD with several local captains, 5 categories of vessels that went through the inlet and went out of view or out of the view arc were counted: (1) small/median powerboats (except as described above) that turn left or proceed east; (2) large powerboats ("cabin cruisers" and/or "deadrises"); (3) sailboats; (4) "maybes" - generally very small powerboats that appear unlikely to engage in fishing; and (5) power boats, generally smaller, that turn south and disappear out of view. Sailboats venturing through the OC Inlet appear to be negligible, mostly from a tour operator that would not be fishing.

This approach was used due to both simplifying the counting, and to allow different estimates of anglers per boat to be applied later, per discussion below. The qualitative vessel-type judgement of the reviewer introduces immediate uncertainty into any counts. The most acute issue is probably the parasailing operations, which frequently use the inlet with several vessel styles and are similar to many boats that may be fishing, especially when viewed in fast-forward. An effort

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[1] There was minimal activity between 9:30pm and 2:30am. To the degree that fog resulted in missed counting time outside of these hours, the proportion of the missed 9.5 hours of meaningful am or pm counting time is used to expand the large powerboat boat effort. Only half of that expansion is applied to the other categories as it seems reasonable that the large powerboats will run similarly in fog but the other categories seem likely to be dissuaded by fog. Activity could often be seen in fog but not discerned by vessel type. For example, if half of the time was missed from 2:30 am until noon, then the count would be doubled for large powerboats (e.g. 10/0.5 = 20) and increased by 1/3 for the other categories (e.g. 3/0.75 = 4, a 1/3 increase). Special circumstances are also considered, for example an entire busy tournament morning through 6am was obscured by fog, so the next day's count through 6am was used.

was made to exclude them from counts, but there are certainly some that were counted, and some boats that may have appeared very similar to the parasailing boats that may have not been counted. Vessels fishing in the inlet were not counted unless they subsequently depart seaward of the inlet. To the extent practicable, vessels are tracked visually and not counted if they make a U-turn and reenter the inlet/back bays, which happens with some frequency especially if the seas are rough. The reviewer cannot pick up all such returns visually especially during busy times. It is virtually certain that some boats transited the inlet twice in one outing and were counted twice – viewing in any degree of fast forward does not allow tracking of individual vessels. It is also certain that some boats, perhaps a substantial portion that get counted, never fished but were only out for a cruise. Ranges of boats fishing are used to account for this behavior, and this provides a transition into the methods used to estimate potential ranges of trips. Each category is addressed separately, and at this point the approaches are best described as "analysts prerogative," though have been informed by discussions with fishermen.

1. Small Powerboats that turn left or proceed generally eastward. Staff preliminarily estimates that 50%-90% of these trips may have fished in the ocean. Trips departing before 9am generally appear headed off-shore and probably have a very high percentage of "ocean fishing." Trips later in the day are less certain in terms of ocean fishing activity versus cruising or fishing mostly in the back bays.

2. Large Powerboats: these are boats designed and dedicated for fishing. Staff preliminarily estimates that 95%-99% of these trips may have fished in the ocean.

3. Sailboat activity was negligible, and most was on a tour that would definitely not be fishing. Staff preliminarily estimates that 0%-5% of these trips may have fished in the ocean.

4. The "Maybes" did not appear likely to be fishing but were not completely dismissed. They could be very small powerboats or large cruisers without a fishing deck. Staff preliminarily estimates that 10%-20% of these trips may have fished in the ocean – they are not a substantial portion of the counts, though more than sailboats.

5. Boats headed out of sight to the south. These are generally smaller boats, but many appear to be "fishy." Staff preliminarily estimates that 50%-80% of these trips may have fished in the ocean, but they may have spent more time in the back bays.

An example of boats counts from July 2020 for the small and large powerboats that exit view north and/or east is provided below (Figure 2). Activity is generally higher on the weekends, but weather can result in low effort on any given day – for example Tropical Storm Fay was in the area on July 10, 2020.
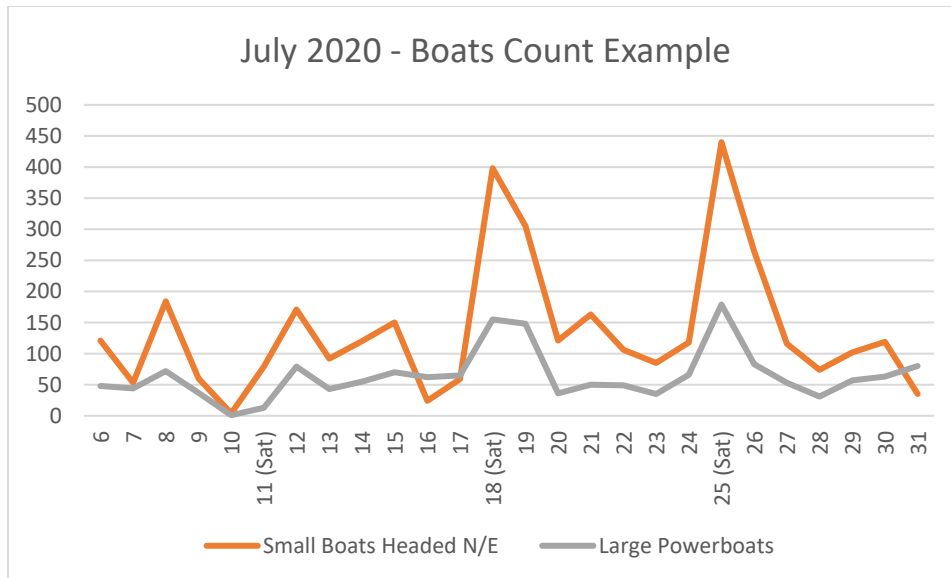

Figure 2, July 2020 Boat Counts Example

Besides assuming a proportion of vessels fishing, to get an approximation of potential trips, a range of anglers per boat must also be assumed. MRIP access point survey data indicated that in 2020, the average ocean private boat trip in Maryland had 3.7 anglers with a range (1.96 standard errors) of 3.0 to 4.5 (pers com John Foster, MRIP staff). For-hire trips, which staff thinks is likely representative of the "large powerboat" group, averaged 4.9 with a range (1.96 standard errors) of 4.1 to 5.8 (pers com John Foster, MRIP staff). Wave by wave estimates are available and could be matched to the monthly estimates but given the ballparking nature of this exercise the annual values seemed likely sufficient. With the boat counts, a range of fishing participation, and a range of anglers per boat, one can construct a range of possible trips, though this range still doesn't fully account for all uncertainties. An example of a constructed angler trip range for July 2020 (all boat types) is provided below (Figure 3).

It was unfortunate that the camera system was not set up leading into the July 4th 2020 weekend starting wave 4, but staff noted that wave heights were consistently low that week (hourly wave height at the weather buoy 19 miles off the MD/DE border for July 1-5 2020 averaged 2.4 feet with no observations over 3.0 feet), and the weather was seasonal except for thunderstorms July 1 (Saulsbury Airport). Winds at the ferry dock in Lewes were also seasonal, generally below 10 knots. Considering the weather and the holiday week, it seems reasonable to expect high participation for July 1-5, except for July 1 given thunderstorms were in the area. If the lowest Wednesday counts are used for July 1, and the highest other matching July day of week counts are used for July 2 (Thursday), July 3 (Friday), July 4 (Saturday), and July 5 (Sunday), it seems possible to fill in the missing days with data that should approximate what occurred so that a full month can be estimated.
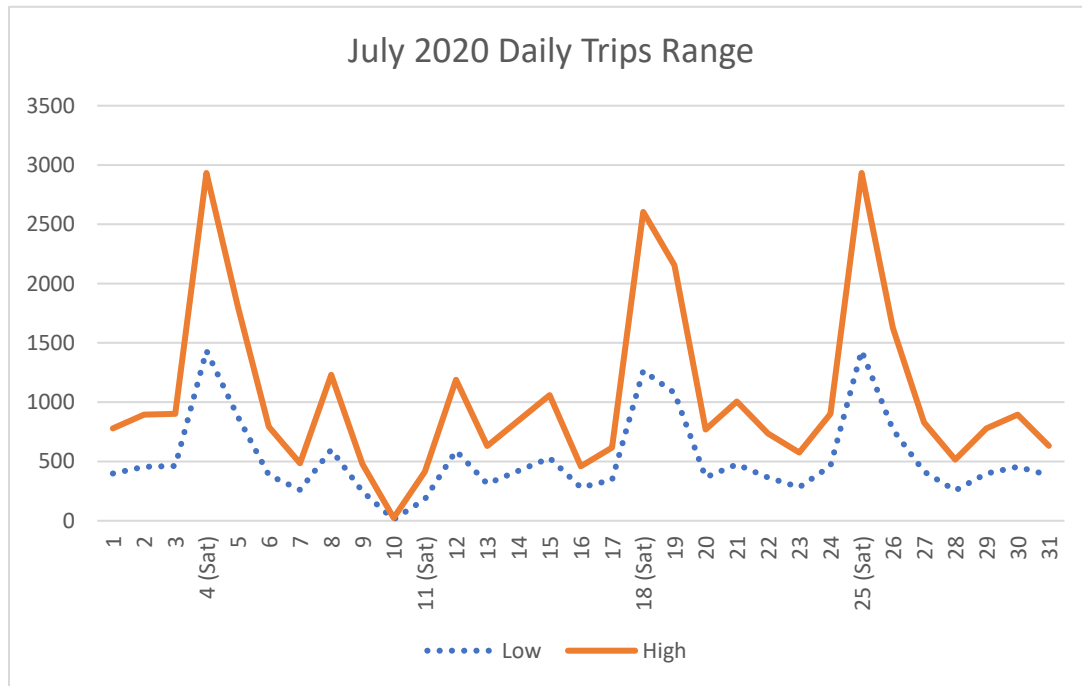
Figure 3. Daily extrapolated ocean angler trips.

For the April Council meeting, staff and a contractor are completing the counts and extrapolations for the time period that data was collected in a similar fashion as above. Staff will also compare the estimates with MRIP Maryland ocean effort by private boats, deducting out the MRIP charter effort estimates (since the counts from the project include charter boats).

Initial Lessons Learned

1. Logistics and equipment issues were major challenges. Any use of a similar system for conducting actual estimates would have to have additional redundancies to avoid loss of data collection. Substantial on-site presence and additional information technology skills would be needed to monitor and correct problems.
2. Video retrieval, storage, and viewing were major challenges and extended the time needed to complete the project. It is likely that different systems could automatically retrieve data and store to the cloud with a file type that is more accessible.
3. This location provided a good view of the inlet. However, the inlet was busier than anticipated, limiting the speed at which video could be reviewed and extending the time required to complete the project. Also, the uncertainty about vessel behavior out of view complicates interpretation of the counts. The geography of the area is conducive to funneling effort and viewing the inlet, but the shoal offshore creates a complicated pattern of vessel behavior after leaving the inlet. A very wide angle could help see where vessels go, but the busyness of the inlet limits the amount of time one can track any given vessel and would make it difficult to discern vessel types. Multiple cameras would greatly add to the complexity of using cameras to count vessels. It may be possible that machine learning/ artificial intelligence could be used to automate counting, but the behavior of jetskis, boats that often fish near the inlet threshold, and non-fishing parasailing operations would seem likely to complicate automatic counting. The issue of

vessel behavior once beyond the inlet threshold would also be a continuing challenge without an immediate solution.

4. Given the challenging behavior of vessels once clearing the inlet, the counts provide some perspective on vessel activity, but staff does not immediately see a path to how a relatively simple video system could be used to accurately and precisely estimate ocean recreational fishing effort in Maryland.