2001 ODFW and WDFW Cooperative Razor Clam Stock Assessment Project on the Clatsop Beaches

Introduction

On September 17th and 18th of 2001 the Washington Department of Fish and Wildlife (WDFW) Razor clam Lead Biologist and his staff of 3 technicians working in cooperation with the Oregon Department of Fish and Wildlife (ODFW) Shellfish Biologists, demonstrated their clam pump stock assessment technique on the Clatsop beaches in Oregon. Developed in the early 1990's by a University of Alaska graduate student, the clam pump stock assessment technique has become the standard in determining Razor clam population abundances. It is used not only by WDFW, but also the Alaska Department of Fish and Game and the Haida Tribe on Queen Charlotte Islands of British Columbia, Canada. This technique is what WDFW uses to determine their harvestable population and subsequently set seasons within a 25% optimal sustainable yield (OSY). The purpose of the demonstration was to determine if the technique would work on Oregon beaches and to examine if this technique revealed abundances of Razor clams higher than with previous ODFW methods (i.e. strip digging). With the anecdotal knowledge that there had recently been a large set, this demonstration hoped to not only prove that theory but to also quantify it.

Methods

The clam pumps effectiveness is equaled by its simplicity, a water pump forces water out of a wand, which when pushed into the sand, liquefies it causing any Razor clam in the defined proximity to float to the surface. The technique uses;

- A 15 hp water pump (Honda WH20X=$700)
- 300 feet of 3 ½ inch flexible intake hose with a filter ($300)
- 600-700 feet of fire out-take hose and cam-locks ($950)
- A PVC 6 foot wand with a 90° connector for the fire hose ($50)
- A ½ square meter round aluminum bottomless sieve basket ($350)
- PVC elevation markers ($50)
- Tape measures ($20)
- Lanterns
- Data sheets

TOTAL=$2,420

WDFW performs one transect for each beach mile they have Razor clam populations on. For this demonstration, two transects were done. Transects were chosen the previous day of use and global positioning system (GPS) coordinates were taken at the highest observed "show" of clams. A piece of steel rebar was driven into the sand for ease of locating in the dark.

Transect one was pumped on September 17th, just south of the Sunset Beach access (High show N 46° 05.158', W 123° 56.408'). Transect two was pumped on September 18th, at the southern end of Gearhart Beach (High show N 46° 00.746', W 123° 55.870'). At each transect, plot lines were set up at 50-foot intervals called elevations. These elevations were westward from the "high show" mark. A random number generator determined if the plot line would be on the north or south side of the elevation marker (Figure 1). Optimally, 6 plots were pumped per plot line, though due to tide conditions 3 were the minimums done for transect two. Pumped plots are one basket length apart and are pumped for 3 minutes each (4 minutes was done at the higher elevations of Gearhart due to the use of long hoses from the pump). All clams seen are removed from the plot and sampled. After the plot time had elapsed, water that remained on top of sand was skimmed with a fine mesh net to collect small juvenile clams.

Data was taken for each plot and plot line elevation for each transect. All clams were measured, classified as either pre-recruits (<3") or recruits (>3") and returned to the plot unharmed. Data is later entered into a computer-modeling program to determine clam density by elevation. The total beach length is used to determine the area (in square meters) of Razor clam beds. The computer program provides Pump Survey Sample Catch Summaries for total clams pre-recruits and recruits. The program determines the number of plots and clams per each elevation of transect to determine the density of clams per square meter per elevation. It provides the number of sampled elevations and mean density per elevation group and, by transect, independently estimated total clam abundance by elevation group and grand mean clam total abundance for all transects. All summaries for abundance include confidence intervals, coefficient variations and standard deviation ranges (Tables 1-18).

Results

A total of 786 Razor clams were sampled from 82 individual plots. The Sunset Beach transect had 8 plot lines from 0-400 feet with 48 total plots. A total of 102 Razor clams (13%) were sampled from this transect, of which 73 clams (71.5%) were pre-recruits and 29 clams (28.5%) were recruits. The Gearhart transect had 9 plot lines from 0-450 feet with 34 total plots. A total of 684 Razor clams (87%) were sampled from this transect, of which 668 clams (97.6%) were pre-recruits and 16 clams (2.4%) were recruits (Table 1).

There was a very high abundance of small pre-recruits (<12mm) in both transects with a high of 62 in one plot at the Gearhart Beach transect. Pre-recruits ranged in size from 3mm (1/8 inch) to 76mm (3 inches) with the average size of the pre-recruit cohort of 10.4mm (about ½ inch) (Figure 3). It should be noted that of the pre-recruit cohort, there was an absence of clams from 31mm (1 ¼ inch) to 53mm (2 inches). Within the recruit sized Razor clams from both transects, only one clam was greater than 110mm.

The remainder of the recruit sized Razor clams were very uniform in size, ranging from 76mm (the 3 inch cut-off) to 107mm (4 ¼ inch) with an average size of 89.4mm (3 ½ inches) (Figure 4).

The computer-model was expanded using two total beach mile values. The first was 18 miles, which represents the beach from the South Jetty to the northern end of Tillamook Head (the Cove beach area) (Tables 1-9). The second used was15.5 miles, which represents the beach from the South Jetty to the northern portion of the Necanicum mouth (Tables 10-18). The reason for using the two differing values was due to the fact that there was no transect done south of the Necanicum River. With only having transects done on the portion north of the Necanicum, it was theorized that a more accurate estimate would be calculated for this area.

With a base beach length of 18 miles it was estimated that there are 5,297,787 square meters of Razor clam habitat (Table 3). With a base beach length of 15.5 miles (excluding Seaside beaches) it was estimated that there are 4,561,983 square meters of Razor clam habitat (Table 12). Mean clam density was 4.857142857 clams per square meter for transect one for all elevations (Table 2) and for transect two, the mean clam density was 58 clams per square meter for elevation 0-50 feet and 42.5208333 clams for elevation 100-600 feet (Table 2). Elevations are categorized as 0-50 feet and 100-600 feet to account for any anomalies within the assumed "high show" mark.

For the base beach length of 18 miles, the estimated grand mean total abundance of all clams was 127,843,934 with 121,841,877 (95.6%) pre-recruits and 6,002,056 (4.7%) recruits. There were 12,802,986 total Razor clams (10%) in the 0-50 foot elevations with 11,772,860 (92%) pre-recruits and 1,030,125 (8%) recruits. There were 115,040,948 total Razor clams (90%) in the 100-600 foot elevations with 110,069,017 (96%) pre-recruits and 4,971,931 (4%) recruits. Confidence intervals and coefficient variations are high for all estimates. (Tables 1-9)

For the base beach length of 15.5 miles, the estimated grand mean total abundance of all clams was 110,087,832 with 104,919,394 (95.3%) being pre-recruits and 5,168,437 (4.7%) being recruits. There were 11,024,793 total Razor clams (10%) in the 0-50 foot elevations with 10,137,741 (92%) pre-recruits and 887,052 (8%) recruits. There were 99,063,039 total Razor clams (90%) in the 100-600 foot elevations with 94,781,653 (96%) pre-recruits and 4,281,385 (4%) recruits. Confidence intervals and coefficient variations are high for all estimates. (Tables 10-18)

Conclusions

Having only performed two transects, all estimates should be treated as extremely rough and considered more like random spot checks of the Clatsop beaches. Still, the data gives a glimpse of what at least a portion of the beach populations are, so it shouldn't be completely disregarded.

It should be noted that the more transects performed on the beach the lower the confidence intervals become. WDFW only performs one per every beach mile due to time and tide constraints, they would do more if it was feasible time and money wise.

With 86.4% of the pre-recruits cohort ranging in length from 10mm-12mm, it is obvious that a large set has just recently occurred and initial survival appears to be good (Figure 3). According to WDFW Razor clam Biologists, this is as high, if not higher, than any pre-recruit set cohort observed on Washington beaches. There also is an apparent bimodal set within the pre-recruits (Figure 3). There is a lack of clams from the 31mm to 53mm range, which would indicate two independent sets. Obviously one set occurred just prior to the cooperative project, and another occurred this past spring. These are both very encouraging signs for the Clatsop beaches since there has not been an observed good set for a number of years. Retired Shellfish Biologist, Terry Link, believes this set might be the largest and widest ranging since the 1970's.

Recruits made up 4.7% of the grand mean clams. Recruits had a very uniform length range indicating only one-year class, most likely last years (2000). It appears that last years set had a high survival rate. It also appears that with no clams over 115mm, survival prior to the year 2000 is virtually non-existent. This information is not surprisingly different than what was assumed to be on the beaches. It is consistent when correlated with the record low catch and effort from the1999-2000 seasons.

Based on the recruit estimates derived from the demonstration, allowable catch following a 25% OSY can be crudely calculated. For a beach base length of 18 miles there are 6,002,056 total recruit clams. OSY is 1,500,514 clams. For a beach base length of 15.5 miles there are 5,168,437 total recruit clams. OSY is 1,292,109 clams. Either figure equates for a healthy potential harvest, though the vast majority of the clams would be smaller than 3½ inches. If current ocean trends continue, the Razor clam population has a great possibility of rebounding on the Clatsop beaches as well as other stretches of Oregon beaches.

The demonstration showed that the Razor clam stock assessment tool used by WDFW can and does work on the Oregon Clatsop beaches.

It is a very efficient tool in exposing all sizes of Razor clams, from the adults to the smallest juvenile set (some captured were translucent). Past Razor clam stock assessment were performed by strip digging those clams that "showed". It is apparent that only a percentage of the clams in an area "show", so this pumping technique exposes all clams in the area regardless if they "show" or not.

The questions have been posed, would this be an effective management tool for ODFW? And if so, how would it help ODFW better manage this resource? To answer both question, yes this would be a very effective management tool for ODFW. WDFW has been using it for almost 10 years, and it has become their most accurate method of estimating clam abundance. WDFW has continued to see an increase in pre-recruits and recruits each year and has set seasons accordingly.

Socially, this has been a huge asset in the publics' perception of WDFW Razor clam management, regardless of the fact that environmental conditions still play the most important role in clam populations. WDFW can determine estimated populations, set abundance, set survival, pre-recruit survival, recruit survival and establish seasons that keep the harvest within OSY. Though ODFW does not have the luxury of a user fee like WDFW, ODFW should and could do the same, because at present we have virtually no management scheme for this resource.