

PUBLIC COMMENT

**Substantiated Best Science Based
Support for
Upgrading the Status of the
West Indian Manatee**

Submitted to:

U.S. Fish and Wildlife Service
Docket Number FWS-R4-ES-2014-0024

Revised April 5, 2016

Submitted and Prepared by



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CFFW SUPPORTS Reclassification of the West Indian Manatee

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CFFW SUPPORTS Upgrading the Status of the West Indian Manatee

EXECUTIVE SUMMARY

This document is the collection of comments submitted in SUPPORT of Reclassification of the West Indian Manatee prepared by Citizens For Florida's Waterways (CFFW). Each comment is written in a standalone manner and provides strong science based support of the reclassification. Most of the supporting science comes directly from the work performed and presented by the Florida Fish and Wildlife Conservation Commission (FWC) and the United States Fish and Wildlife Service (USFWS).

Both individually but more conclusively in collection, these comments provide a strong case for reclassification of the manatee as *Recovered*. Make no mistake. We believe delisting is the only reasonable conclusion that can be drawn from the best available data. In addition, failure to do so presents unacceptable risk to the very local habitats and ecosystems that the manatee shares with thousands of other species, many of which truly deserve listing and protections afforded by the ESA.

CFFW is Florida's oldest and largest advocacy organization for recreational boaters. CFFW's founding is rooted in opposition to arbitrary and questionable implementation of speed zones with significant impact to large areas where recreational boating activities had been a popular activity for families for several decades. Over the three decades of our existence, CFFW has represented educated, informed, and sound science based counter-point for much of the unfounded and unscientific rhetoric of anti-boating organizations like the Save the Manatee Club.

CFFW is a charter member and consistent participant of the Manatee Forum. As such, we have been privileged to learn manatee science from the foremost experts with the latest available and best manatee science. We have listened to representatives of the state and federal management decision makers and numerous experts from outside government. It has always been our pledge to follow where the best science leads.

Each comment deals with a specific topic:

- Habitat
 - Manatee habitat has expanded significantly because of human activity.
- Abundance & Survival
 - Manatee abundance is large and growing; abundance is under-reported.
- Carrying Capacity and Optimum Sustainable Population
 - Manatees are at or near Optimum Sustainable Population

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- Risk Management
 - Management policies based on the legal requirements of “endangered” or “threatened” status contradict proven Risk Management methods
- Potential Biological Removal/Authorized Take
 - Delisting the manatee would allow issuance of a take authorization that matches best science and data
- Rebuttal of the form letter opposing reclassification
 - Calls to retain endangered status are debunked

These comments provide substantial support and valid justification for reclassification not just to *Threatened* but removal from the ESA as *Recovered*. CFFW realizes that delisting is a further step beyond reclassification as *Threatened*, but the evidence we include in each of the subject papers gives compelling reasons for reclassification as *Recovered*. In fact, we believe we have provided sound evidence that failure to reclassify the manatee as *Recovered* may very well delay the more critical tasks of habitat protection.

Clearly there are no defining features of the manatee habitat that limit the manatee to small geographic areas. The basic elements required are water over 68F, availability of nearby fresh water and adequate submerged aquatic vegetation for forage. Consequently we find manatees throughout all parts of coastal Florida, as well as rivers extending far inland. The manatee has made itself home in almost any location in Florida that can be reached by water from either coast. The habitat has not had any adverse effect or created any limit to manatee sustainability and lends absolutely no support to classification as endangered.

The abundance of manatees is impressive. Although we use the synoptic surveys to determine minimum counts of more than 6,000, these surveys undercount the total population.

Can you imagine the look of joy on the faces the manatee stock managers in 1980 or even 1990, if you told them that by 2010 we would have a confirmed 5,000 and probably more like 8,000-10,000. What if you told them that the calculated probability of extinction over the next 150 years had also been determined to be zero? Then, add in adult survivability rates of nearly 0.96 and annual population growth rates of 5-7%. These are not the characteristics of a depleted stock that has any real survivability threat.

We contend that the recent findings with respect to warm water vs. forage carrying capacity are an immediate game changer. Now that we know SAV availability is easily more limiting than warm water sources, we are compelled to manage the population at a new lower limit. The optimum sustainable population (OSP) is no longer equivalent to the warm water carrying capacity (CC). Further, without some true natural disaster, reaching and surpassing the OSP will happen in the near future. *In fact, in some locations this may have already started to occur.* If we can't

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do anything to manage the size and location of the herd, we are doomed to sit back and hope the manatee does not over-pressure SAV to a point it cannot sustain — and we lose habitat for *all* species that depend on SAV for a portion of their life cycle. Manatees may be able to sustain themselves on the resulting floating algae, but fish will not spawn in it.

With zero probability for extinction over the next 100 years it is easy to understand that it is ultimately highly unlikely that extinction can occur. Regardless of the assigned severity of this outcome, the risk of manatee extinction has to be classified as acceptable (highly unlikely occurrence combined with any assigned severity of consequence). OSP has to be redefined based on available forage that is likely to be considerably less than previously calculated based on warm water refugia. Further, achieving and/or surpassing OSP is highly likely, based on all current abundance predictions. The consequence of surpassing OSP is severe for the ecosystem itself. This concern, which has been privately voiced by FWS supervisors, is real. Reclassification will provide for increased opportunity to correctly manage the manatee stock.



The photo here was taken in March, 2016, in Malabar, Brevard, Florida.

Seagrass outside the staked area is gone, consumed by manatees.

Sadly, the conflict between manatee protection and seagrass has been documented in peer-review since 2004, but has never been discussed at the Manatee Forum, despite our repeated efforts to bring this critical subject forward.

Two Water Management Districts have conducted similar tests – both with the same results. Seagrass is utterly devoured, stalks, roots

and all.

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The risk of manatee impact on seagrass is a risk that has to be classified as unacceptable and must be managed (highly likely occurrence combined with severe consequence). But our hands are tied by the erroneous classification as endangered, requiring you to manage for population growth, rather than sustainability.

Our considered opinion – and as the only organization seriously examining the OSP, we must be considered expert on the matter – is that the manatee is not responsible for the collapse of Indian River seagrass, but it is contributory, and also a formidable obstacle to recovery, as peer-review has confirmed.

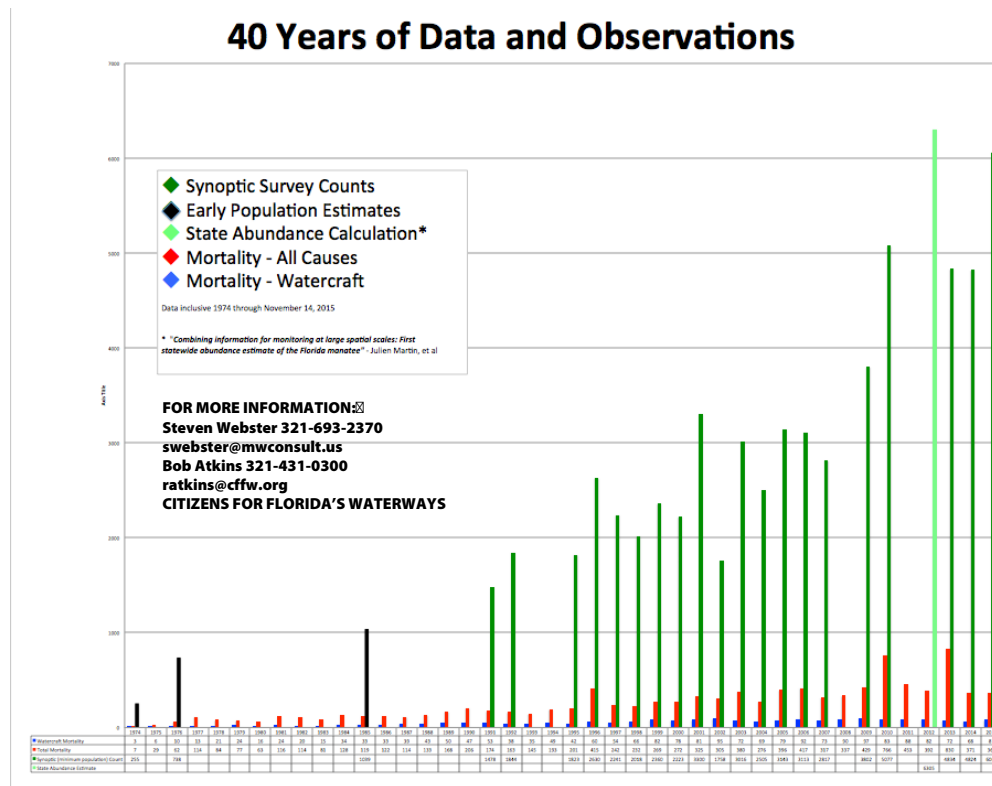
Any rancher can confirm that livestock is limited by pasture. Too many animals will destroy grazing land. (Ranchers in Brevard, near the photo site, maintain five to eight acres of pasture for every head of cattle, for example). Seagrass that is continuously stressed – that is, there is no longer an “idle season”, as manatees no longer migrate away during colder weather – is more likely to succumb to threats.

While the manatee will not see immediate significant harm from the loss of grass, every other species that calls the Lagoon home will be hugely harmed. In our expert opinion, as grass acreage stabilizes at some future, lower, level, manatees will self-regulate population, and further disperse. It is, in our expert opinion, unlikely that manatee populations in the Indian River, and likely other areas experiencing high impacts to seagrass (such as Citrus and Collier), can be sustained above current numbers.

As this population stabilization begins, you will regret not having moved more quickly to upgrade manatee status from its present, and ridiculous, status as a “depleted” stock, to a more appropriate management process focusing on sustainable population and resource management.

Probably the worst example of managing by failure to prioritize risk is the amount of time and dollars spent, the un-measurable success, and the significant negative impact to recreational boating, as regulators try to eliminate or reduce boating mortality in the belief that if they did not, this threat alone would hasten manatee extinction.

Here, too, our considered opinion – and as the only organization that has seriously examined the effectiveness of manatee speed zones, we must be considered expert on the matter – is that the effectiveness of speed zones is, at best, of little significance. As the chart below shows, watercraft mortality is about 1% of total manatee population. Interestingly, and paradoxically, our own investigation of mortality that compares counties with FWC zones versus counties with no zones, showed that counties *without* zones have experienced a pronounced decline in watercraft:total mortality, whereas counties with zones have maintained historic levels of mortality (about one in four due to watercraft).



Nonetheless, despite no serious effort ever to evaluate speed zone effectiveness, regulators continue to expend huge time and effort on a non-problem. The recent Pinellas Rule, and the coming Collier County review, which take place even as the Indian River crisis was underway, are a sad testament of the inappropriate focus of regulatory efforts.

The absence of any serious inquiry into the effectiveness of zones speaks volumes about the true purpose of most government manatee actions. It is to satisfy a legal burden, rather than to manage and sustain a large and growing manatee population.

Even the most recent Potential Biological Removal (PBR) calculation for the manatee is nothing short of interesting in that it has no correlation to reality. The PBR is supposed to represent the number of animals that can be lost due to human causes and the stock still remain viable. Over the period 2009-2013 an average of 84+ manatee deaths / yr have been attributed to watercraft alone, yet the population continues to grow at a rapid rate. How can this be when the recently calculated PBR was 14. How in the world did 14 pass the giggle test in light of clearly contradictory and overriding data. Of what value is a calculated number that has no correlation to the real world. The answer, of course, comes right back to the wrong classification of manatee as endangered.

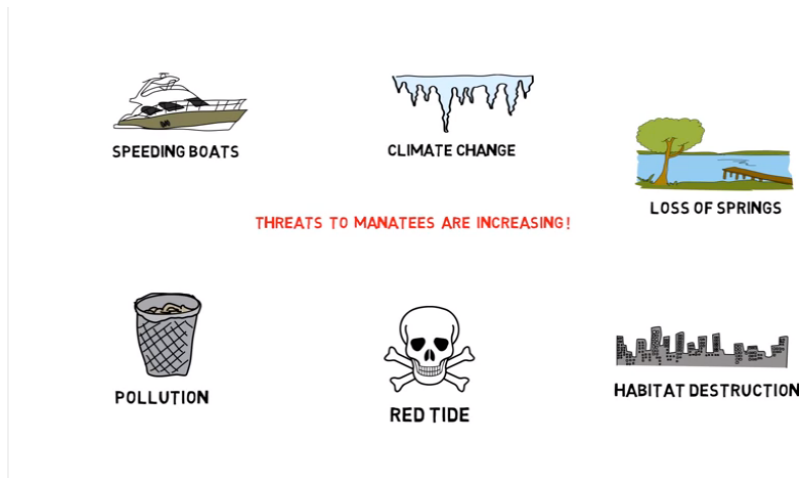
And finally, because we knew the Club would have its members inundate the Service with comments based on pre-determined talking points, we provide you with real world factual rebuttal to the form letter comments submitted by the Club.

(http://www.savethemanatee.org/aa_fws_downlisting_7-14_sample_language.html) By stating that reclassification to *Threatened* will eliminate the possibility for species *Recovery* the Club is proposing that no change in status is warranted until the animal is *Recovered*. This premise is illogical. The Club's comments offer no new information or data. In fact, they are for the most part outdated, overused attempts to identify perceived potential risks if the manatee is not given continued endangered status. And for the most part the comments are simply parroted by well-intentioned but ill-informed members of the club whose sole source of information about manatee science is the Club.

Adopting and naming wild animals is a clear indication of how the Club portrays the manatee as a collection of individuals rather than a species. This approach will never see past the trees to the forest. One might argue that it is their attachment at the individual level that creates most fear about reclassification. There is no denial that the loss of a single manatee is a tragedy, but the task at hand is to protect and manage the stock and protect the environment.

The other overriding theme the Club has promoted is boat regulations. One could argue that has been the predominant theme, even though the near entirety of their settlement agreement has been implemented, There remains a clear linkage to anti-boating sentiment because of emotional attachment to individual wild animals. So it is not surprising that the first threat illuminated on this screen capture from the Club's latest video (<https://www.youtube.com/watch?v=mZf2yXpigLQ>) encouraging members to comment is that of speeding boats. It has been established for quite some time that mortality due to watercraft does not pose a risk of extinction. The other feared risks are revealed to the viewer are shown below. Each of these risks has been evaluated and the associated risks are acceptable (highly unlikely combined with any assigned consequence of occurrence) according to accepted principles of Risk Management. From an endangerment, risk of extinction perspective, none of these risks create a risk of extinction, which by risk management principles, is well within acceptable parameters.

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There is no risk or combination of risks that overrides the risk of NOT reclassifying. We believe the time has come to stop listening to unsupported rhetoric and place science above a public opinion that has been swayed by years of misinformation. We must report that reclassification as *Recovered* is the warranted and proper action.

Of course our 'favorite' argument for delaying the inevitable reclassification is climate change. Without regard to arguments of the validity of predictions of the various climate change theories, how many species would we immediately add to the ESA if we blindly accepted worst-case future climate change scenarios? First and foremost, on which scenario shall we base current decision-making? Theoretical threats of drastic global change cannot be the basis for listing a species as endangered. The recent rule to list the Polar Bear as threatened shows there is no case for endangered status, even when rising from a species with the most directly applicable habitat risk stemming from the effects of climate change. In the case of the manatee, climate change has an equally strong possibility of increasing the size and range of the habitat, both in aquatic coverage and temperature.

Established in 1994, CFFW promotes the need for responsible use of Florida's waterways. Our primary objective is to encourage coexistence among recreational and commercial boaters, the marine industry, property owners and the environment. CFFW advocates education in the safe and considerate use of watercraft with respect for our marine environment.

CFFW is a self-governed, member-funded and financially self-sufficient organization. None of the officers or Board Members are compensated in any manner with the exception of select cost reimbursements for expenses related to manatee policy and regulation activities. While our origins are in trying to promote a reasonable coexistence of man within the environment, we find ourselves in a somewhat unique position of trying to protect our environment from the whims of public opinion based on erroneous information leading to USFWS continued distraction over a *Recovered* Species.

Section I: Habitat

Reclassification of the West Indian Manatee from Endangered is Mandatory Based on a Vast Habitat with Diverse Characteristics that Continues to Expand

SUMMARY

This comment addresses the vast expanse of the West Indian Manatee habitat as a key indicator that the species is not *Endangered*. Manatee habitat and species range have greatly expanded. Historically, manatees were limited to warm water habitat south of Sebastian Inlet on the East Coast and Charlotte Harbor on the West Coast. Construction of thousands of miles of canals and channels, and warm water and fresh water outfalls, have increased habitat and range across the entire state, and into neighboring states as well. Further, efforts by resource managers to provide access by manatees to previously inaccessible habitat (spring runs), is also expanding range and habitat. Manatee population has significantly grown as a result of this expansion of habitat and range, increasing the species' resilience and survivability.

COMMENT

The decision to list or not list or the determination of the correct classification must be based on the best scientific assessment of the health of the species considering specific criteria defined in the Endangered Species Act. It must not be based on popular opinion, political pressure, or how various clubs or organizations and their membership have adopted a specific species as their focal cause.

Species classification as *Endangered* or *Threatened* is based on any one or combination of the following factors:

- 1) The present or threatened destruction, modification, or curtailment of its habitat or range;
- 2) Over utilization for commercial, recreational, scientific, or educational purposes;
- 3) Disease or predation;
- 4) The inadequacy of existing regulatory mechanisms; or
- 5) Other natural or manmade factors affecting its continued existence.

The vast extent of suitable habitat is inconsistent with the above criteria, and therefore, with respect to habitat, the above criteria are not applicable to the West Indian Manatee. The best available science developed by the USFWS supports *Delisting* based on the fact that the species has *Recovered*. Reclassification from *Endangered* to *Threatened*, although the best available science indicates total *Recovery*, is movement in the proper direction.

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Many species listed in the ESA are unique to specific limited geographic locations, such as a particular river or forest, or they require specific combinations of environmental factors, which significantly limit the locations where they can exist. For these species, the preservation of the limited habitat itself becomes the most critical factor to the survival of the species. Contrary to those species, the West Indian Manatee has shown adaptability to almost any aquatic environment that it can swim into, as long as the water temperature remains 68F or above.

The critical habitat elements are temperature above 68F, available fresh water sources and submerged aquatic vegetation. Consequently, we find the manatee in all regions of the southeastern US coastal brackish estuary waters, several miles up inland fresh tannic water rivers, crystal clear springs and spring runs, in coastal bays and ports, and a few miles off the coast in the Atlantic and Gulf waters. Man has actually significantly *increased* the habitat over the last 40-75 years. We have seen large numbers of animals find refuge and residence in the manmade residential, navigational and flood control canals and waterways throughout the southeast. This habitat increases with the warmer temperatures of the summer months and diminishes with the cooler temperatures of winter as they affect the water temperatures above and below 68F. This annual climatic affect has traditionally created a traveling northern boundary of the habitat that induced a natural N-S migration of many manatees.

The introduction of manmade warm water outflows at several power plants and other sources has provided winter-time refuge from the threat of natural seasonal colder water temperatures in regions that had not historically provided cold season manatee habitat. These sites, along with several known fresh water sources, were identified as the primary locations to observe and perform synoptic surveys (population counts) of the animals. These are the same sites that have been observed throughout the history of the surveys up to and including 2014.

The comparison of animal counts performed in the traditional synoptic survey locations (Power Plants, Berkeley Canal, and Sebastian River/C-54 Canal) in Brevard County now account for less than 50% of the animals actually residing in Brevard County as we can see by comparing the January 24, 2014 synoptic count of 633 with the average count performed by FPL during the November 2013 to March 2014 time frame. During this period, 9 counts were performed that included 18 additional Brevard locations including open space estuary waters, tributary creeks and rivers, and several commercial and residential canals. These counts located an average of 1392 animals and the range of the counts was from 968 to a high of 1966. So we see that not only have the animals found new locations to congregate, but also they have done so in significantly larger numbers. This is clear evidence of an increasing habitat or the ability of a diverse set of conditions to provide desirable habitat for the manatee.

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Since the habitat is so expansive and diverse and the range of the species is so great, there is absolutely no threat to the survival of the West Indian Manatee due to loss of overall habitat, or a significant portion (a key listing criteria). Conversely, what we do observe is that local changes or impacts to preferred locations within the habitat result in the manatee moving on to other attractive locations nearby.

Although we expect that the human population of the coastal Southeast will continue to grow, this growth is limited by natural coastal geography and by significant existing regulatory measures at all levels of government from community to federal. These regulatory limitations will preserve a high percentage of pristine estuary, bays and rivers from shoreline development. The combination of extensive natural occurring habitat, the mobility and nomadic nature of the manatee, and the collective geographic and regulatory limitations to loss of habitat eliminate the present or threatened destruction, modification, or curtailment of the manatee habitat or range.

Section II – Abundance and Survivability

Reclassification of the West Indian Manatee from Endangered to Threatened is Mandatory Based on Abundance and Survivability

SUMMARY

This comment addresses the continued growth of the West Indian Manatee population as a key indicator that the species is not *Endangered*. The most recent data presented by Langtimm and Runge predict a zero percent chance of extinction, a robust growth rate statewide, and negligible impact of anthropogenic threats – the reason the manatee was listed as endangered. Runge further maintains that if the most recent models were available in 2007, the same highly positive outcomes would have been reported. Other recent information confirms a significant undercount of manatees using traditional synoptic methods. In sum, there is no scientific or legal standard for continuing to list the manatee as endangered. Indeed, delisting is the most appropriate outcome.

COMMENT

The decision to list or not list or the determination of the correct classification must be based on the best scientific assessment of the health of the species considering specific criteria defined in the Endangered Species Act. It must not be based on popular opinion, political pressure, or how various clubs or organizations and their membership have adopted a specific species as their focal cause.

Species classification as *Endangered* or *Threatened* is based on any one or combination of the following factors:

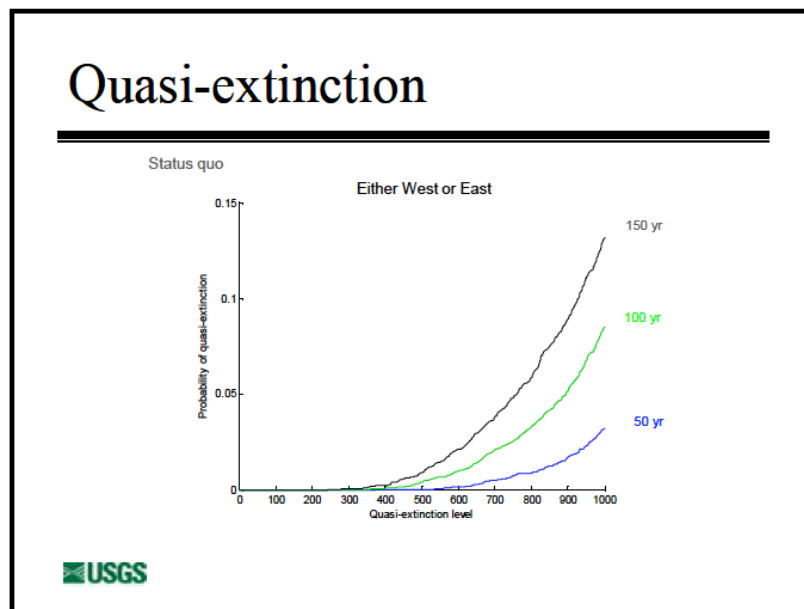
- 1) The present or threatened destruction, modification, or curtailment of its habitat or range;
- 2) Over utilization for commercial, recreational, scientific, or educational purposes;
- 3) Disease or predation;
- 4) The inadequacy of existing regulatory mechanisms; or
- 5) Other natural or manmade factors affecting its continued existence.

Ever increasing manatee abundance is inconsistent with each of the above criteria, and therefore, none of the above criteria are applicable to the West Indian Manatee. The best available science developed by the USFWS supports *Delisting* based on the fact that the species has *Recovered*. Reclassification from *Endangered* to *Threatened*, although the best available science indicates total *Recovery*, is movement in the proper direction.

Manatee Population Growth

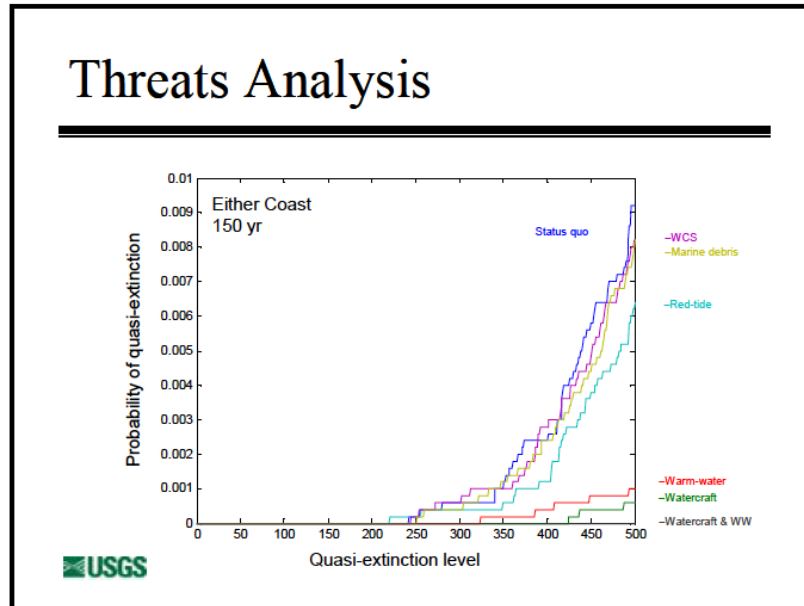
There are several factors that can be used to determine manatee abundance. Synoptic Surveys provide a minimum population count. Adult Survivability and Mortality Statistics have been combined with these minimum counts and analyzed by the most sophisticated population stock assessment, the Manatee Core Biological Model (MCBM), available to the USFWS for any species. The results of this assessment indicate that the population has the following characteristics:

- Population growth rate between 4% and 7%
- Adult survivability rates above 0.96
- Probability of NOT reaching “quasi extinction” of 99.9% over the next 100 years
- Probability of extinction - ZERO



Source: Manatee Threats Analysis, Michael C. Runge, USGS, presented to the Manatee Forum, May 2013

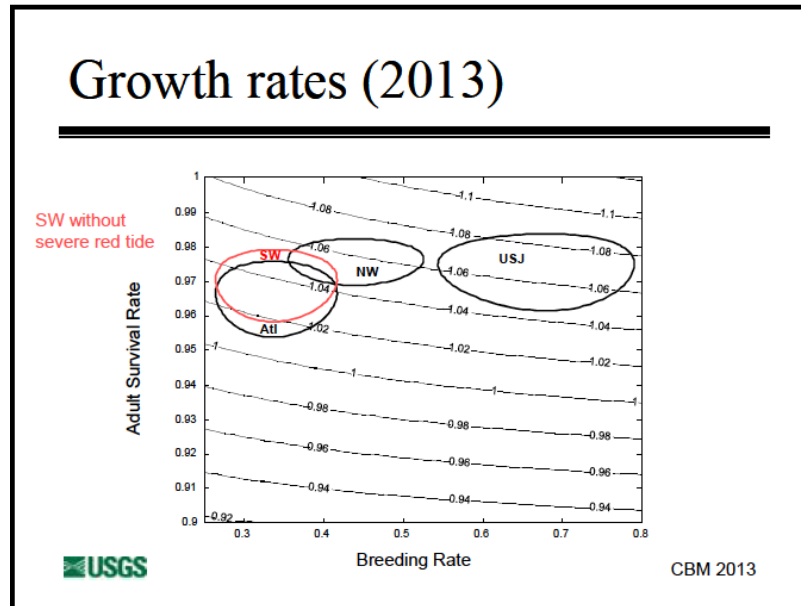
No single threat or combination of threats (including manmade and natural such as an annual significant red tide event) artificially added to the model produced any negative affects leading to a significant probabilistic threat of “quasi-extinction”. In fact elimination of these threats only slightly improved the probability of population growth over the next 150 years. These are NOT the characteristics of a population in decline and clearly not the characteristics of an *Endangered* or even *Threatened* species.



Source: Manatee Threats Analysis, Michael C. Runge, USGS, presented to the Manatee Forum, May 2013

Artificially subdividing this species into four regionally based subpopulations has been the only opportunity to reach any less positive assessment. These regions are the Atlantic, the Upper St. Johns, the Southwest and Northwest. These should not be considered distinct populations subject to evaluation under the Endangered Species Act. One cannot distinguish between specimens from one region or the other and the long-range migratory habits of these animals do not restrict them from moving from one region to another.

There is only one population to address and a single listing of the West Indian Manatee in the ESA to evaluate. But, even in this attempt that many perceive as a ploy by some to bend the rules in deference to political pressure from environmental NGOs, fails to support further classification of *Endangered*. Artificially manipulating the population assessment in this manner still produces positive results. Two of the four regions exhibit phenomenal population growth around 6-7%, while the Atlantic and Southwest still exhibit growth around 4% solely by reproduction (CFFW notes that Florida's human population grows at about 1%, almost entirely from immigration, not reproduction).



Source: Manatee Threats Analysis, Michael C. Runge, USGS, presented to the Manatee Forum, May 2013

So just how many manatees are there? We may never know the true number. In 1974 the estimate was 255. In 1976 the estimate was 738. No wonder the species found its way onto the ESA *Endangered* list. By 1985 the estimate was 1039 but argued to be as many as 1200. But were these counts accurate? We'll never know.

By 1991, criteria for synoptic surveys were developed and the first count was 1267. The most recent survey was conducted this January and performed by 20 observers who searched 21 areas on both coasts – hardly a significant sample of the Florida coastal areas. In fact, the majority of these vast areas remain unobserved and uncounted. Nevertheless, 4824 animals were counted.

Because the observed locations have remained fairly consistent over the period, one can test the assumption that the growth rate observed in the synoptic surveys is indicative of the overall population growth. This increase over the 23 years is equivalent to a 5.8% population growth rate, which is consistent with the Runge core biological model assessment and further supports the conclusion that the population is healthy and increasing and not in threat of significant decline and clearly not extinction.

As an indication of the inadequacy of the synoptic surveys to count the *total* manatee population, CFFW compared the typical FWC Brevard County synoptic count conducted in three primary locations (Cape Canaveral Energy Center (CCEC), the Berkeley Canal, and the Sebastian River/C-54 areas). The two most recent Brevard County counts were 640 (Jan/2011) and 633 (Jan/2014). The previous count in 2010 was the highest recorded in both Brevard and statewide.

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Year	Brevard	Total Count	Brevard % of Total
2010	1087	5077	21.4%
2011	640	4834	13.2%
2014	633	4824	13.1%
24 Year Totals	13410	73025	18.4%

Source: Excerpts from detailed Synoptic Surveys, 1991-2014. Provided to CFFW by FWC

Over the last 2 years, Florida Power and Light (FPL) has been conducting independent population counts specific to Brevard County under direction of the FWC. In the "Cape Canaveral Energy Center 2012-2013 Annual Biological Monitoring Report" bi-weekly manatee counts are provided for the period October 2012 through March 2013. 17 of these counts were "successful". The average of all counts was 963. Two counts exceeded 1600 with a high count of 1719 and the 6 counts conducted in Feb/Mar averaged 1376 manatees.

FPL performed and reported counts of the same areas of Brevard County from November 2013 to March 2014 and provided the results in their annual report to FWC on July 30, 2014. These 9 counts were significantly higher than the previous year, averaging 1392 animals. Three of the counts exceeded 1700 animals with a high count of 1966 animals observed on Feb 18, 2014. Again, the Jan 2014 synoptic survey only indicated 633 animals in Brevard. What's of more interest is that during the spring of 2013, Brevard experienced a significant unusual mortality event (UME), where 161 animals were classified as dying from an unknown cause – and still the number of animals observed was significantly more in 2014. In fact, there is a 45% increase in average count as compared to 2013

Survey No.	Survey Date	Surveyor	Start Time	End Time	Break (min)	Survey effort (hrs)	Total Manatees	Manatees/ Unit Effort (hrs)	Calf Proportion (%)	Daily Ave. Air Temp. °C	Daily Ave. Water Temp. °C
1	17-Oct-12	REYNOLDS	850	1512	99	4.7	447	94.8	6.0	23.7	27.0
2	2-Nov-12	REYNOLDS	851	1555	97	5.5	1632	299.4	3.6	19.4	21.7
3	4-Nov-12	REYNOLDS	936	1628	92	5.3	1292	242.3	6.1	21.2	22.1
4	13-Nov-12	PROVANCH/GARREAU	906	1605	130	4.8	579	120.2	15.2	21.5	21.4
5	27-Nov-12	SCHIEDT/PROVANCH	855	1553	101	5.0	662	133.7	5.7	20.8	19.7
6	5-Dec-12	REYNOLDS	845	1547	98	4.8	226	46.8	8.0	19.6	20.5
7	22-Dec-12	REYNOLDS	816	1403	53	4.9	605	123.5	5.0	10.9	20.2
8	8-Jan-13	REYIER	845	1445	71	4.8	454	94.3	10.8	21.7	20.1
9	15-Jan-13	PROVANCH/GARREAU	900	1622	122	5.3	560	105.0	15.0	22.5	21.9
10	23-Jan-13	PROVANCH/GARREAU	900	1630	106	5.6	729	130.2	11.8	14.7	19.6
11	29-Jan-13	REYNOLDS	901	1545	91	5.2	929	178.1	5.6	21.3	20.2
12	3-Feb-13	REYNOLDS	848	1510	47	5.6	1233	220.8	2.7	NA	NA
13	12-Feb-13	SCOLARDI	835	1544	109	5.3	1209	226.7	5.5	22.0	21.1
14	17-Feb-13	SCOLARDI	1015	1350	50	2.7	—	—	—	—	—
15	27-Feb-13	GARREAU/REYIER	856	1536	131	4.4	382	87.8	7.6	19.8	21.8
16	4-Mar-13	REYNOLDS	750	1444	55	6.0	1232	205.9	3.0	9.6	18.7
17	15-Mar-13	REYNOLDS	910	1448	57	4.7	1719	367.0	1.9	13.1	19.1
18	21-Mar-13	PROVANCH/REYIER	841	1620	100	5.8	1372	237.9	6.5	16.3	20.2
19	28-Mar-13	PROVANCH/GARREAU	852	1630	136	5.4	1492	278.0	7.5	13.0	19.3
MEAN ± SD: 5.2 ± 0.7 963.1 ± 463.2 182.6 ± 86.6 7.0 ± 4.0											

Note: Survey #14 (17-February-13) was a Multiple Pass survey; therefore counts from this date are not comparable to the other counts and not included in the table. Survey #15 (27-February-13; highlighted yellow) was not a complete survey due to areas of Satellite Beach and Banana River being inaccessible; counts from this date are not included in the mean values.

source: 2012-13 FPL Report

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The FPL counts included 22 specific locations – 19 more than in the synoptic surveys and found on average an additional 700 and as many as 1300 more animals than the synoptic survey counts. This indicates the synoptic survey for Brevard County alone is probably missing as many manatees as are being counted. Extrapolation is risky but based on the minimum number of sites that are actually being counted statewide, one must conclude that the actual size of the manatee population is considerably larger than the number counted in the synoptic surveys.

Survey No.	Survey Date	Surveyor	Start Time	End Time	Break (min)	Survey effort (hrs)	Total Manatees	Manatees/ Unit Effort (hrs)	Calf Proportion (%)	Daily Ave. Air Temp. °C	Daily Ave. Water Temp. °C
1	17-Nov-13	SCOLARDI	1002	1702	86	5.6	983	176.6	5.9	22.7	21.2
2	3-Dec-13	REYNOLDS	840	1433	46	5.1	1789	349.6	3.1	18.5	19.4
3	18-Dec-13	SCOLARDI	855	1538	49	5.9	1590	269.5	2.6	15.9	17.2
4	12-Jan-13	SCOLARDI	900	1500	54	5.1	1072	210.2	3.5	18.3	18.3
5	24-Jan-14	SCOLARDI	855	1145	0	2.8	--	--	--	11.0	12.2
6	2-Feb-14	REYNOLDS	950	1443	40	4.4	1320	301.1	2.3	22.0	18.9
7	11-Feb-14	REYNOLDS	834	1408	49	4.8	1046	220.2	5.2	17.7	18.9
8	18-Feb-14	SCOLARDI	837	1523	50	5.9	1966	331.3	5.6	18.8	17.9
9	3-Mar-14	SCOLARDI	823	1550	48	6.7	1795	267.9	8.5	21.9	21.1
10	23-Mar-14	SCOLARDI	931	1605	60	5.6	968	173.9	6.3	22.4	23.2
MEAN + SD:							5.4 + 0.7	1,392.1 + 397.3	255.6 + 64.5	4.8 + 2.0	

Note: Survey #5 (24-January-14) was a synoptic survey; therefore counts from this date are not comparable to the other counts and not included in the table.

source: 2013-14 FPL Report

Using the 24 year synoptic surveys as an indication of the percentage of the total population that is counted in Brevard, and using an average of the last two years of FPL counts one can extrapolate in two ways:

By applying the 24-year synoptic percentage to the FPL average

1111 (FPL 2yr Avg) = 18.4 % x (Extrapolated Total Population)

Extrapolated Total Population = **6,041 Total Manatees**

OR

By applying the ratio of FPL vs synoptic observed

1111 (FPL 2yr Brevard Avg) / 636 (2yr Synop Brevard Avg)

=

(Extrapolated Total Population) / 4829 (2yr Tot Synop Avg)

Extrapolated Total Population = **8,435 Total Manatees**

Further evidence of the size of the manatee population can be discerned from the population vs. mortality numbers. While accurately counting the live population is extremely difficult, counting those that have perished is much more accurate due to the size of the animal and the fact the carcasses float to the surface where they are easily observed.

Over the same period (1991 – 2014) during which the synoptic surveys indicate a 5% population growth rate, mortality has exhibited a similar growth rate of around 5%. This indicates that the mortality numbers, although significantly higher over time, have been consistent with the observed population growth. This explains how the population has been observed to increase even as the number of deaths has reached what some groups indicate is an alarming value.

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Using the Manatee Core Biological Model (MCBM) developed by Mike Runge of USGS, CFFW “reverse engineered” the MCBM to use mortality to estimate total manatee abundance. We shared the model with Chris Fonnesbeck, Assistant Professor of Biostatistics, Vanderbilt University specializing in Computational Statistics, Biometrics and Epidemiology, who commented that the model was, indeed, accurate; if anything, it would tend to undercount manatees slightly, due to “slippage” in carcass recovery. The result of the reverse engineering, which was conducted seven years ago (2007) was an adult manatee population of 4,500, and several hundred juveniles, for a total estimated population of approximately 5,300 manatees. It is no surprise to us that 5,300 animals in 2007 would have expanded into the “extrapolated” population explained above (6,041 – 8,435).

The fact that the synoptic counts continue to grow in light of historically high mortality, even when several years total mortality is naively expressed by some as a percentage of a single synoptic count, is further indication that the synoptic survey counts are grossly inadequate and that the actual manatee population is probably closer to 6,000 - 9,000 and increasing at 5%. We should expect the population to double over the next 14 years. Thus, if weather conditions are favorable, one should expect the January 2015 synoptic survey result to exceed 5200 animals.

Other Factors Driving Classification of Endangered or Threatened

Factor: Over utilization for commercial, recreational, scientific, or educational purposes - The population is under no threat of over utilization for commercial, recreational, scientific or educational purposes. These activities are illegal under protections afforded by the Marine Mammal Protection Act (MMPA).

Factor: Disease or predation - The species has no predators throughout its habitat and the only impact by disease is from periodic occurrences of red tide or less significant events. These events, although alarming when only considering the number of animals affected, have not negatively impacted the continued growth of the population.

In addition to a lack of predatory concerns and limited impacts from disease, extended cold temperatures have historically affected large numbers of animals on a periodic basis. Again, the resiliency of the overall population to absorb each and all of these impacts and continue to grow at approximately 5% has been demonstrated for over 40 years of observation and data collection.

Factor: The inadequacy of existing regulatory mechanisms - There are two sets of regulatory mechanisms and manmade factors that have been implemented to affect the continued existence of the species. First is the waiver of the Federal Clean Water Act of 1974 as it applies to the thermal outflows from the collective power plant cooling systems around the state and throughout the habitat. The warm water

outflows were permitted as manatee sanctuaries, described as critical to the survival of the species and regulated to prohibit/limit human activities.

The historic view of the outflows has been positive for manatee population expansion. They artificially diminish the annual impacts of cold water. The future of these outflows may yet prove to be of detriment to the ecosystem, as thermal effluent was one of the key concerns leading to passage of the 1974 Act — not so much from the primary effect of the warm water, but the unintended consequence of a secondary impact from the artificially induced ever-increasing year-round resident manatee population. Nevertheless, these outflows continue to be permitted through regulation and must be considered as evidence of the adequacy of existing regulation.

The second set of regulatory actions that provide evidence of the adequacy of existing regulatory mechanisms is the implementation of extensive aquatic zones where human activity has been regulated in deference to the manatee. These include additional areas set aside as manatee sanctuaries where human activity is either prohibited or limited and the collective set of manatee protection zones throughout the manatee habitat and range, where motorized vessel operations have been regulated with the intent to protect manatees from potential injury or death. The effectiveness of these zones has never been proven, but the fact that the zones exist throughout the state with a single specific purpose to offer manatee protection is further evidence of the adequacy of existing regulation.

Factor: Other natural or manmade factors affecting its continued existence -Since the species has exhibited a 40-year history of population growth and resilience to all threats, there are no natural or manmade factors that can be cited that could affect the species continued existence. Moreover, one can only reasonably expect the population to increase to the limits of the collective carrying capacity of the habitat.

Section III – Carrying Capacity and Optimum Sustainable Population

Reclassification of the West Indian Manatee from Endangered is Mandatory Based on Carrying Capacity (CC) and Optimum Sustainable Population (OSP).

SUMMARY

This comment addresses the current state of the of the West Indian Manatee population as compared to a calculated carrying capacity (CC) as a key indicator that the species is not *Endangered*. Historically, FWS has believed that warm water is the limiting factor for CC as well as Optimum Sustainable Population (OSP). This comment documents that forage – submerged aquatic vegetation – is more critical. Moreover, CC is not the same as Optimum Sustainable Population (OSP), which is established to be smaller than CC. We show that the manatee population is already at or near its OSP in areas of Florida. Policies based on an “endangered” classification are no longer proper for the successful future management of the species.

COMMENT

The commonly accepted definition of CC is the number of individuals an environment can support. OSP is the upper bound on population that includes consideration for negative impacts of the given organism on its environment. The emphasis is the inclusion of potential negative impacts to the environment as important factors for manatee managers to assess and understand.

The decision to list or not list, or the determination of the correct classification, must be based on the best scientific assessment of the health of the species considering specific criteria defined in the Endangered Species Act. It must not be based on popular opinion, political pressure, or how various clubs or organizations and their membership have adopted a specific species as their focal cause.

Species classification as *Endangered* or *Threatened* is based on any one or combination of the following factors:

- 1) The present or threatened destruction, modification, or curtailment of its habitat or range;
- 2) Over utilization for commercial, recreational, scientific, or educational purposes;
- 3) Disease or predation;
- 4) The inadequacy of existing regulatory mechanisms; or
- 5) Other natural or manmade factors affecting its continued existence.

Carrying Capacity (CC) is defined as the maximum number of animals an

environment can support based on the available resources. Optimum Sustainable Population (OSP) is defined, with respect to any population stock, by the Marine Mammal Protection Act (MMPA) section 3(9). OSP is the number of animals, which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element. (16 U.S.C. 1362(3)(9)).

OSP is further defined by Federal regulations (50 CFR 216.3) as a population size which falls within a range, from the population level of a given species or stock which is the largest supportable within the ecosystem, to the population level that results in maximum net productivity. Maximum net productivity is the greatest net annual increment in population numbers or biomass resulting from additions to the population due to reproduction and/or growth, less losses due to natural mortality.

Clearly, for many species, CC will exceed OSP, as the resulting and continued health of the ecosystem or habitat is a key factor in determining OSP but not CC. The West Indian Manatee has shown adaptability to almost any aquatic environment that it can swim into, as long as the water temperature remains 68F or above.

The critical habitat elements are temperature above 68F, available fresh water sources and SAV. Therefore, CC is also only limited by warm water capacity, SAV, and available fresh water. For the manatee, these are the only naturally occurring and constantly present limitations to population – or in other words the elements defining CC.

The greatest danger of continued misclassification of the manatee is the inability to implement appropriate measures of population control or containment even as the population exhibits continuous increase – ultimately reaching OSP - or potentially even surpassing OSP and reaching CC. The *Endangered* classification requires a management approach consistent with a depleted species. Per language of the ESA and the MMPA, the USFWS is compelled to continually manage and regulate to increase the manatee population.

Unfortunately, there is little change in allowable management approaches between *Endangered* and *Threatened*. Reclassification to *Recovered* is required to implement appropriate measures of population controls for any species listed in the ESA, which is also included in the MMPA. Because the threat of local area manatee overpopulation far exceeds any threat of extinction – or even ‘quasi-extinction’ – the manatee should be reclassified as *Recovered* as soon as possible.

We at CCFW are not cognizant that an accepted value for overall CC has been calculated. There has been some research as it relates to CC. All of the research found by CFFW has examined a top-down statewide or habitat wide CC. This overall CC might be more readily determined by collectively determining and combining local area CCs. These local area CCs may actually have more significant value to species managers in their decision processes on specific actions, both regulatory

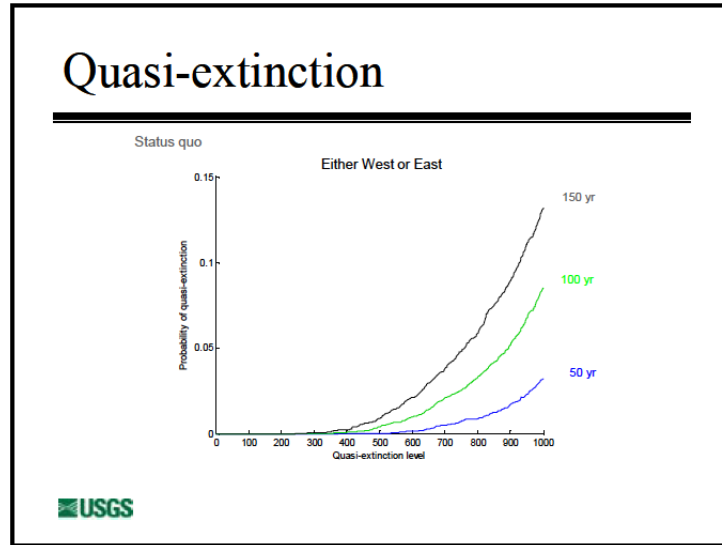
and stock management, since the impact on the ecosystem by the manatee population size may be more critical in one local area versus another.

For example, it may be a good management decision to eliminate the warm water outflow from a particular manmade source and not others based on the local area population comparison to the local area OSP. While in another area, such a decision might clearly be detrimental in light of a locally limited population.

One of the concerns with manatee management is that this species is capable of exceeding OSP. That is, the manatee population has the capacity to continue to grow, even beyond the ability of the environment to thrive as a healthy ecosystem for other shared species. At some point, even the manatee population could experience decline, but the ecosystem may have been all but destroyed prior to reaching that event, as a result of continuing to manage population toward increasing growth

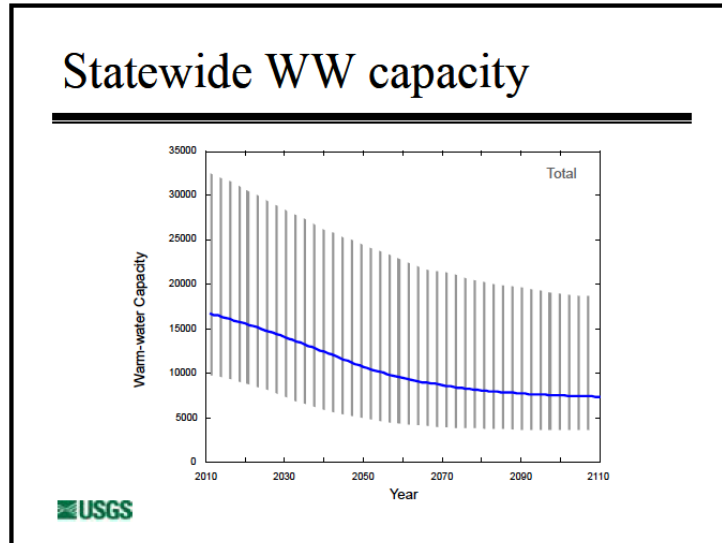
This comment will look at some *localized* CC numbers and compare that to the associated local area population. As we will discuss and illustrate, the CC is greater than the OSP. This approach to determining CC and the results can be extrapolated to the entire manatee habitat by simply applying the methodology to a well-defined collection of local areas and then combining the results. The conclusion is clear. In the local area of the Indian River Lagoon (IRL), the West Indian Manatee population is consistently increasing at a positive rate. Without some natural catastrophic event or significant change in our management approach, this population, which is at or near OSP, will likely exceed the OSP or worse yet, continue to increase toward the total CC. The near certainty of this outcome is nearly three orders of magnitude greater than the likelihood of the manatee population reaching 'quasi-extinction' (0.1% probability) over the next 100 years.

When Michael C. Runge, USGS Patuxent, presented the summary of analysis and results of the latest applications of the USGS Manatee Core Biological Model (CBM) to the Manatee Forum in May 2013, he showed manatee population predictions for the next 100-150 years as well as the projection in each of the four sub-regions. The representatives of USGS and USFWS praised the Manatee CBM as the most sophisticated species model developed to date. Runge's presentation of results is the source of the 'quasi-extinction' prediction above and is illustrated in this graph.



Source: Manatee Threats Analysis, Michael C. Runge, USGS, presented to the Manatee Forum, May 2013

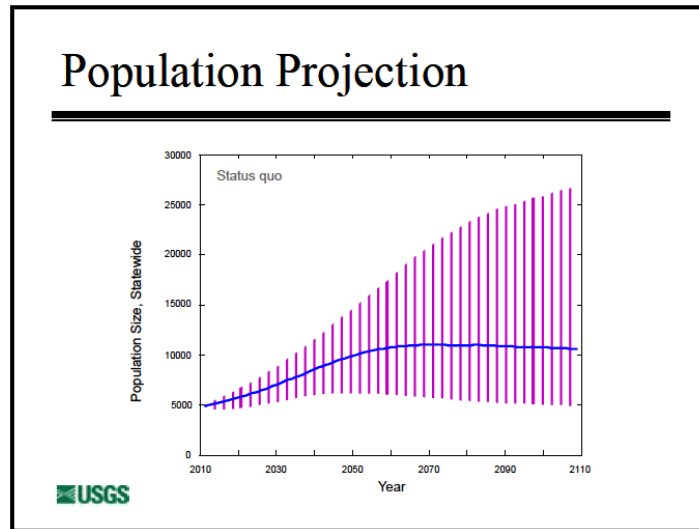
Also included in the CBM analysis were limitations of the statewide warm water capacity and its effect on manatee population predictions. Runge showed the greatest upper bound of warm water capacity at around 32,000 manatees, decreasing to around 20,000 over the next 100 years and the lowest lower bound at 10,000, decreasing to around 4,000 manatees over the next 100 years.



Source: Manatee Threats Analysis, Michael C. Runge, USGS, presented to the Manatee Forum, May 2013

Incorporating the theoretical decreasing warm water CC into the long-term manatee population 100 year growth predictions illustrated a statewide maximum upper bound of around 25,000 and a minimum lower bound around 5,000 animals. The CBM gave a likely prediction of sustaining growth based on a current population level around 5,000 with steady growth over the next 50 years and reaching a state

wide population of 10,000 that would level off due to the limits of the theoretically decreasing warm water CC.

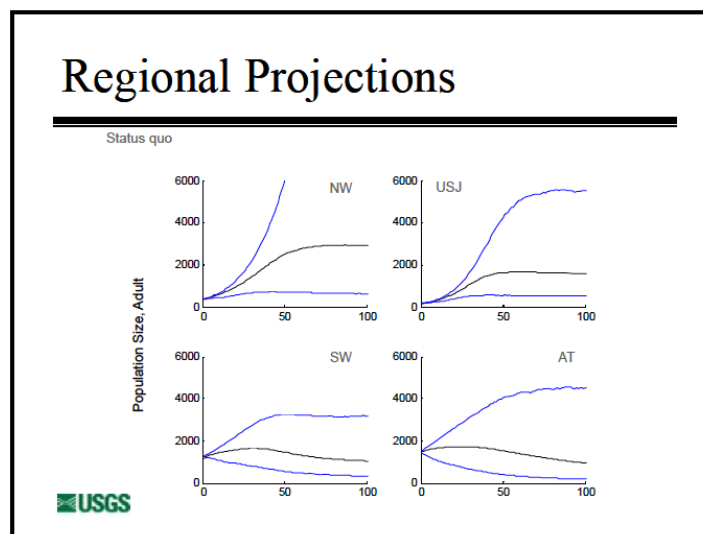


Source: Manatee Threats Analysis, Michael C. Runge, USGS, presented to the Manatee Forum, May 2013

Further, the CBM provided individual modeling predictions for the four regions. One region (Northwest) appeared to be unbounded while the other three exhibited approximate greatest upper bound as follows:

Atlantic	4000
Southwest	4000
Upper St. Johns	6000

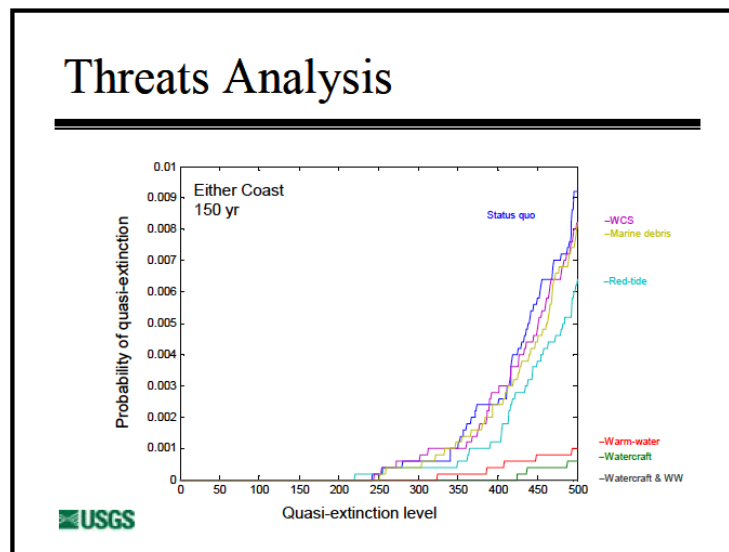
Looking at the combined predicted population values, we again see the population leveling off at around 10,000 animals due to warm water CC.



Source: Manatee Threats Analysis, Michael C. Runge, USGS, presented to the Manatee Forum, May 2013

These numbers have direct relevance to the overall statewide/regional manatee CC but only from the perspective of warm water capacity. This look at CC does not include any limitations with respect to forage.

For those who might argue that human activity, such as mortality attributed to watercraft, or who might also conjecture that a sudden change in the historically observed frequency of red tide events has an impact on overall population or even more implausible, on OSP or CC, one need only look at the following summary charts from the CBM to see that these events have been incorporated and their effects have been calculated in the CBM predictions. In fact, if for example, all man made mortality due to watercraft were immediately eliminated for all time the effect on the prediction of 'quasi-extinction' would be about a half of a percent (0.06%) improvement over the previously stated probability of 0.10%, reducing the probability of quasi-extinction prediction to .094%. Red tide elimination would improve probability of quasi-extinction by 0.64%, further reducing the 0.10% probability of 'quasi-extinction to 0.036%. These are negligible impacts and therefore watercraft and red-tide considerations are not significant to calculations of OSP or CC.



Source: Manatee Threats Analysis, Michael C. Runge, USGS, presented to the Manatee Forum, May 2013

In June 2012, Provancha, et al, published *Carrying Capacity Assessment of Manatee Forage and Warm-water Associated with Eleven Florida Sites*, which was submitted to the USFWS by Innovative Health Applications, LLC (IHA). Even though the intent of the study was to examine warm water CC, the authors recognized the availability of nearby SAV for forage as another primary consideration in determining the limits on CC.

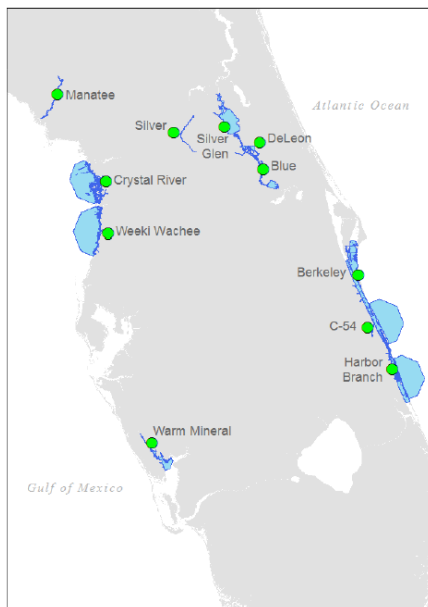
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This IHA study examined CC while evaluating these two basic limiting capacities:

- 1) What is the *Site* capacity? (How many manatees could volumetrically gather in the warm refuge?)
- 2) What is the *Forage* capacity of the nearby available SAV?

The eleven sites studied by the IHA group are probably the most significant natural sources of warm water in the overall manatee habitat. Understanding the CC associated with them is of importance due to the long-term potential closure of some or all manmade warm water outflows found at the various power plants throughout the manatee habitat. Each site was evaluated for Site CC and Forage CC using multiple 10,000 trial Monte Carlo simulations of ranges of input variables relevant to the site and the forage.

When taken at face value, the IHA study suggests that the combined CC for these eleven sites is around 18,500 manatees, but further investigation shows that the site limited CC for Crystal River (13,725) comprises 74% of the calculated total CC. All of these values are the median (50 percentile) results from separate 10,000 trial Monte Carlo simulations.



Site Name	Limiting K	Site-K	Forage-K
Blue Spring	456	491	646
Crystal River	13725	14336	20388
De Leon Springs	349	1445	349
Manatee Springs	0	243	0
Silver Glen Springs	917	5638	917
Silver Springs	15	31827	15
Warm Mineral Springs	141	308	143
Weeki Wachee	1953	1953	31266
C-54	230	15713	230
Berkeley	464	1414	464
Harbor Branch	298	18598	298

Source: IHA Study

Note that the IHA Study uses K for carrying capacity.

Further evaluation reveals that 8 of the 11 sites were determined to have a CC (shown as K) limited by available forage (SAV within a 30km, radius of the site), and not limited by warm water. Four of the sites (Crystal River Weeki Wachee on the west coast and Sebastian River/C-54 Canal and Harbor Branch on the east coast) were close to an ocean inlet, so the IHA calculation extended nearly 30km offshore. This results in the inclusion of large areas of offshore SAV, never or very rarely used by manatees, into the forage calculations. The SAV beds offshore Citrus County (the Crystal River site) therefore present the most pronounced (and unlikely) impact on the CC assessment, greatly inflating statewide CC

As recently as 2003, USFWS was making policy and regulatory decisions based on the now outdated premise that warm water refugia was THE limiting factor for manatee CC and therefore OSP, as evidenced by this quote directly from the Federal Register: May 8, 2003 (Volume 68, Number 89), Proposed Rules, Page 24700-24704 in reference to: Fish and Wildlife Service ACTION: Proposed rule; withdrawal. Availability of Record of Decision; 50 CFR Part 18; RIN 1018-AH86; Marine Mammals; Incidental Take During Specified Activities.

*"New information about carrying capacity suggests that it may decline over the next 3 to 60 years, which would affect density-dependent life history and management functions of the Florida manatee. **The limiting factor for the carrying capacity of each stock is warm water refugia.** Each stock of Florida manatees is variably dependent on natural and artificial warm water refugia, such as springs, sewerage outfalls, and power plant discharges. Preliminary information presented in the Incidental Take Model, but not yet peer reviewed, suggests that a reduction in total warm water carrying capacity is possible, if not likely, in the near future. This would suggest that OSP will change over time. Our implicit assumption of a stable OSP is challenged by this information. This, in turn, has implications for our interpretation of total population estimates, and our assumption that none of the stocks were severely depleted based on the demographic benchmarks."*

With the Crystal River site removed from the IHA analysis, the estimated CC of the remaining 10 sites was merely 4832, with 8 sites limited by nearby forage and 2 limited by warm water volume. Clearly manatee carrying capacity is more strongly limited by forage than by warm water refugia, as was previously believed and used as the basis of determination of OSP as well as CC.

The most important and consistent message from both of these independent and diverse analyses of the manatee species is that there are upper bounds to manatee population, which are the naturally occurring features of the habitat itself. Further, the previous fear that anticipated losses of warm water, which have not occurred in the 11 years since, have had no adverse impact on population growth. In both of these analyses, the determined upper bounds of the population are less than 25,000 and more likely around 10,000, if you only consider available warm water outflows. When we consider SAV as a potential limiting factor, the numbers are further reduced as indicated below.

The IHA Study input variables in the simulation analysis with respect to SAV were:

- 1) m² of SAV coverage within a 30 km radius;
- 2) SAV density (kg/ m²), and;
- 3) SAV winter growth rate in days.

The IHA study concentrated on a sustainable period of 120 days based on an extended winter. SAV coverage was based on expert input. The assumption for growth was full SAV regrowth rates of 100 – 192 days and the SAV biomass range was 7,003 to 14,453 lbs(wet) / acre. These values are a direct conversion from the values found in Table 1 of the IHA study, reproduced here.

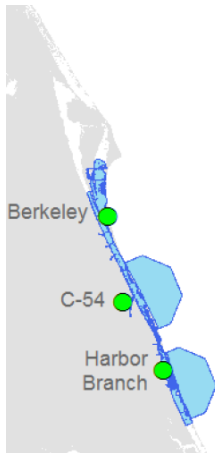
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Manatee Parameters	Simulated Value	Units	Assumption Distribution Inputs		
			Min	Likely	Max
Length	2.30	m	1.5	2.4	4
Length Buffer	0.30	m	0.18	0.3	0.35
Width	1.10	m	1	1.16	1.25
Calculated Area	2.86	m ²			
Avg Body Wt	800	kg	500	800	1200
Consumption (C)	13%	%bm/day	12%	13%	14%
SAV Biomass Factors			Min	Likely	Max
Winter Growth Rate (G)	0.0052	120 dys	0.0052	NA	0.01
Forage Biomass	1.20	kg/m ²	0.785	NA	1.62

Source: IHA Study

Because of the relevance and consistency with the results of our own analysis of the local area CC for the Indian River Lagoon, the results for three of the sites in the IHA study are included here. These are the Sebastian River / C-54 Canal area, Berkeley Canal, and Harbor Branch Canal.

All three sites were determined to have SAV limited CC. Collectively, the 30km radius around these sites overlaps to include all areas of Sykes Creek, all of the Banana River into the northern Federal Restricted Zone, and the Indian River – from just south of SR 520 (Cocoa) to around 20 km south of Ft Pierce inlet. The figure below, taken from the IHA study, illustrates the actual upper and lower extremes of the IRL and highlights the areas evaluated by the IHA study.



The following table illustrates specific percentile values for the 10,000 simulation runs of the IHA Study for each of the IRL sites. Each of the values is the limit to the total number of manatees resulting from the 10,000 trial Monte Carlo analysis of the IHA study. These values were all limited by available forage (SAV). The 0 and 100 percentile values bound all of the 10,000 results. One should note that at 90 and clearly at 100 percentile, the end condition is such that ALL available forage has been consumed. One MUST consider the dire consequences this implies for the IRL ecosystem.

Therefore, 100 percentile population predictions clearly are equal to or exceed the local area CC. The 50 percentile results represent the median (half of all results smaller and half larger). The IHA Study authors chose to analyze CC based on the 50 percentile results. One could argue that these values are valid determinations of the OSP for these areas.

Site - FORAGE LIMITS	0 Percentile	50 percentile	90 percentile	100 percentile
C-54	145	230	349	640
Berkeley	294	464	706	1,419
Harbor Branch	189	298	451	844
TOTALS	628	992	1,506	2,903

Source: data extracted directly from the IHA study.

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Conversely, the combined warm water limit for these three sites at the 50 percentile level is 35,725. This is clear indication of the significant difference between warm water CC and forage limiting OSP. The fact that the difference is two orders of magnitude is further indication of the absolute importance of considering available forage when determining OSP. The larger the difference between the forage limits and the warm water limits, the greater the risk of the local area population exceeding a forage-based OSP. Of the 8 forage limited sites studied, five of these show forage limits at least one order of magnitude less than warm water limits.

Site – WARM WATER LIMITS	0 Percentile	50 percentile	90 percentile	100 percentile
C-54	3,598	15,713	28,152	56,936
Berkeley	736	1,414	1,936	2,836
Harbor Branch	10,504	18,598	24,556	35,733
TOTALS	14,838	35,725	54,644	95,505

Source: data extracted directly from the IHA study.

One should be cautious that all of the forage limiting numbers are somewhat optimistic, and still significantly less than the warm water limits,. The analysis is biased toward large forage value results. This is due to the fact that the regrowth rate range (100-120 days) makes no provision for extended regrowth (years) due to some percentage of the SAV having been uprooted during grazing and not immediately capable of regrowth. We also note that other lesser estimates of SAV density exist. The St Johns River Water Management District (SJRWMD) estimates that the SAV density in the IRL is more on the order of 1400 – 1500 lbs per acre, not the 7,000 – 14,000 range in the analysis.

Even by including all of these optimistic assumptions in the calculations of the model, then somewhere between 1,500 and 3,000 animals living in this extended area would push the limits of the local area OSP to the point that we would expect to see negative impact on the amount SAV in these areas of the IRL. The IHA Study establishes that the OSP for this area is forage-limited (not warm water) and implies that the OSP is around 992 animals.

What the study does not say is that the population will not exceed 992 animals. In fact there is no controlling factor to insure that the local population will not exceed 992. Statistically, there is available forage beyond the needs of 992. But, since the IRL is an ecosystem whose life-blood is SAV, can we allow one species to reach a population that threatens to deplete the SAV beyond its ability to sustain an equilibrium state where SAV is not constantly declining? This event risks the loss of the IRL ecosystem itself! One must consider the sustainability of the SAV, the basic element of the ecosystem habitat in any discussion with respect to OSP.

Clearly, the IHA study establishes an effective approach for evaluating and estimating both OSP and CC on a local area basis. By applying the methodology of the IHA study to a mutually exclusive collection of local areas that span the manatee

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habitat, one can extend this approach to achieve reasonable calculations of overall OSP or TOTAL CC for the entire population within the habitat.

CFFW first posed the question of CC to the State and Federal wildlife managers in the mid 80's and has continued to ask this question over and over. The latest attempt at getting this critical question addressed was in the framework of four questions submitted to the agencies in late 2013. These questions were and are relevant to the ongoing crisis in the IRL that is most evidenced by the significant and continued loss of SAV acreage and the continued increase in nutrient content in the IRL.

- 1) What is the average annual production (by weight) of an acre of seagrass producing estuary bottom?
- 2) What is a good value for average consumption of seagrass (by weight) for the average manatee in a given population?
- 3) What percentage of seagrass intake results in excrement?
- 4) What is a reasonable chemical decomposition of manatee excrement?

The Florida FWC provided some valuable data in response to 1-3. We continue to wait for any data relative to question 4. CFFW initiated an assessment of the response to questions 1) and 2) in combination with the analysis of SAV coverage in the IRL determined by the St John's River Water Management District (SJRWMD) to perform an independent analysis of the Carrying Capacity of the IRL.

So what is the CC for the IRL? Based analysis and results of the IHA study, CFFW would define CC in terms of the upper bound of the population without regard to the sustainability of the habitat. We would define the OSP as that population level which can be sustained by the habitat without risk to the habitat. Therefore the OSP must be such that there is reasonable margin between it and CC which can be jointly managed by both manatee and habitat managers.

In May 2014, CFFW presented *A Look at Manatee Carrying Capacity in the IRL* to the Manatee Forum. Although the perspective and approach of this analysis was vastly different from that of the IHA study, the findings are surprisingly consistent.

The IRL is defined as the system of interconnected Atlantic coastal estuary, bounded by Ponce de Leon Inlet to north and Jupiter Inlet to the south. For the purposes of the analysis that follows, we will use Ft. Pierce Inlet as the southern boundary. This is simply because the SAV coverage estimates for this more limited area are readily available from the SJRWMD. These estimates are:

YEAR	Acres SAV
2007	84,000
2009	73,000
2011	41,000

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Florida FWC provided a wide range of estimates for seagrass density/production in the IRL:

SOURCE	Production/Density (wet lbs / acre / year)
Short, et al - 1993	6210
SJRWMD - 1996 – 2010	1446
Provencha, et al – 2012 (the IHA Study)	7003 – 14454

FWC also provided that an average manatee is 1,000 lbs and consumes 4 – 9% of body weight per day which equates to 42 – 94 wet lbs / day.

By comparison, Table 1 of the IHA study assumed 800kg with a simulation range of 500-1200kg. (since this translates to a range of 1100-2640 lbs, we assume the IHA study meant to express manatee weight as 500 - 1200lbs). Based on this correction and assuming 12 – 14 % body mass as daily intake, the IHA study used a consumption range of 60 – 168 wet lbs /day. If one were to assume the weight estimate is actually expressed as kg, the consumption range would be 132 – 370 wet lbs/day. These values are outside any previously acceptable consumption rates.

How many acres of IRL seagrass are required to sustain one healthy manatee for one year? Looking at minimum consumption combined with maximum SAV production we get:

$$\frac{42\text{lbs}}{\text{day}} \times \frac{365\text{ days}}{\text{year}} \times \frac{\text{acre}}{14,500\text{ lbs}} = 1.06\text{ Acres of Seagrass /yr}$$

Looking at maximum consumption combined with minimum SAV production we get:

$$\frac{94\text{lbs}}{\text{day}} \times \frac{365\text{ days}}{\text{year}} \times \frac{\text{acre}}{1446\text{ lbs}} = 23.7\text{ Acres of Seagrass /yr}$$

So we have developed upper and lower bounds for acreage of SAV to sustain 1 manatee for 1 year. Admittedly this is a wide range, but that is a direct result of the wide range of SAV production estimates.

Unlike familiar land grazing mammals such as horses, cows and sheep, the manatee has no teeth in the front of it jaw. Therefore it has no ability to bite grass off and only weak grass will break off in the manatee split gum front jaw. As the manatee tugs and pulls at SAV, a significant percentage is pulled up by the roots leaving bare bottom. How long does it take this bare bottom to replenish? In the observation of CFFW – it NEVER grows back – but to be conservative, we have chosen to use a four year regrowth term.

Depending on the estimate used for bare bottom regrowth, the acreage that is consumed in the first year will not replenish for the number of years determined. One must multiply the minimum acreage to sustain 1 manatee for 1 year by a factor of the number of years which the reader feels is reasonable to determine the minimum number of SAV acres to sustain 1 manatee indefinitely.

Using 4 years, yields upper and lower bounds of 4.24 and 94.9 acres of SAV for long term sustained health of 1 manatee. One can argue whether this is the best

approach to find the OSP of a local area. For the IRL, with 41,000 acres of seagrass available, this would imply the OSP is bounded between around 432 and 9700 manatees. These numbers are comparable in both principle and magnitude to the 0 (628) and 100 (2906) percentile values in the IHA Study considering the extended range of the IRL beyond the range of the areas evaluated in the IHA study.

The problem with this calculation is that we have assigned ownership of all the SAV to the manatee. An OSP must survive without detriment of its habitat. In this case the SAV is the habitat for part of the life cycle of every living creature in the IRL. So again, conservatively, let's assign 50% of the SAV to the manatee and leave 50% unimpacted by manatee forage and available for the survival of all other creatures in the ecosystem. This would bound the OSP roughly between 215 and 4800 manatees.

But remember – these are boundary values and the closer we get to 4800 the more likely we are putting the IRL at risk since the upper bound assumes minimum consumption and maximum SAV production.

So the obvious question becomes: “What is a realistic value for Optimum Sustainable Population?” Without access to the Monte Carlo model employed by the IHA study, CFFW chose to select a set of reasonably supportable values for SAV consumption and IRL SAV production and determine the results based on these values.

We chose the midpoint of the 42-94lb range used for consumption rate per day – 68 lbs. One must be skeptical of the 10-fold range of values provided by FWC for SAV production. These rates range from 1,446 (SJRWMD) to 14,500lbs (IHA study max) per acre. Clearly there is opportunity for some future analysis, but if one were to use the Short, et al estimate of 6,200lbs per acre, that would be 4 times the SJRWMD estimate of 1,446 and nearly half the IHA / Provancha maximum of 14,500. So we chose 6,200 lbs /acre for our test case value.

The resulting numbers would be as follows:

Consumption:	24,800lbs seagrass / year / manatee
Production:	6,200lbs seagrass / acre / year

This equates to 4.0 acres of SAV for 1 manatee to survive 1 year
16 acres for sustained survival of 1 manatee (4 year regrowth estimate)
32 acres for sustained health of 1 manatee without detriment to the IRL

based on these values and the estimated 41,000 acres of SAV,
The IRL can sustain 1280 manatees and remain viable (OSP)

This is very consistent with the results of IHA Study 50 percentile value of 992 for the southern and central areas of the IRL.

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The 2012-13 Brevard County manatee counts performed by FPL averaged 963 animals with a high count of 1719 manatees. The 2013-14 FPL counts averaged 1392 animals with a high count of 1966 manatees.

SJRWMD estimated the 41,000 acres of SAV remaining in 2011 decreased to 25,000 acres in 2012. Private communication with SJRWMD staff indicate that 2016 reductions in seagrass may be even more severe.

Clearly, these two independent analyses of CC and OSP indicate that the current observed conditions in the IRL with respect to manatees and available SAV are converging rapidly to and potentially beyond the local area manatee OSP.

Since the species has exhibited a 40-year history of population growth and resilience to all threats, there are no natural or manmade factors that can be cited that could affect the species continued growth. Moreover, one can only reasonably expect the population to increase to the limits of the collective carrying capacity to the detriment and potential destruction of the habitat itself.

The conclusion is clear. We are closer to the OSP in the IRL than we previously believed. If we do nothing to manage this local area population, we risk allowing the IRL SAV to decline to levels that no one wants to imagine. If we do not reclassify the manatee from *Endangered* to *Recovered*, we are trapped by the MMPA and the ESA to continue to implement policies and regulations that have one singular goal – “More is Better”. The IRL cannot survive this management approach indefinitely. As the IRL SAV goes, so goes the habitat of all the other species that rely on the SAV for habitat during a portion of their life cycle.

We find ourselves facing a paradox similar to the one identified by the USFWS in 2006 when considering the Upper St Johns manatee subpopulation. That is the very real likelihood of the species subpopulation reaching OSP before it is classified as *Recovered*. Now we see this is a very real possibility for a critical percentage of the Atlantic subpopulation. If this happens, manatee managers will not be able to meet the criteria for *Recovery* because the population will not be growing at a fast enough pace.

A different paradox arises from the circular argument that reductions in SAV mean reductions in habitat which implies continued classification as *Endangered*, which implies a depleted population, which demands population growth measures for manatee management, which continues to pressure the SAV and further reduce the habitat - and so on. Reclassification to *Threatened* is a step in the right direction, but reclassification to *Recovered* needs to follow in the near term so that proper management approaches can be implemented that favor the IRL ecosystem specifically and the overall habitat in general, above and beyond that of a singular species.

Section IV – Risk Management

Reclassification of the West Indian Manatee from Endangered is Mandatory Based on Best Practices of Risk Management

SUMMARY

This comment addresses the contradiction of current manatee management practices with the best practices of Risk Management. This contradiction is a direct result of the continued classification of the manatee as *Endangered*. *Endangered* means a species is in danger of extinction throughout all or a significant portion of its range, which is clearly not the case (*see CFFW Habitat analysis*). Further, the classification of a marine mammal as Endangered requires that regulators treat the species as a “depleted” stock in need of Recovery. Failure to recognize that manatees are already recovered has led to a contradiction between current management practices and Risk Management.

Classification of the manatee as “endangered” violates basic and accepted principles of Risk Management, as manatees are not in danger of extinction. Moreover, current management practices intended to increase the ‘depleted’ manatee population, limited only by warm water carrying capacity, are seriously flawed. In order to effectively manage a species that is likely already at its Optimum Sustainable Population, science requires that the manatee be delisted.

COMMENT

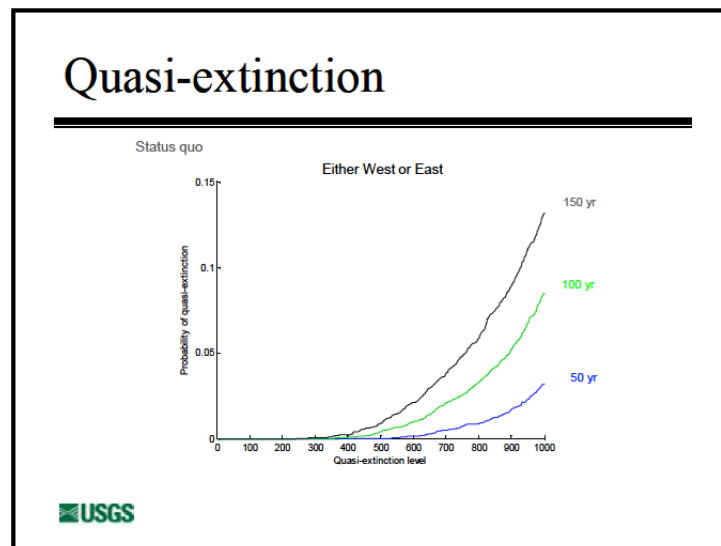
Unfortunately, with respect to manatee management, the USFWS decision-making has been adversely affected by public pressure from a small group of special interest groups. In this case, a series of bad decisions started and continues to be driven by a legal settlement to a 2001 lawsuit brought by these groups. This settlement and continued pressure by these groups has led to a dichotomy between politically motivated actions and scientific based needs. (The most blatant example of political infighting is the then-Florida Governor’s meddling in that state’s wildlife commission’s plan to reclassify the manatee as “threatened” (a behind-the-doors move by the manatee club that nearly destroyed the Manatee Forum))

CFFW is based in Brevard County in the shadow of Kennedy Space Center. Our current President, Bob Atkins, was the Senior Manager for Operations for Lockheed Martin and a member of the KSC Senior Management Team. As such he managed key portions of several start up investigations and mishap investigations. He has substantial training, experience and expertise with respect to risk management skills, a key part of that responsibility.

Sound risk management starts with an effort to identify all elements of risk. This task in itself can be arduous. The next step is to prioritize all risks in order to manage overall risk more efficiently. In many instances, one cannot eliminate all risk, so prioritization plays an important role. Many times we hear comments within the manatee management group that are basically an identification of one risk or another. These risk-related subject comments include loss of warm water, loss of habitat, collision with watercraft, occurrences of outbreaks of toxic red-tide, and sudden onslaught of extreme cold weather, to name a few.

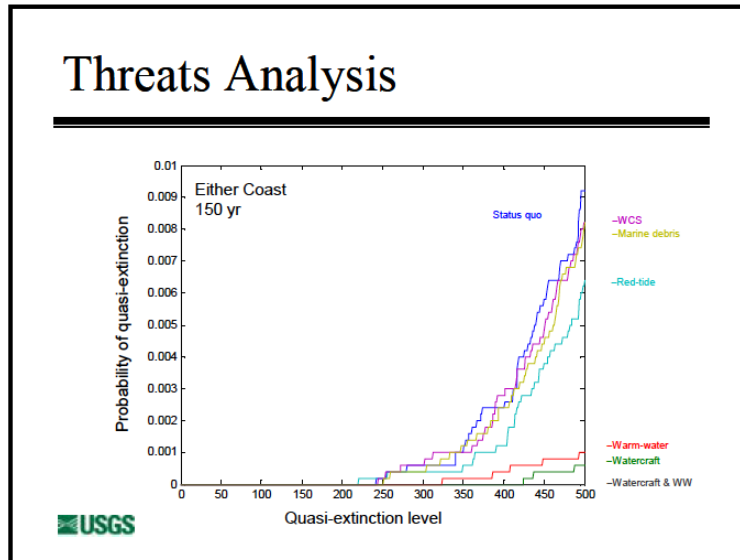
All of these are related to the historically most relevant risk for the manatee species – the risk of extinction. Continued classification as *Endangered* forces the risk of extinction to be the risk of highest priority.

Recently, Michael Runge of USGS updated the manatee core biological model (CBM) as in input to the USFWS manatee stock assessment. This CBM is considered to be the most sophisticated population modeling tool developed to date. The CBM is based on current minimum population size, adult survivability rates, reproductive rates and includes the potential influence of various threats such as watercraft, warm water, red tide, and other threats. The primary output of the CBM is that the probability of ‘quasi-extinction’ over the next 100 years is less than 1/10 of 1% (0.1%). There is zero chance of actual extinction based on CBM analysis.



Source: Manatee Threats Analysis, Michael C. Runge, USGS, presented to the Manatee Forum, May 2013

Runge included a set of analyses that address the level of risk associated with the various perceived threats to manatee survival. The results of these analyses and the potential risk associated with each threat individually and collectively are illustrated in the chart below. Note that even when considered over the next 150 years, these threats do not significantly impact the probability of ‘quasi-extinction’ one way or another. (Again, we emphasize, there is zero risk of extinction.)



Source: Manatee Threats Analysis, Michael C. Runge, USGS, presented to the Manatee Forum, May 2013

Industry standard Risk Management practices have application to all types of situations and decision-making, especially when developing strategic planning. There are many forms of the risk assessment matrix, but the following one from www.faasafety.gov will help illustrate how different manatee management would be if based on accepted risk management practices.

RISK ASSESSMENT MATRIX				
	Severity			
Likelihood	Negligible	Marginal	Critical	Catastrophic
Frequent				
Probable				<i>High</i>
Occasional			<i>Serious</i>	
Remote		<i>Medium</i>		
Improbable	<i>Low</i>			

likelihood of manatee extinction →

Matrix Source: www.faasafety.gov

The collective data from two consecutive stock assessments including the CBM analysis (the best available science) establishes beyond any reasonable doubt that the threat of manatee extinction is zero. When we look at this with respect to the basic risk management matrix, this places the risk of extinction well within the bottom region of the bottom row of the matrix. Therefore no matter how serious you may feel that the consequence of extinction is, the risk is clearly classified as acceptable.

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On the other hand, there is also a potential risk of over-population. This occurs if the population exceeds the optimum sustainable population (OSP) and continues to grow to carrying capacity (CC).

All available data indicates that the manatee population has grown at a rate of 5-7% over the last 40 years. Without some form of management intervention, this population will continue to increase until it reaches some natural limiting factor. As late as 2003, it was clear that USFWS believed that this limiting factor was available warm water volume. This is clear from the following excerpt:

Federal Register: May 8, 2003 (Volume 68, Number 89), Proposed Rules, Page 24700-24704 in reference to: Fish and Wildlife Service ACTION: Proposed rule; withdrawal. Availability of Record of Decision; 50 CFR Part 18; RIN 1018-AH86; Marine Mammals; Incidental Take During Specified Activities.

*"New information about carrying capacity suggests that it may decline over the next 3 to 60 years, which would affect density-dependent life history and management functions of the Florida manatee. **The limiting factor for the carrying capacity of each stock is warm water refugia.** Each stock of Florida manatees is variably dependent on natural and artificial warm water refugia, such as springs, sewerage outfalls, and power plant discharges. Preliminary information presented in the Incidental Take Model, but not yet peer reviewed, suggests that a reduction in total warm water carrying capacity is possible, if not likely, in the near future. This would suggest that OSP will change over time. Our implicit assumption of a stable OSP is challenged by this information. This, in turn, has implications for our interpretation of total population estimates, and our assumption that none of the stocks were severely depleted based on the demographic benchmarks."*

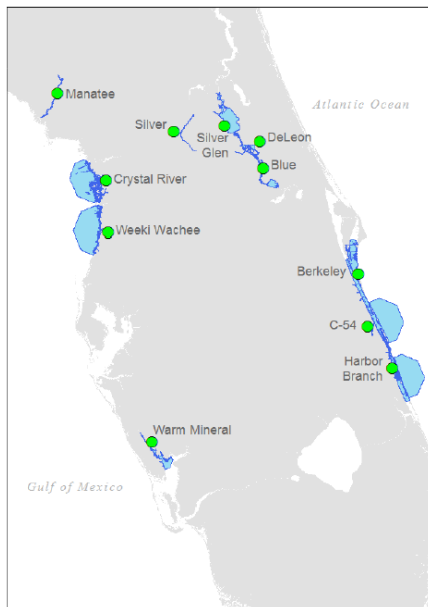
As long as warm water was believed to be the limiting factor for CC, there was no official concern over any consequence to habitat if the manatee population actually reached the CC of the ecosystem. Manatees simply would reach equilibrium where the volume of warm water would limit the number of manatees that would not be subject to cold stress mortality. In this case, the OSP and the CC would essentially be the same.

OSP is defined, with respect to any population stock, by the Marine Mammal Protection Act (MMPA) section 3(9). OSP is the number of animals, which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element. (16 U.S.C. 1362(3)(9)).

In June 2012, Provancha, et al, published *Carrying Capacity Assessment of Manatee Forage and Warm-water Associated with Eleven Florida Sites*, which was submitted to the USFWS by Innovative Health Applications, LLC (IHA). Even though the intent of the study was to examine warm water CC, the authors recognized the availability of nearby SAV for forage as another primary consideration in determining the limits on CC.

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The importance of this study is that it forever changes the underlying assumption that warm water refugia are the limiting factor for CC. This study established that available forage, submerged aquatic vegetation (SAV), was a more limiting factor than warm water. These graphics, taken directly from the study, indicate the 11 natural warm water refuges that were evaluated by the IHA study team. The blue shading indicates the 30km radius around each of the warm water sites where available SAV was evaluated. The SAV available in these surrounding areas proved to be more limiting than the warm water volume itself at 8 of the 11 sites evaluated. The total CC of these areas was estimated using 50 percentile values from 10,000 Monte Carlo simulations for each site.



Site Name	Limiting K	Site-K	Forage-K
Blue Spring	456	491	646
Crystal River	13725	14336	20388
De Leon Springs	349	1445	349
Manatee Springs	0	243	0
Silver Glen Springs	917	5638	917
Silver Springs	15	31827	15
Warm Mineral Springs	141	308	143
Weeki Wachee	1953	1953	31266
C-54	230	15713	230
Berkeley	464	1414	464
Harbor Branch	298	18598	298

Source: IHA Study. Note that the IHA Study uses K for carrying capacity.

When taken at face value, the IHA study suggests that the combined CC for these eleven sites is around 18,500 manatees, but further investigation shows that the warm water volume site CC limit for Crystal River (13,725) comprises 74% of the calculated total CC, the vast portion of which is in offshore Gulf waters. With the Crystal River site removed from the analysis, the estimated CC of the remaining 10 sites was merely 4832, with 8 sites limited by nearby forage and 2 limited by warm water volume¹. Clearly manatee carrying capacity is more strongly limited by forage than by warm water refugia, as previously believed.

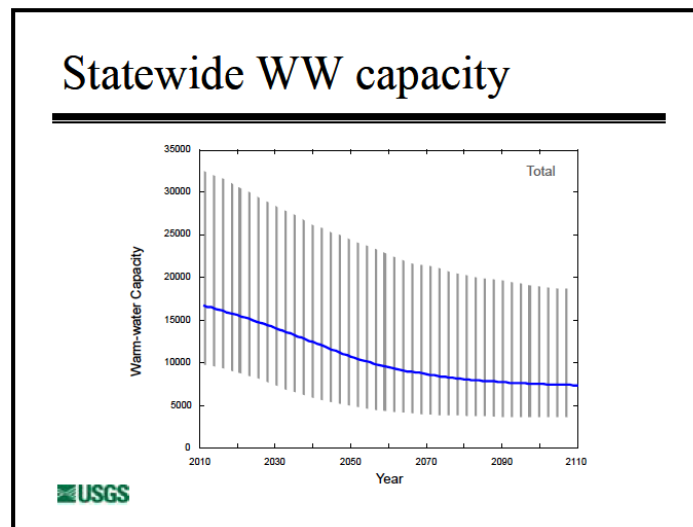
The fact that available SAV is more limiting to carrying capacity than warm water changes manatee management policy forever. This is due to one simple fact. Unlike warm water, which is not consumed and constantly replenishing, SAV is consumed and can be over-pressured to the point where it could be depleted. The manatee

¹ This is a minimum number, as other sites besides the 11 examined in the IHA study provide warm water and forage. We agree with the IHA study that these sites comprise a very large share of total possible habitat, meaning the maximum number likely does not significantly exceed the capacity that can be carried at these 11 sites.

could continue to consume a natural resource to the detriment of the overall habitat. SAV is the basic element of the habitat ecosystem that nearly every species in the ecosystem relies on for at least a portion of its life cycle. Therefore, available SAV establishes the OSP for the West Indian Manatee.

This clearly establishes that the values for OSP and CC for the West Indian Manatee are distinct values. Carrying capacity remains limited by warm water. The CC exceeds the OSP, which is limited by SAV.

As has been established, the manatee population has been increasing for the last 40 years and will continue to increase to carrying capacity. Runge's estimations of future manatee population limits were all impacted by warm water CC.

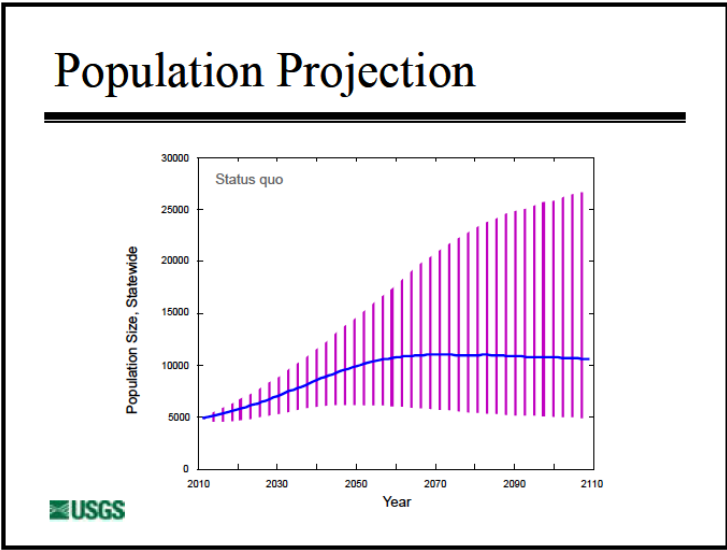


Source: Manatee Threats Analysis, Michael C. Runge, USGS, presented to the Manatee Forum, May 2013

The CBM indicates the manatee will continue to increase until ultimately limited by warm water at or near 10,000.

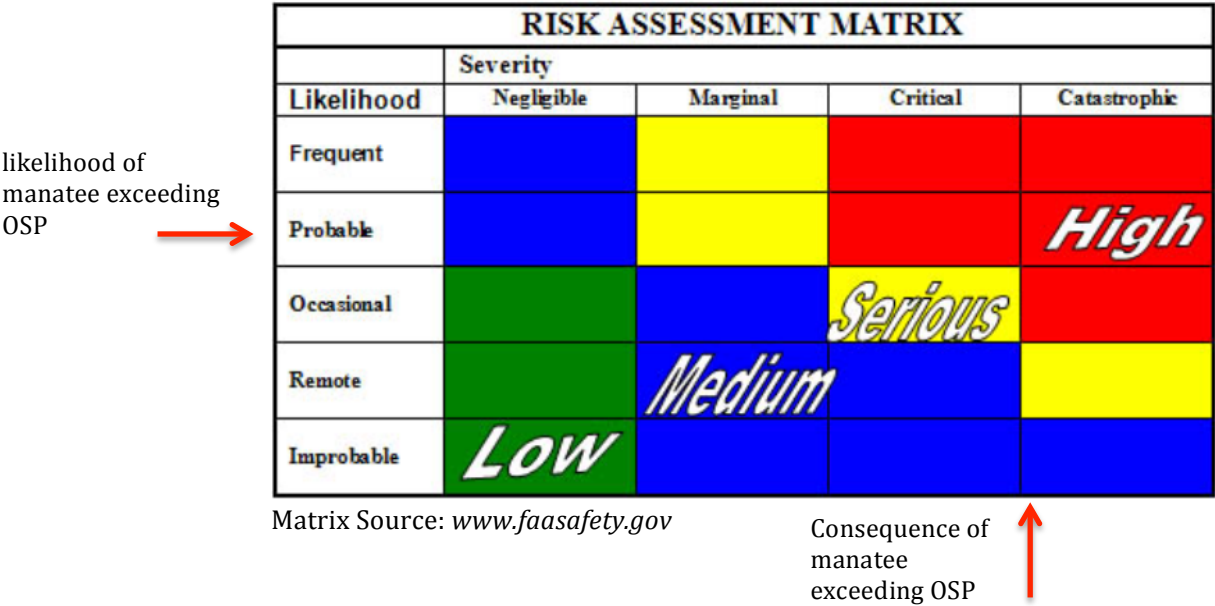
But the IHA study establishes that the OSP, limited by available SAV is considerably less than the CC. All indications are that it is highly probable that current trends in the manatee populations will continue unbounded to the CC, surpassing the OSP, without some other intervention.

If the manatee population increases beyond OSP, the potential impact to the habitat ecosystem is significant. Because we have continued to classify the manatee as *Endangered* based more on pressure from special interest than science, we now find



Source: Manatee Threats Analysis, Michael C. Runge, USGS, presented to the Manatee Forum, May 2013

ourselves in an ironic situation where we continue to manage the extremely unlikely (and therefore completely acceptable) risk of extinction and completely ignore the more likely unacceptable risk of overpopulation.



The overarching public perception of the manatee is that it is completely harmless with no natural enemies and no adverse consequences. But as is the case with any species, there is a population level where the numbers make this notion erroneous. If the manatee is allowed to exceed the OSP and over-pressure the available SAV in the ecosystem, especially our fragile coastal estuaries so critical to the life cycle of numerous in-shore and off shore species, we have made a critical management

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mistake. The unacceptability of the risk of overpopulation demands mitigation. This starts with reclassification of the species. The best available science demands reclassification, even in the face of popular opinion to the contrary.

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Section V – Potential Biological Removal

Reclassification of the West Indian Manatee from Endangered is Mandatory Based on an Analysis of Potential Biological Removal (PBR)

SUMMARY

This comment is in support of the removal of the West Indian Manatee from the imperiled species list. There is an uncontestable proof that manatees are now improperly classified as either “endangered” or “threatened.” This comment shows that the calculation of Potential Biological Removal (PBR) under “endangered” or “threatened” status miserably fails a “reality check” with synoptic counts, mortality counts, and the Service’s Core Biological Model. Failure to match the species’ listing with the best available science is confounding effective species management.

COMMENT

Hypothesis

If manatees are accurately classified as ‘endangered’ or ‘threatened,’ then their population should be decreasing, as human-caused mortality far exceeds the species’ calculated Potential Biological Removal (PBR), which is the number of manatees that can be safely “taken” by human causes without jeopardizing recovery. Calculating PBR is a requirement for establishing “incidental take authorization.”

Also discussed herein is the risk caused by improper classification. Perversely, continued classification of manatees as “endangered” could result in massive harm to Florida ecosystems, as species managers continue to base policy on “more is always better”.

Background

According to the 2001 US Fish & Wildlife Manatee Recovery Plan, “The near and long term threats from human-related activities are the reasons for which the Florida manatee currently necessitates protection under the Endangered Species Act.”

Classification of manatees as “endangered” triggers certain required findings under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). Specifically, “endangered” or “threatened” marine mammals are a “depleted” stock, meaning they are below their optimum sustainable population (OSP). Thus, a PBR calculation (like its relative, Fractional Excess Growth), is intended to ensure that

desired growth rates to “recover” a species’ OSP² are met.

Section 117 of the MMPA requires the Fish & Wildlife Service to prepare “Stock Assessment Reports” (SAR) for manatees. A SAR typically includes the following:

- a description of the stock's geographic range
- a "minimum population estimate"
- current population trends
- current and maximum net productivity rates
- "Potential Biological Removal" levels
- status of the stock
- estimates of annual human-caused mortality and serious injury by source
- descriptions of other factors that may be causing a decline or impeding the recovery of "strategic stocks"

To calculate PBR, US FWS uses a calculation process developed by the National Marine Fisheries Service (NMFS):

PBR is the product of three elements: the minimum population estimate (N_{min}), half of the maximum net productivity rate ($0.5 R_{max}$), and a recovery factor (F_r). Recovery factor values range between 0.1 and 1.0 and population simulation studies demonstrate that a default value of 0.1 should be used for endangered (depleted) stocks and a default value of 0.5 should be used for threatened stocks or stocks of unknown status (NMFS 2005).

A 2014 attempt to calculate PBR produced the number 14 – the number of manatees that could be “taken” annually without preventing recovery of the species³. A 2009 SAR calculated a PBR of 12. The reason for the small change in PBR is two-fold:

² In the 2001 Manatee Recovery Plan, the Manatee Population Status Working Group proposed a target annual population growth rate of at least 4%, based on a 94% or better adult survival rate. This goal is not one of the population-related criteria for reclassification, which are:

Achieve the following population benchmarks in each of the four regions over the most recent 10 year period of time:

- statistical confidence that the average annual rate of adult survival is 90% or greater;
- statistical confidence that the average annual percentage of adult female manatees accompanied by first or second year calves in winter is at least 40%; and
- statistical confidence that the average annual rate of population growth is equal to or greater than zero.

These criteria were replaced in 2007 by the CBM and related models (*see 2007 Manatee 5-Year Review*)

³ The 2009 and 2013 SARs focused on ‘take’ by commercial fishing (an MMPA requirement). However, this same PBR method was used in 2003 by FWS in an effort to authorize “incidental take” by all watercraft. The proposed rule was withdrawn, as the PBR of 12 was far less than actual “take”. At the time, modeling was far less accurate than today; it was believed the southwest manatee “unit” – then called a “stock” – was in decline, and that the outlook in the southwest and Atlantic stocks, using the parameters was ‘dire’. The Service withdrew the proposed “incidental take” rule.

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- 1) In 2009, the minimum population estimate was 3,808. In 2013, the number increased to 4,834.
- 2) In 2009, the fractional result of the computation (11.8) was rounded UP to 12. In 2013, the fractional result (14.98) was rounded DOWN to 14.

2009 SAR	2013 SAR
$N_{min} = 3,802$ $R_{max} = 6.2\%$ $F_r = 0.1$ $PBR = (3,802) (0.031) (0.1) = 11.80 \text{ (or 12)}$	$N_{min} = 4,834$ $R_{max} = 6.2\%$ $F_r = 0.1$ $PBR = (4,834) (0.031) (0.1) = 14.98 \text{ (or 14)}$

“Take” versus modeled growth rate

According to the PBR, the human ‘take’ of manatees that could be authorized under law far exceeds actual take. FWS states that an average of 99 manatees per year are taken by human causes, which is seven times greater than the PBR calculation!

Why is the manatee population growing – and not, as the PBR would appear to strongly suggest, shrinking?

In 2009, strong growth rates were reported in three of the four “management units,” with the Southwest Region reporting a likelihood of a 1.1% annual decline. Yet, taken as a whole, manatee numbers were clearly increasing, rapidly, despite the PBR.

In 2013, new estimates using an updated Core Biological Model (CBM) by Langtimm and Runge increased growth rates in all four management units, most especially in the Southwest, a management unit that moved from a possible decline to a certainty of an increasing population. Moreover, when questioned at the May 2013 Manatee Forum where these findings were presented, Runge stated that the improvements were not due to improved “protection,” but due to improved data and methodologies. These very strong population increases would have been documented in 2009 if the 2013 data and method had been available. In short, the improved numbers are not due to better “protection,” but to better numbers. Moreover, and importantly, past concerns about declining southwest unit population, and a possible decline in the Atlantic, were based on inaccurate data!

Clearly and unequivocally, the hypothesis presented in the opening of this commentary is false. Manatee population increases raise the question: How can seven times as many manatees be killed by people as the PBR allows? Is the data or method used to calculate PBR flawed; is classification as “endangered” or “threatened” wrong; or both?

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Management Unit	2009 Adult Survival Rates (from 2009 SAR)	2013 Adult Survival Rates (not included in 2013 SAR; Langtimm 2013 estimates are shown here)	Change
Northwest	.959 (+4% growth)	.975	+.016
Upper St Johns	.960 (+6.2% growth)	.977	+.017
Atlantic Coast	.963 (+3.7% growth)	.967	+.004
Southwest	.908 (-1.1% growth)	.956	+.048

Is the data flawed?

No. FWS itself calls the CBM the most sophisticated modeling program for any species. At the request of CFFW, Mike Runge fitted the model to the Upper St Johns unit, which has the most complete and accurate assessment of manatee population and mortality. The model fit. CFFW itself has reverse-engineered the CBM with FWC mortality data, and with synoptic surveys. Again, the model fit both times.

Is the method flawed?

It is not the PBR calculation method that is at fault. Certainly, the data poured into the calculation could be improved. FWS and FWC have been unable to develop an OSP for manatees (readers are encouraged to review CFFW President Bob Atkins' presentation before and part of the record of the May 2013 Manatee Forum providing upper and lower boundaries for carrying capacity and OSP for the Indian River Lagoon). In lieu of their own OSP, FWS instead uses synoptic survey results in its PBR, despite the agencies' disdain for the counts. While recognizing synoptic surveys are a "minimum count" – indeed, surveys by Florida Power & Light counted significantly more manatees – the PBR does not adjust the synoptic count upward to account for the undercount.

However, moving the minimum population upwards has little effect on the resulting calculation. We note that between 2009 and 2013, the minimum count moved up from 3,802 to 4,834, an increase of more than 1,000, or 22% higher! Yet, the PBR increased only by two (22% of 12).

The PBR calculation has been used for years, and for myriad species. While the calculation certainly can be "tweaked," it is difficult to envision that if huge disparities between calculated PBR and actual population growth, such as we see with manatees, were occurring with other species, that the calculation would still be used.

Is the PBR wrong because the manatee is incorrectly classified?

Yes. Listing manatees as “endangered” is the sole explanation.

Because manatees are listed as “endangered,” the PBR calculation result is decreased by a factor of 10, only *one-tenth* of the PBR that would be calculated for an unlisted species.

Consider the result if manatees were reclassified as “threatened.” The PBR recovery factor default value would be .5, allowing for 74 annual human-caused mortalities.

$$\text{PBR} = (4,834) (0.031) (0.5) = 74.8 \text{ (or 74)}$$

74 is still substantially less than the 99 deaths per year average. Moreover, the actual number of manatees killed by human-related causes is certainly higher than an average of 99, as a substantial fraction of deaths are ‘undetermined.’

It is simply not conceivable, even as a “threatened” species, that the PBR is accurate, or a useful tool for guiding policy.

Only if the manatee is delisted completely does the formula for calculating PBR correlate with reality and the Core Biological Model. If manatees were delisted, the PBR would be 149 human-caused deaths per year, or about 50 more than the recent annual average. While this result likely still does not fully account for the growth rates established by Runge, et. al., it is certainly much closer.

Why this matters

The PBR is the required tool for determining whether “incidental take” of a species can be authorized. As we have reviewed, efforts to establish minimum take of manatees by recreational vessels have failed, as the PBR is so much lower than actual human take. Therefore, because there is no incidental take authorization, FWS and FWC remain focused on reducing human-caused mortality.

As noted earlier, the stated reason for listing the manatee as an endangered species is the threat of human-related activities, in particular, boating-related take.

Much of what has been done in the name of manatee protection has dealt with reducing the risk of watercraft collisions. A formidable permitting gamut has been established, which has placed slow speed zones in much of peninsular Florida – and most certainly in those areas favored by boaters for recreational watersports such as fishing, skiing and tubing. As FWC and FWS staff have stated, slowing boats down by establishing slow-speed zones is almost the only tool in the toolbox to try to reduce human-caused mortality. *(We note that effectiveness of speed zones has never been demonstrated, as a recent CFFW analysis showed.)*

Langtimm and Runge in 2013 (in preparation for review), showed that the heretofore greatest perceived threat to manatees – watercraft collisions – is of no real concern to the persistence of the species (eliminating watercraft mortality would reduce the risk of quasi-extinction by less than one-half of one percent over the next 100 years, according to the scientists' findings).

As explained above, if the manatee was delisted, "incidental take" under the MMPA for up to 150 deaths/year could be authorized, which is well within current mortality counts. However, a realistic "incidental take" authorization cannot be computed as long as the manatee remains endangered or threatened, managers remain focused on a largely inconsequential threat. In simple terms, their eyes are not on the ball.

The greatest threat facing manatees – ironically, even perversely – is overabundance. If we are at, near, or even above carrying capacity in key regions, which senior FWS officials have privately admitted to CFFW, then focusing on reducing mortality and increasing the manatee population is a highly inappropriate strategy. Moreover, we are learning that there are indeed negative consequences to the ecosystem caused by manatees, in particular overgrazing of seagrass that is critical to the survival of virtually every animal species that inhabits coastal waters.

But, because we are bound *de jure* to treat the "endangered" manatee as a "depleted" species that must be "recovered," managers must continue down the wrong "more is always better" path until such time as the manatee is finally and appropriately delisted.

Delisting in no way implies an end to "protection," as both the Federal and Florida manatee plans clearly state. Rather, it will give managers a larger toolbox to address the very real emerging threats to the whole ecosystem.

The 2001 recovery plan outlines a 20-year timeline to delist, but that timeline, along with so much of the information and recovery criteria in the 2001 plan, is outdated, and even outright incorrect. If the CBM tools available today had been available in 2001, the manatee would have been upgraded to 'threatened' at that time, and today we would be debating delisting, not simply a reclassification to threatened.

It is time to delist. Reclassification is overdue.

Section VI – Rebuttal of Arguments in Opposition

Reclassification of the West Indian Manatee from Endangered is Mandatory Based on a Review of the Arguments in Opposition

SUMMARY

FWS has received hundreds of nearly identical emails opposing upgrading. The purpose of this comment is to examine the claims in the opposition's email, which was written by the Save the Manatee Club.

The arguments put forth in the Club letter are puzzling, and do not merit much attention. However, recognizing that the Club has wielded its power very effectively over the years, we cannot let its comments stand unchallenged. We appreciate that many of those who have sent in copies of the letter are genuinely concerned about manatees. We want to assure them that reclassification of the manatee as *Recovered* will ensure that wild manatees will thrive in Florida waters for generations to come.

COMMENT

Arguments of Opponents to Reclassification are in italics.

CFFW responses follow in plain text.

From 2010-2013, 2,441 manatees died in Florida waters, which is 48% of the highest minimum population ever recorded (5,077 in 2010).

It's unusual to see opponents refer to synoptic surveys. Here are the counts from the years in question:

Year	Dates	East Coast	West Coast	Total
2010	January 12-15	2,780	2,297	5,077
2011	January 20 and 24	2,432	2,402	4,834
2014	January 24 and 27	2,315	2,509	4,824

Recognizing that 2011 and 2014 survey weather conditions were not as ideal as in 2010, the similarity in counts is surprising. Nearly as many manatees were counted in 2011 and 2014 as in 2010, despite the weather.

Two lessons can be brought home:

1. The loss of 2441 manatees during this period had virtually no effect on the visible population.
2. There must be many more manatees than are being counted during the FWC surveys. This view is reinforced by the numbers counted during Florida Power & Light surveys, as a part of its permit reauthorization for its Canaveral power plant. FPL counted hundreds more manatees in Brevard County than did FWC, about 50% more.

Both lessons can be confirmed statistically. In 2012-13, Florida Power & Light conducted aerial surveys of Brevard County as a part of its permit obligations for the Cape Canaveral Energy Center (a rebuilt facility previously fueled by barges

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traveling the Barge Canal). FPL repeated the flights in 2013-14, and the findings have just been released (August, 2014). Sightings in 2013-14 increased by an average of over 400 manatees compared to 2012-13, despite Brevard being the epicenter of the die-off that opponents argue show a manatee population in decline. The table below shows a side-by-side comparison of the FPL counts

FPL 2012-13	# Counted		FPL 2013-14	# Counted
17-Oct	447			
2-Nov	1632			
4-Nov	1292			
13-Nov	579		17-Nov	983
27-Nov	662			
5-Dec	226		3-Dec	1789
22-Dec	605		18-Dec	1590
8-Jan	454			
15-Jan	560		12-Jan	1072
23-Jan	729			
29-Jan	929			
3-Feb	1233		2-Feb	1320
12-Feb	1209		11-Feb	1046
			18-Feb	1966
4-Mar	1232		3-Mar	1795
15-Mar	1719			
21-Mar	1372		23-Mar	968
26-Mar	1492			
AVERAGES	963			1392

Could the FWC undercount documented in Brevard translate to similar undercounts statewide? This is highly likely. One of the recommendations from the FPL study is improve synoptic survey counting methods.

2007 Review Assumptions Regarding Growth Rate of the Atlantic Coast Population and Primary Threats to the Species Are No Longer True:

Yes, they are.

Opponents to reclassification argue that the impending loss of artificial warm water, and the (incorrect reference to a) “red tide” in Brevard mean that population growth rates are no longer believable. This contention is false for two key reasons:

1. There are no plans to reduce artificial warm water. It is reasonable to assume that current levels of artificial warm water will continue. Meanwhile, access to natural sources of warm water is being improved.

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2. While the deaths of many manatees (likely related to the massive seagrass die-off, and also to cold spells), is unfortunate, the reproductive rate predicted in the CBM has already replaced those losses. Without doubt, the growth rate in the Atlantic was reduced during this unusual mortality event (UME)", but even during this UME period, the growth rate was still higher than the criteria for either reclassification or complete delisting.

Unhappily, the insistence by opponents on high levels of population growth could be detrimental to the health of the overall Indian River Lagoon. We contend it is time to focus on optimum sustainable population, not recovery. Reclassification is key to implementing such a strategy.

State and Federal Agencies Have Not Managed to Safeguard the Manatee's Habitat:

Opponents use very vivid language, but little fact. The truth is that humans have dramatically expanded manatee habitat since WWII. Vast networks of transportation channels, and, later, the dredging of thousands of miles of residential and commercial canals, have expanded manatee habitat beyond the Peace River on the west coast and Sebastian Inlet on the east, to cover the entire state. Manatees are found year-round in abundant numbers in locations they previously rarely visited, such as the Wakulla River, Upper St Johns, Suwanee, Kissimmee River and more.

Opponents mention Sea Level Rise (SLR) as a threat, apparently on the theory that higher water may reduce seagrass (forage). There is little information available how SLR might affect inland waters or estuaries; nor is there information on the potential benefits to manatees, including an increase in range and habitat as waters warm.

Opponents worry about spring flow, but they are fully aware that springs are a high restoration and preservation priority. Here is a list of springs in manatee habitat with currently funded projects:

- King's Bay Area: \$3.8 million
- Suwanee River Springs: \$1.9 million
- Silver Springs: \$20.3 million
- Ichetucknee Springs: \$4.6 million

There is nothing in the opponents' arguments that poses an identifiable risk of extinction in even a small portion of the manatee's range, much less the significant portion of habitat required for listing as endangered or threatened.

Manatee Recovery Plan Criteria Has Not Been Met:

In fact, the three criteria have been met. This is a never-ending demand. More will never be enough. There is no reason to belabor this point.

Watercraft Mortality Will Likely Increase:

The threat from watercraft has been and is hugely overstated. We've all seen the latest threats analysis (Runge, Langtimm, 2013), which estimates that the possibility of "quasi-extinction" can be reduced by about ½ of 1 percent if all watercraft deaths were eliminated. Watercraft should no longer be the focus of protection. Indeed, there is no real evidence that speed zones have been an effective form of protection, with effectiveness defined as a measurable reduction in vessel-caused mortality that has measurably reduced the risk of extinction. Just one small study (Laist & Shaw) is in the literature. This study had numerous short-comings: a small data set; a questionable premise that attempted to identify boat strikes within a very small geographic area; and no discussion of whether the speed zones produced a reduction in the risk of extinction. A much more comprehensive analysis of speed zones by CFFW and presented at the Stem to Stern Forum, showed that counties without zones surprisingly saw the most significant decline in watercraft collisions. Neither FWC nor FWS have examined these findings, which call into question the fundamental utility of speed zones as an effective protection strategy.

It Is Questionable Whether Florida State Regulations Alone Can Protect Manatees and Their Habitat:

Florida has always lived up to its obligations under law. When the opponents to upgrading sued the state, FWC staff urged the commissioners to fight. Instead, commissioners settled, and regret the decision to settle. While CFFW certainly has its own issues with the state's policies with regard to manatee regulation, there is no doubt that the state undertakes its responsibilities with zeal and commitment.

Likely Effects If Manatees Are Upgraded From Endangered To Threatened:

Rhetoric of opponents, with proper classification, an incidental take authorization can be issued, using a calculation of potential biological removal that is based on a realistic status, preferably unlisted. If a science-based PBR is developed, it will be because science has finally won out over politics.

If all of the risks and threats to the manatees are taken into account, the only possible conclusion under the law is to maintain the West Indian manatee's status as endangered for both of its subspecies.

All of the non-trivial risks and threats to the future of the manatee stock are acceptable by any application of sound risk management principles. Further each of the quantifiable elements of risk have been taken into account and still there is zero

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risk of extinction from any source – natural or anthropogenic – according to the most recent US Geological Survey report.

Moreover, the only possible conclusion is that the given reason for listing manatees as endangered – human-caused threats – is no longer a threat of extinction.

As a marine mammal living in close proximity to humans, manatees will always be managed and protected. With this change in classification, management can move away from “recovery mode” — where growing the population is the key goal — toward management of a sustainable population.

**The time for reclassification
was *established* in 2007,
reconfirmed in 2012 / 2013
and
is *overdue* 7 years later in 2014.**

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