DRAFT

Delaware Center for the Inland Bays
Scientific and Technical Advisory Committee
April 13, 2022, 9:00 a.m. to noon - Zoom Meeting

Attendees:

STAC Members
Kristen Covaleski, Inter-Fluve
Aaron Givens, DDA
Zina Hense, DNREC
Andrew Homsey, UD
Deb Jaisi, UD
Chris Main, DNREC
Bhanu Paudel, DNREC
Roger Shepherd
Claire Simmers, CAC
Kelly Somers, USEPA
Kari St. Laurent, DNREC
Jennifer Volk, UD Coop Ext, STAC Chair
Rich Watson
Ed Whereat, DESG
Andrew Wozniak, UD

CIB Staff
Caitlin Chaney
Nivette Pérez-Pérez
Michelle Schmidt
Aviah Stillman
Marianne Walch, STAC Liaison

Others
A.G. Robbins, Citizen Monitoring Program
Fengyan Shi, UD

Meeting recording

The meeting was called to order by Jenn Volk at 9:00 a.m. with roll call and introductions.

Announcements

- Membership updates:
  - New STAC members: Zina Hense has replaced John Clark as the appointed representative of the Division of Fish and Wildlife. Aaron Givens will now be the official representative for the DE Department of Agriculture, with Chris Brosch filling in as needed.
  - Hassan Mirsajadi, Ellen Dickey, Kathy Coyne, Bill Ullman, Bob Stenger, Jack Puleo, and Jordan Zimmerman resigned from STAC due to retirement or other commitments.
  - Jenn encouraged everyone to review the membership list posted on the CIB website, and help identify gaps (e.g., expertise, organizations/industries) that should be filled in recruiting new members.
- CIB Staff Changes:
  - Marianne Walch has announced that she will be retiring in August. All STAC members also received the announcement that Chris Bason has resigned as Executive Director. STAC is asked to share the position announcements as widely as possible.
- Presiding Officer Election:
  - Marianne summarized the process and announced that the only nominations received were Jenn Volk (to continue as Chair) and Doug Janiec (to continue as Vice Chair).

- Fifteen members present met the requirement for a quorum. A motion to elect Jenn and Doug as Chair and Vice Chair was approved by voice vote – 14 in favor, none opposed, one abstention.
- Judy Denver has resigned as Secretary (an appointed position). Rich Watson and Claire Simmers have volunteered. We are looking for four people to share the note-taking role, so please volunteer!
- Anyone potentially interested in an officer role in the future should please contact Jenn. She's happy to discuss and provide mentorship.

- Members were invited to attend the Water Family Fest & Native Plant Sale, May 14th, 10 am to 3 pm, at the James Farm.

Old Business

Wastewater Subcommittee Update

Aviah Stillman, CIB Watershed Assistant, provided an update on the work of the CIB staff and STAC subcommittee to develop a wastewater nutrient budget for the Inland Bays.

It was decided that the 'Case Study' facility for determining what data/information to collect would be the Piney Neck Regional Wastewater Treatment Facility. A FOIA request was submitted to DNREC for the following information for that facility:

- Discharge Monitoring Reports (DMRs) from 2011-2021
- Annual Reports from 2011-2021
- Soils Investigation Report (SIR)
- Hydrogeologic Suitability Report (HSR)
- Surface Water Assessment Report (SWAR)

A Quality Assurance Project Plan for the project is being drafted.

New Business - State of the Inland Bays Report: Status, Review and Approval

Indicator analyses have been completed, and STAC subcommittees have reviewed most of the results. At this meeting, the remaining water quality and nutrient load indicator were presented for review, and the STAC's concurrence with the status and trends was sought. Once STAC has approved, the results will be presented to the Board in June. This meeting provided one more opportunity for STAC members to review and comment on the indicator results. Prof. Fengyan Shi presented the results of his work to model the Indian River inlet tidal flushing, and Marianne Walch and Andrew McGowan presented the results of all other report indicators.

STAC members have also been invited to provide written reviews of technical reports, which are available here. Reviews should be sent to Marianne Walch (science@inlandbays.org). All comments received during this meeting and in writing will be addressed. The public-facing report is currently being drafted, and release is anticipated at the end of the summer.

Estimating tidal prism of Delaware Inland Bays using a numerical model – Fengyan Shi, Univ. of Delaware

Link to presentation

Attempts to identify funding for repeating physical measurements of the Indian River inlet tidal prism (last measured by USACE in 2004) were unsuccessful. A modeling approach was suggested by USACE and STAC as an alternative. Prof. Shi used an existing numerical model that he developed to estimate the tidal prism. Model results revealed that the tidal prism increases with increased inlet

cross-sectional area, but the increase has slowed in recent years as the effective inlet cross-sectional area approaches equilibrium. Based on the model results and empirical formulas, the best estimate of the maximum tidal prism at present is about 2,150 million ft^3, and it appears to be reaching an equilibrium.

Q: Rich Watson: Can you estimate the impact of a given level of SLR (which we know will happen)? A: Yes, this can be done, have to put the water elevation in the model and recalculate. Jenn Volk: This is the state now, for the report. But can think about using SLR scenarios for future planning.

Q: Andrew McGowan: Why is the incoming water volume less than the outgoing? A: Good question, cannot explain this. River discharge in the Inland Bays is very small. Should be symmetric, so he used an average. *(Note added by Marianne: We can ask Jeff Gebert at USACE to explain this.)*

Q: Andrew Homsey: Is a linear extrapolation of the tidal prism to future years reasonable? How significant is the extra water coming in, relative to total volume of the bays? A: Linear extrapolation definitely is not appropriate. Increase slows down. Empirical formula doesn't factor bay water. In our case, the inlet is constrained manually. Increased water volume means increased velocity and increased friction at inlet, which decreases the prism. This is why numerical method is more trusted than empirical methods, which don't consider this.

Q: Marianne Walch: Seems your work was limited by lack of bathymetric data for the inlet. So perhaps this should be considered as a priority for the next updated Environmental Monitoring Plan. Also, uncertain how to update the curves shown in the 2016 report – you provide one number, and the previous plot has two (incoming/outgoing). A: Unsure. The asymmetric figure is confusing. Suggests change the figure using the averages. Or could use the output from the model for past years.

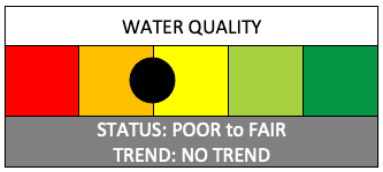
Water quality status and trend analyses – Andrew McGowan, CIB

Link to presentation

Andrew provided a summary of the results of two different trend analyses – seasonal Mann Kendall and a Generalized Additive Model (GAM) approach used by DNREC. The latter approach was used to perhaps better handle the nonlinear relationships seen at multiple stations. Both will be included in the State of the Bays technical report. The results are slightly different, and input was sought from STAC on which to use in the public report.

The Inland Bays report also will be displayed on the ecoreportcard.org website hosted by the Univ. of Md. Integration and Application Network. This requires a 'report card' style of scoring that also was discussed. The scoring method used was explained. A new overall Water Quality Index was developed based upon the average of the scores of individual parameters. The previously used index that was based upon criteria required for eelgrass growth will be moved to the Bay Grasses indicator section of the report.

Water quality conclusions/highlights summarized in table below:



INDICATOR	OVERALL STATUS	OVERALL TREND (LT)	NOTES
Dissolved Inorganic Nitrogen	Poor to Fair	No Trend	>50% of stations meet standard; Indian River and most tribs very poor; improvements in LAB continue over ten years.
Dissolved Inorganic Phosphorus	Poor to Fair	No Trend	<50% of stations meet standard; DIP better than DIN in the Indian River but still not meeting standard; continued good status in much of LAB.
Chlorophyll a	Fair	No Trend	Indian River again far worse than standard; some improvements in LAB now being seen.
Water Clarity	Poor	No Trend	Most areas don't meet standard, IR especially poor; may be biggest driver for lack of SAV;
Dissolved Oxygen	Fair	No Trend	Only a few stations failed standard, but doesn't match data from continuous stations. Status fair based on discrete data,
Seaweed Abundance	Good	No Trend	No trend since last report. Looking at a more public-friendly way of presenting this data.
Water Quality Index	Fair	No Trend	Average of DIN, DIP, Chl, Clarity scores. Open bay waters good, tribs poor.

Comments from STAC:

- Jenn Volk: Really likes how the new WQI is presented – sharp and easy to interpret. DO is listed here as fair, but you discussed it as poor to fair. Are you on the fence with this indicator? Andrew: We know more about the DO than is indicated by this discrete data set. Jenn: Should stick with the data, but include information about the continuous data.
- Marianne Walch: A communication challenge is presented by the difference between the water quality in LAB versus other bay areas. Maybe need to separate the water quality status/trends by bay? Definitely need to communicate this clearly and highlight successes. Jenn agrees in separating it by bay if it can be done clearly and easily.
- Claire Simmers: Looking at this from the point of view of the public, she thinks it's clear and easy to follow. Obvious that LAB is different – very important to highlight why that is. In this time period there has been a lot of development, but things aren't getting worse. So maybe the public will think development and climate change aren't really impacting water quality. Similarly, why is the IR so much worse? Andrew: LU changes can take up to decades to be observed in water quality. Jenn: Could also discuss actions that are being taken that may be mitigating the impact of these changes.
- A.G. Robbins: Why is RB10 on the DO map but no others? Also, it's a nontidal, freshwater site. Are there two sets of data for Banks Bridge? Andrew: RB10 actually should not be included. There is overlap at some locations between CMP and DNREC data. We used both if the data qualifies.

- Ed Whereat: Question about time cutoff for DO data. For the 305(b) report, all that's required in a five-year period to list a segment is two minimum DO readings <4mg/L. If looked at through that lens, there would be a much higher degree of impairment than shown. Andrew: Cutoff is 9:00 am. Agrees that if the 305(b) criteria were used, essentially all stations would show as impaired. But that criteria may be too stringent in terms of biological significance.
- Aaron Givens: Does 'no trend' mean we've reached a steady state and don't expect further changes? Also, might be best to give the overall score up front and then get into the breakdown of why. The data presented definitely agrees with what he knows from boating on the bays. Andrew: These are long-term statistical trends. Definitely see changes within shorter periods. Marianne: Both LT and ST trends are addressed in the public report.
- Ed Whereat: Can Md Coastal Bays data be used? People would be interested in comparisons. Andrew: MCBP uses a different grading system. Both will be shown on ecoreportcard.org site. Ed: Might be interesting to compare northern Assawoman Bay at least. Also relates to where eelgrass grows.

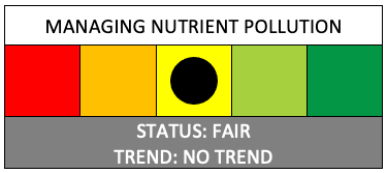
Nutrient load and nutrient management indicator analyses – Andrew McGowan and Marianne Walch, CIB

Link to presentation

These indicators have previously been reviewed by STAC subcommittees. Brief overviews of the analytical methods, status, and trends were presented, and these are summarized in the table below. Status and trends determined by average scoring (1-5), weighted more toward loads than practices.

Comments from STAC:

- Jenn Volk: Should overlay precipitation/flow on plot to show more load in wet years. Important in messaging about what we can do to control the loads.
- Andrew: Subcommittee noted the lack of granularity in the nonpoint source data due to lack of stream gauges.
- Andrew Wozniak: From a public perception, we've done all of these things, but loads aren't getting better. Is holding the line good enough if you aren't achieving goals. This is a counter to the perception that development and climate change don't have an impact.
- Claire Simmers: Thinks we're seeing an acceleration of the negative impacts.
- Jenn Volk: Agrees not fair to judge stormwater progress against 4,500 ac goal.
- A.G. Robbins: Was there any analysis of wind patterns to determine how representative the Assateague atmospheric station is of our watershed? Andrew W: Next closest station is State College, PA. Local impacts on nutrient deposition much more important than wind direction. Lewes has been shown to be different than Millsboro. A.G.: Definitely need a new monitoring station.

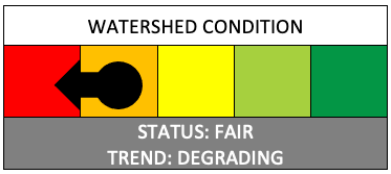


INDICATOR	OVERALL STATUS	OVERALL TREND (LT)	NOTES
Point Source Loads	Good to Very Good	Improving	Rehoboth outfall removed May 2018; Lewes and Allen Harim discharges remain, but mitigated, so essentially all point sources gone.
Atmospheric Loads	N - Good P - ?	N - Improving P - Degrading	Lewes monitoring station removed in 2017; N data taken from Assateague; no P data available; atmospheric N continued to decrease and below goal for last three years; only one P data point available, shows continuing increase.
Nonpoint Source Loads	N – Very Poor P – Fair to Good	N – No Trend P – Degrading (based on LAB)	N remains far above goals for all three bays; IRB and LAB have exceeded TMDL goal every year since 2013; RB right about at goal; LAB TP significantly increasing.
Agricultural Nutrient Management Practices	Fair	Improving	Tracks progress on meeting PCS goals; met goals on some practices (NM plans, manure relocation); limited progress on others; 2020 progress generally exceeds that of 2016.
Septic System Conversion to Central Sewer	Very Good	Improving	Have exceeded PCS goal by >20%, and continued progress by Sussex County on this.
Stormwater Retrofits	Poor	Improving Slightly	Assesses progress toward goal of 4,500 acres; only ~240 acres so far; goal may be unrealistic though; most installed by CIB; flooding and resiliency may drive future retrofits.

Summary of watershed condition, living resources, human health risks, and climate indicator analyses – Marianne Walch and Andrew McGowan, CIB

Link to presentation

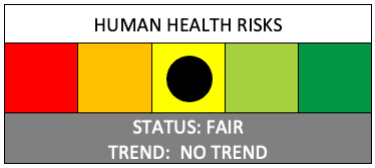
These indicator groups have previously been reviewed by STAC subcommittees. Marianne and Andrew presented the proposed status and trends for each indicator, which are summarized in the tables below.



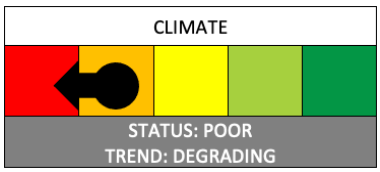
INDICATOR	OVERALL STATUS	OVERALL TREND (LT)	NOTES
Human Population Growth	Fair	Degrading	Continued growth in FT residents and related development (13% since 2010 census, higher than projected); densities highest in coastal areas near waterways; more wastewater, more development; pressure on natural resources.
Land Use Change	Fair	Degrading	Latest data 2017; agric. and forested lands being converted to development; 18% loss of forest since 1992; loss of forested buffers; direction of losses/gains consistent over time.
Impervious Surface Coverage	Fair	No Trend	Correlated w/ development; 22.5% increase since 1992; concentrated near bays; 10.44% IC overall, but rises to 60-80% in urbanized areas; little increase since last report, but newest development not included in this 2016 data.
Salt marsh Acreage and Condition	Fair	Degrading	Total acreage stable, but marsh integrity and function – as indicated by open water ponding – is rapidly degrading. Particularly prominent in LAB and western RB.
Natural Habitat Protection and Restoration	Fair to Good	Improving	Tracks acres added/yr of lands/habitat permanently conserved, restored, or enhanced; progress in last five years has accelerated; current focus of state and local partnerships.
Indian River Inlet Tidal Flushing	? Unsure how to assign this	No Trend	Large increase over the past 80 years, but tidal prism appears to be reaching an equilibrium, as modeled. may continue to increase somewhat with SLR; better bathymetric data needed.

INDICATOR	OVERALL STATUS	OVERALL TREND (LT)	NOTES
Baygrasses	Very Poor	Slightly improving	Surveys completed last year; 10.7 acres total found, horned pondweed in Love Creek, widgeon grass in LAB; no eelgrass. Widgeon grass has increased recently, and restoration projects planned.
Eagle and Osprey Nesting	Very Good	Improving	Both have resurged since the 1990's. Last eagle survey 2018 – 14 active nests, stable trend. CIB-led volunteer survey done in 2020, but comparison difficult due to inconsistencies over the years in survey methods. 279 nests with bonded pairs found.
Commercial Clam Landings	Fair	No Trend	Landings reflect health of fishery rather than health of clam populations. Landings remain very low compared to historical. Fewer harvesters, less efficient fishing methods than in the past.
Shellfish Farming	Good	Likely Improving	Insufficient data so far to make plots. Numbers still low. Will be included as an information page. Industry taking off and prospects look good.
Winter Waterfowl Counts	Fair	No Trend	Tracks Canvasback, American Black Duck, Atlantic Brant. Atlantic Flyway data no longer being collected by USFWS. CANV numbers very low; ABDU numbers low but stable; ATBR stable but low, possible slight ST increase.
Blue Crab Abundance	Fair	Improving	STAC had suggested looking at only YOY to indicate annual recruitment. Abundance increased over last five yrs, with low to average recruitment. WQ problems in some nursery areas concerning.
Fish Abundance	Fair to Good	Improving	Large interannual variation typical. YOY of four species used as indicators. Above average recruitment last five years, esp. bay anchovy and summer flounder. No LT trends apparent.
Shorezone Fish	Fair	Degrading	Important nursery area for YOY of many species, and many important forage species. Four species dominant (Mummichog, Atl. Silverside, Sheepshead Minnow, Striped Killifish). Mummichog and Sheepshead Minnow have declined over last ten years (possibly due to habitat changes).
Horseshoe Crab Spawning	Fair	No Trend	Spawning densities comparable to those in Delaware Bay. Numbers stable but remain far below historic levels. Spawning habitat loss due to development and shoreline hardening.
Recreational Fishing Statistics	Fair	Degrading	Harvest lower than expected. Major drop in striped bass harvest; continued minimal harvest of weakfish; summer flounder, bluefish harvest stable. Estimates for no. of trips and overall pounds caught unavailable from NOAA.

Number of Fish Kills	Poor to Fair	Possibly Degrading (pending data review)	Indicator of stress, usually a combination of nutrient pollution and weather conditions. Will be revised (per STAC reviewers recommendation) to include numbers of fish and standardize how a 'kill event' is defined.



INDICATOR	OVERALL STATUS	OVERALL TREND (LT)	NOTES
Bacteria Pollution (Fecal Indicator Bacteria)	Fair	Degrading	Many tributary sites routinely fail primary contact (swimming) standard. Most areas do routinely meet the secondary contact standard (for boating, etc.). Cannot distinguish between human and wildlife sources. More stations failing to meet primary standard than in previous reporting period. Guinea Cr. And Love Cr. Show significantly degrading trend.
Approved Shellfish Growing Waters	Fair	No Trend	Classification based on proximity to potential pollution sources. No changes in last five years.
Fish Consumption Advisories	Fair	No Trend	Continuing advisories for bluefish and striped bass. No changes since 2016. Potential future advisories for PFAS. A call-out box on emerging contaminants will be included.



INDICATOR	OVERALL STATUS	OVERALL TREND (LT)	NOTES
Atmospheric Carbon Dioxide Concentration	Poor	Degrading	Monthly average in March 2022 up to 419 ppm (compared to preindustrial 280 ppm). 32% increase since 1960. Rate of increase is accelerating.
Sea Level Rise	Poor	Degrading	
Mean Annual Air Temperature – Southern Delaware	Poor	Degrading	3°F increase since 1890s. Two highest recorded mean annual temps since 1895 occurred in the last ten years.
Annual Days Below Freezing (Lewes)	Supporting data for Air Temp Indicator		Decreasing by 6.93 days per decade

Annual Days Above 90F (Lewes)	Supporting data for Air Temp Indicator		Increasing trend beginning in the 1990s. Models show rate of increase accelerating through 2100.
Growing Season Length (Lewes)	Poor to Fair	Degrading	Increasing by 7.92 days per decade. Impacts bay and watershed ecosystems.
Annual Precipitation – Southern Delaware	Fair	Degrading	Increasing, but at a slower pace than air temperature. ~3" increase in precipitation over 12 decades.
Coastal Storm Frequency, Delaware	Fair	No Trend?	Frequency of coastal storms varies greatly, with a minimum in the 1980s. Larger numbers of storms during the last decade, but no clear trend. Frequency of intense storms increasing.
Ocean Acidification	Fair	Degrading	Increase in oceanic CO2 over the past 17 years is consistent with atmospheric increase. Clear increasing trend.

No additional comments on these sets of indicators were made during the meeting.

STAC Concurrence on Indicators

STAC members in attendance were gave general agreement and approval of the analyses, statuses, and trends presented, with the understanding that not everything has been finalized. Additional reviews and/or comments can still be sent directly to Marianne or Andrew. All comments will be addressed and placed on record in the technical report that accompanies the public State of the Bays report. STAC will also be given the opportunity to review report text and final assigned status/trends prior to publication.

Open Discussion: None

The meeting was adjourned at 12:02 pm. The next full STAC meeting is on Wednesday, August 3rd. This meeting hopefully will be in-person, location TBD. A virtual option will also be offered.

Draft meeting notes submitted by Marianne Walch, STAC Liasson. Edited and approved by Jenn Volk, STAC Chair.