

FDEP Triennial Review of Water Quality Standards Paragraph 62-302.530(70)(b), F.A.C.

Revisions to Turbidity Criteria for Coral Areas

U.S. Army Corps of Engineers

South Atlantic Division and Jacksonville District Comments

05/18/2021

NOTES ON FDEP'S PROPOSED STANDARDS FROM THE 5 MAY 2021 PUBLIC WORKSHOP:

From 62-302.530(70)(b), F.A.C.:

- “Turbidity shall not be increased above background conditions within areas of the state where coral reef or hardbottom communities are currently found or have been demonstrated to have occurred since November 28, 1975. To evaluate this criterion, background conditions shall take into account the natural variability of turbidity levels, not to exceed 29 NTU.”
- From slides 61/112 and 62/112 of FDEP Triennial Review of Water Quality Standards, paragraph 62-302.530(70)(b), F.A.C.
- DEP conducted comprehensive search for studies addressing effects of turbidity on corals and concluded that 29 NTU is not protective of corals/hard bottom. However, there are insufficient data to establish a numeric criterion.

DEP must ensure the following in order to implement the revised criterion:

- Must demonstrate that criterion is protective;
- Must also address complexity of natural spatial and temporal variability;
- Resident corals are adapted to the natural variability.

CORPS OF ENGINEERS COMMENTS ON THE ABOVE PROPOSAL

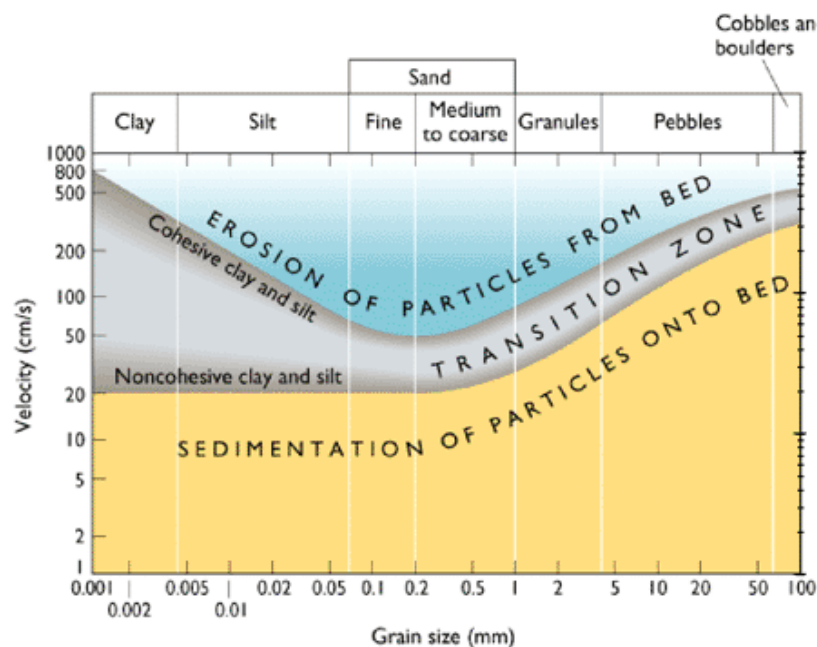
1. It is our understanding that the proposed changes to the F.A.C. on this topic stems from sedimentation impacts associated with dredging project(s), not from turbidity or any given level of turbidity. Therefore, the rationale appears to be misapplied or targeted to the wrong parameter.
2. Under the new proposal, FDEP asserts that turbidity levels need to be lowered to protect corals and indicating that studies support this assertion. However, no studies were cited. It appears that FDEP may be relying on Fourney (2017), as the principal study on this topic. However, as stated previously, upon careful reading of Fourney (2017), the cause of all coral larvae mortality was solely due to smothering or

sedimentation, not turbidity. The chief error in the paper was conducting the investigation in a laboratory setting and then spuriously conflating turbidity with sedimentation; this is no different than conflating humidity with precipitation: they are distinct parameters. Therefore, the FDEP should base the new proposal on sound science measuring the parameter in question. It is unknown which research was utilized to develop the new proposals specific to turbidity.

3. The presumptiveness that turbidity is harmful to corals is incorrect. Turbidity and its relationship with corals is extremely complex. For example, there are other studies which detail the beneficial and likely necessary effects of turbidity on corals: “For the (deeper) reef slopes, finer particles may be found in suspension for extended periods of time (Larcombe et al. 1995), thereby reducing light availability (Kirk 1994) and, potentially, rate of photosynthesis. However, the generally higher abundance of fine particles in suspension and their higher organic content represents a food source that enables some heterotrophic compensation for reduced phototrophy, depending on the coral species (Anthony and Fabricius 2000).” Anthony 2001. These findings may be related to two key processes: (1) nutrition enhancement under high turbidity, and/or (2) the secondary effects of turbidity on the underwater light regime. First, feeding on particles at high concentrations may provide corals with nutrients and consequently facilitate tissue growth and increase lipid levels (Anthony and Fabricius 2000; Anthony et al. 2002), thereby reducing the risk of mortality due to starvation (see also Grottoli et al. 2006).”
4. Even the impacts from sedimentation are more complex than meets the eye. For example, there is research which demonstrates that corals can tolerate high levels of smothering (or turbidity saturation) for relatively long durations with no apparent ill effects. For example, Lybolt (2008), documented numerous corals which were buried for 7 days and were completely unaffected from it. The paper states “Figure 2: Inshore 1 m² quadrant of transect R-99. Left-buried (Wednesday 10 March 2004) and right-exposed Wednesday 17 March 2004. In seven days a 23-meter-wide sand bar disappeared and the apparently unaffected hardbottom community was exposed. Even a 10 cm stony coral, *Oculina diffusa* (inset) was apparently unstressed. This sequence is not an isolated occurrence.”
5. The Corps also previously provided information to FDEP which helps to explain the observations from the various studies through a Hjulstrom diagram. The diagram depicts the different and fluctuating sediment states which occur in every natural energetic water body, with each state being determined by the hydrodynamic conditions at any given moment. The diagram demonstrates that even small currents can prevent suspended sediments from settling (represented as transitional or erosional states). In other words, suspended sediments (measured as turbidity) may or may not result in sedimentation, depending on the current velocities they are

exposed to. And the opposite is true, settled sediments may or may not remain in a settled state depending on the currents they are exposed to. Therefore, when laboratory tests are conducted in a tank with no currents being induced, they generally do not translate to real world observations. In this case, it appears the FDEP may be applying specious research into the new water quality criteria.

6. The Corps is opposed to FDEP basing water quality criteria on either unidentified and/or misapplied scientific studies. It appears the FDEP intends to place the burden of collecting long-term water quality data on permit applicants to try to establish what signifies baseline turbidity levels. This would likely delay numerous projects throughout the State to collect adequate data, likely one year or more to account for seasonal fluctuations. Otherwise, the standard of not exceeding background turbidity levels is unrealistic and arbitrary. It is simply not possible to conduct work in the water without exceeding background levels as presently done: background levels are fundamentally measured concurrently with the compliance levels, with samples being collected upstream from the work (background) and samples being collected downstream from the work (compliance), and then compared.



Hjulstrum – Sunborg Diagram

7. No specific requirements are provided in the criteria revision to establish the applicable background turbidity, so the burden of proof will fall upon the permit applicant to establish the background for each area of the project subject to the coral/hardbottom criteria. Given the potential fluctuations in turbidity in project

locations over time (seasonality) — especially during storm events when discreet turbidity samples are not typically collected, either a long time period of sampling or deployment of remote sensing data sondes will be required to establish those location-specific background turbidity ranges.

8. For current Corps contracts, turbidity monitoring is conducted as a part of the dredging or beach construction contract. Advertising a solicitation without having as specific numeric turbidity compliance level in the contract will likely result in a higher risk to the contractor for frequent shutdowns which could cause the overall bid to be much higher in overall price.
9. Should the Corps chose to establish the background levels during the permitting or solicitation phase, executing a service contract to deploy data sondes and staff to collect and analyze the turbidity data for a sufficient period of time to capture all variations in turbidity will be a significant additional project cost that would factor in to the Federal government's ability to perform maintenance.
10. The rule also appears to assume that dredging of navigation channels or beach construction activities can be achieved without producing a minimal amount of turbidity from the project. Should a project location occur within an area without substantial fluctuations in background turbidity, the resulting turbidity limit may not be practicable to achieve.
11. The new criteria appear to be implementing OFW anti-degradation rule 62-4.242(2), thus essentially making most of coastal South Florida subject to an OFW water quality standard which would not otherwise apply to many of these areas currently. The revised criterion could affect costs on up to 5 port navigation projects, 20 beach protection projects, as well inland navigation projects located in the vicinity of inlets.
12. There is no mechanism to establish an alternative length of a mixing zone or exemptions for activities within a Federal navigation channel provided in this revision.
13. The new criteria is not consistent with the 2020 South Atlantic Regional Biological Opinion which lists specific minimalization and avoidance measure to be implemented to avoid sedimentation effects to corals.
14. Summary: The Corps is opposed to FDEP basing water quality criteria on inappropriate scientific information which appears to address the incorrect parameter of concern affecting coral population (turbidity, not sedimentation). The burden of water quality data collection to establish appropriate water quality criteria would be unreasonably placed upon the applicant; the methodology for the applicant to

address the criteria is not provided. The applied standard appears to be both unrealistically low and arbitrary and will likely increase costs of dredging and beach construction projects with a limited benefit to the resource.

References

Fourney, Francesca & Figueiredo, Joana. (2017). Additive negative effects of anthropogenic sedimentation and warming on the survival of coral recruits. *Scientific Reports*. 7. 10.1038/s41598-017-12607-w.

Lybolt, Matt & Tate, S. (2011). Rapid changes in nearshore habitat: is resource burial an appropriate measure of project impact?

Anthony, Kenneth. (2006). Enhanced energy status of corals on coastal, high-turbidity reefs. *Marine Ecology Progress Series*. 319. 10.3354/meps319111.

Anthony, Kenneth & Larcombe, Piers. (2000). Coral reefs in turbid waters: sediment-induced stresses in corals and likely mechanisms of adaptation. 1. 239-244.

State of Florida Triannual Review of Chapter 62-302, F.A.C. Draft Revisions March 2021
