1. Escoffier (1977)

Assumptions:

1. Neglects local acceleration.
2. Single inlet system.
3. The separation of stable and unstable inlets is determined by the maximum in the closure curve.
4. The Major limitation to Eschffier's theory is that any cross-sectional area greater than A_{crit} is considered to be stable.
5. Idealized depositional pattern within the inlet.

$$K = \frac{TA_{avg}}{2\pi A_b}\sqrt{\frac{2g}{a_o\left[k_{en} + k_{ex} + \frac{fL}{4R}\right]}}$$

A_{avg}	average area over the channel length
A_b	surface area of bay
T	tidal Period
a_o	ocean tide amplitude
k_{en}	entrance energy loss coefficient
k_{ex}	exit energy loss coefficient
L	inlet length
R	inlet hydraulic radius

$$V\max = \frac{C_k\ 50{,}000}{gT\sqrt{2a_o}}$$

where C_k is a function of the repletion coefficient, K.

2. Bruun (1978)

Stability is a function of the ratio of tidal prism to gross longshore transport. Bruun's major concern in his analysis was the use of the inlet for navigation. Bruuns's limits for each classification re approximate.

$$\frac{\Pr ism}{GrossDrift}$$

3. O'Brien and Dean (1972)

Assumptions:

1. Calculated values of the existing inlet characteristics represent the inlet in equilibrium.
2. The reduced cross sectional area was geometrically similar to the equilibrium cross-sectional area.
3. Applies to a single inlet system.
4. Not applicable to mixed tidal conditions.
5. The spring tidal range was used as the condition considered most effective in governing stability.

Stability Index (β, m^5/s^3 or ft^5/s^3)

A measure of stability, β, was defined to represent the capacity of an inlet to remain stable under conditions of deposition.

$$\beta \equiv \int_{A_C^*}^{A_{C_E}} \left(V_{\max} - V_T\right)^2 \, dA_C$$

V_T: Threshold velocity

4. Metha et al. (1975)

Like Bruun's ratio, the stability theory yields only general qualitative results. Stability coefficient, M, is defined to be the ratio of annual longshore wave energy per unit length of shoreline to tidal flow energy per unit length of inlet.

$$M = \frac{P_A T}{2\gamma A_C w}$$

P_A alongshore annual wave power
γ unit weight of seawater
T tidal period
W the power per unit length along the inlet channel which Mehta shows:

$$w = \frac{4.2\, P^3}{C^2\, h_C\, A_C^3\, T_2}$$

P tidal prism
C Chezy's C

The average annual alongshore wave power can be estimated for the gross littoral drift.

$$P_A = 0.48\ Q_{TOT}$$

5. Van de Kreeke (1990)

Analytical method to evaluate the stability of multiple inlets connecting the bay to the ocean.

Assumptions:

1. The bay surface area fluctuates uniformly.
2. Velocity is simple harmonic function of t, not applicable to mixed tidal conditions.
3. A_i and A_b are constant.
4. Rectangular cross-section or triangular cross section.

Conclusion
For a two inlet bay system there exists no set of stable equilibrium flow areas. This implies that ultimately one or both of the inlets will close.

Beckert and Rosst (2001) presented the simple methodologies used to assess inlet stability, while useful, do not by themselves provide a sufficient means of evaluating depositional and erosional tendencies of inlets in a multi-inlet bay system.

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