1.0   To answer the question "What is a region?", an adequate theory of regions must be used.

1.1   But all bodies of knowledge which might be supposed to have a theory of regions are discipline-based, i.e. geography, politics, etc., and are consequently so one-sided as to make them inaccurate.

1.2   General System Theory would seem to offer the most complete theoretical base from which to derive a theory of regions; but even better than General System Theory is

1.3   "Whole System Theory." Whole System Theory is theory derived deductively and empirically from the largest practical system. The largest practical system for the present discussion is the Biosphere.

1.3.1   The Biosphere has component processes and structures. The structures are regional ecosystems which are participants in the various biospheric cycles (such as the nitrogen cycle, etc.).

1.3.2   The semiotic ("language") system of the Biosphere is energy. Thus it seems more appropriate to define regional subsystems as energetic provinces rather than biotic provinces (see Exhibit B) thus allowing the inclusion of non-living cycles and processes into the definition of a region.

1.4   Regions are separated by their boundaries from what is not considered part of the region.

1.4.1   A discussion of boundaries.

Notation: S = System   E = Environment

$\overline{S}$ = Nonsystem B = Boundary

According to the literature in General System Theory (based partially on set theory): S and $\overline{S}$ are complementary; $\overline{S}$ = E; and B separates S and $\overline{S}$.

But the systems which these statements are based on are human-scale systems. We might even call these subsystems special cases since their scale is eye-level. On the atomic scale and on the biospheric scale the facts justify what has been called "fuzzy logic." Fuzzy logic is the logic of fuzzy systems.

1.4.1.1   Regional systems are fuzzy systems because

1.4.1.1.1 their structures and processes blend into nature without discontinuity and only rarely with distinct boundaries (Odum).

1.4.1.1.2 Boundary flux in large ecosystems is small compared to internal cyclic fluxes (Odum). In other words there is enough going on within a regional system not to be concerned about precisely where the boundary is.

1.4.1.1.3 The amount of information transmitted between points within a system is significantly larger than the amount transmitted across its boundary (Miller).

1.4.2   Thus, to continue the discussion of system and boundary rules, $\overline{S} \neq \overline{\overline{S}}$ (to preserve identity), but it seems that $\overline{\overline{S}} = E$ if and only if an adequate B exists between $\overline{S}$ and $\overline{\overline{S}}$. And this is what is at issue. Furthermore E should not have to include the idea of <u>outsideness</u> as it is required to do as long as $\overline{\overline{S}} = E$. So if E is not outside $\overline{S}$ then it must be co-extensive (at least partly) with $\overline{S}$. If this is so then $E \subset \overline{S}$. There can be no identification of $\overline{\overline{S}}$ with E. <u>If</u> $E \subset \overline{S}$ and $E \subset \overline{\overline{S}}$ then the relation between $\overline{S}$ and $\overline{\overline{S}}$ is fuzzy.

1.4.3   One way to handle fuzzy relationships between system and non-system is through a <u>topological transformation</u>.

1.4.3.1   When discontinuities are present in a system (or singularities, irregularities, contradictions), and when a continuous domain is the goal (in this case a continuous region), then it is possible to circumscribe the singularities and thus effectively exclude them from the system. The mathematics of this is called <u>contour integration</u>.

1.4.3.1.1 A brief discussion of contour integration. Assume we have a closed contour c upon which an analytic function f(z) is defined for all points within and on the contour.

1.4.3.1.2 This process is analogous to the kind of operation we want to perform on a "protoregion" (i.e. a region-in-the-making). We want to make the Gulf of Mexico into a single region rather than the Austro-riparian Biotic Province. There are many reasons for thinking that the Gulf and its shores should be one kind of area. The first is intuitive: a resident of South Louisiana would feel more at home in Merida, Yucatan than in Shreveport, Louisiana. The Gulf as a body of water ties together the communities on its shores, with common food, common weather, common natural enemies (hurricanes), a common geopsychic milieu. But there are singularities - things that don't fit - which must be accounted for. Language is the most obvious; and there are others. The solution is simple, at least mathematically: exclude the discontinuities and thus maintain the continuity of the investigation.

1.4.3.1.3

EXHIBIT A

Contour Integration

Then, integrating along the contour c we have

$$\int_c f(z)\ dz = 0$$

(This is a result of the Cauchy-Goursat Theorem.) Now if there exist certain discontinuities (called "singularities") within the contour, the theorem no longer applies. However, the difficulty can be circumvented as follows:

Let the closed contour c contain a finite number of closed contours interior to c each containing a singularity. Connect the contour c to

the inner contours by straight line segments, thus forming two closed contours c' and c" upon which the theorem can now apply; i.e.

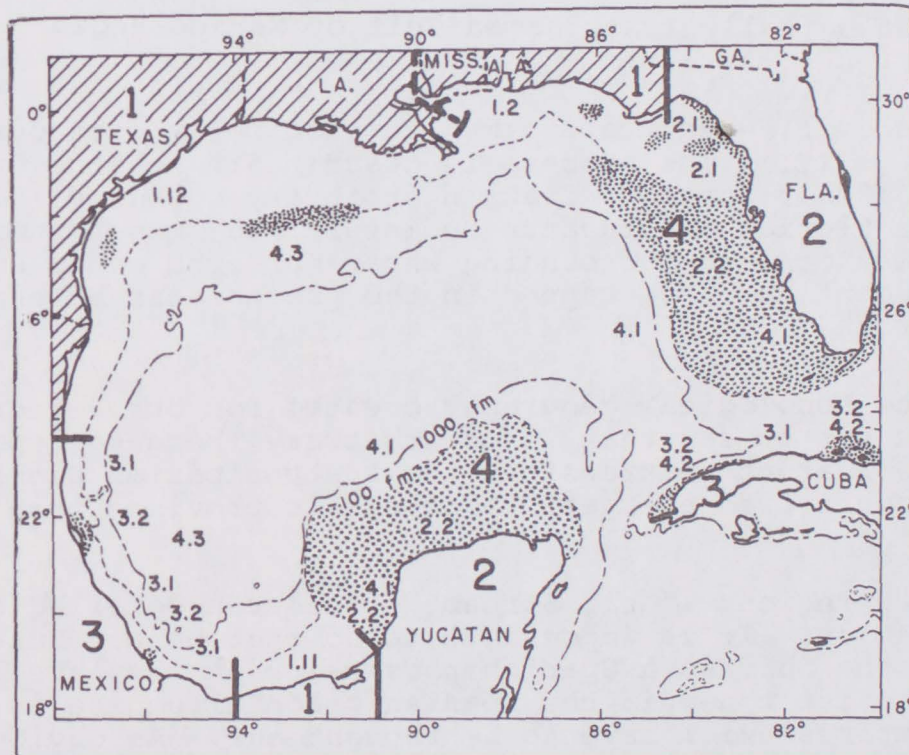$$\int_C f(z)\,dz = \int_{C'} f(z)\,dz + \int_{C''} f(z)\,dz = 0$$

We have effectively integrated around the singularities thereby maintaining the consistency of our results.

EXHIBIT B

Austroriparian Biotic Province - to be retooled into

1.4.3.1.4

Regional geo-oceanographic classification, shorelines and coasts, Gulf of Mexico: 1, alluvial coasts; 2, drowned limestone plateaus; 3, young orogenic coasts; 4, biogenous (organic) development on various coasts. Sub-sectors: 1.1, deltaic coasts, with 1.11, unentrenched simple deltaic plain, and 1.12, entrenched and embayed compound deltaic plain. 1.2, terraced deltaic coastal plain; 2.1, unsimplified to little simplified drowned karst; 2.2, limestone karst with beaches; 3.1, erosional, and 3.2, depositional, orogenic coasts; 4.1, broad shelf; 4.2, shelf absent to narrow; 4.3, lesser biogenous development (more extensive than shown). The two southerly Mexican 3.1 Sectors are volcanic salients.

EXHIBIT C

Gulf of Mexico and Adjacent Shores

1.4.3.1.5

Part I   Part II

area to be transformed

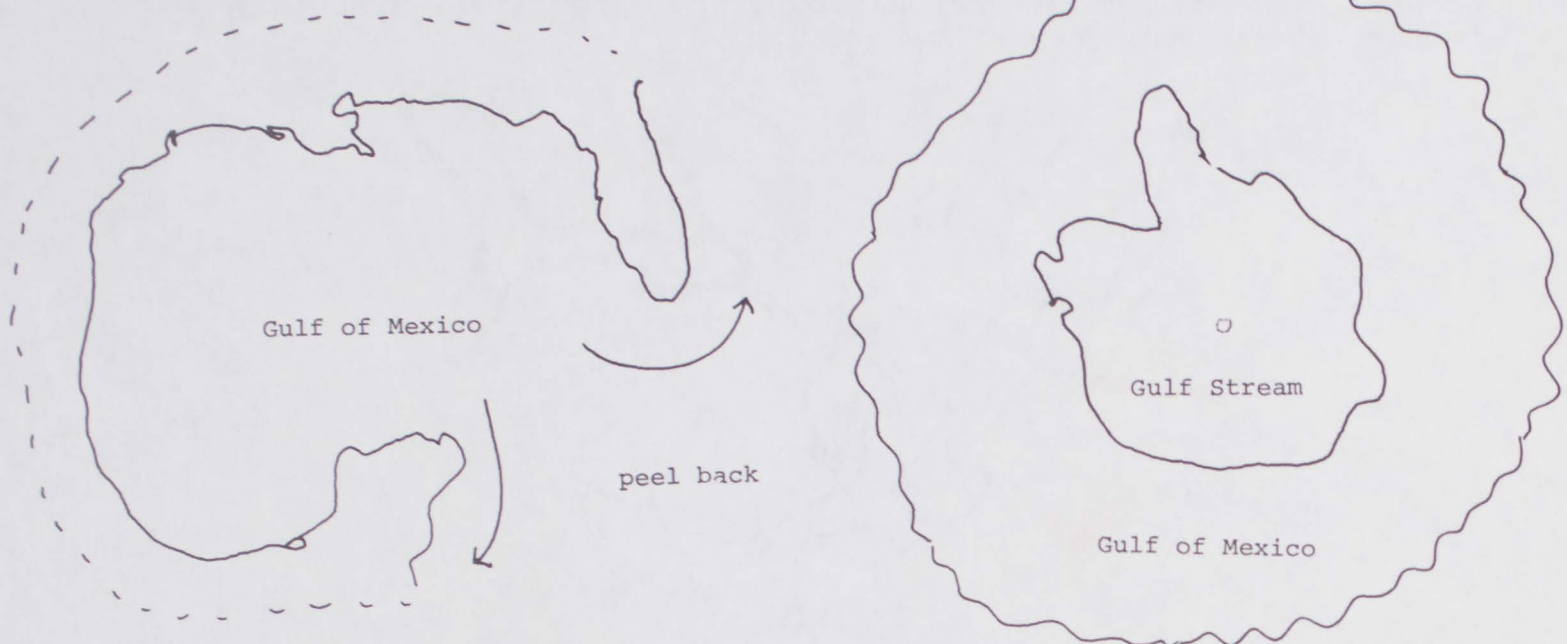Gulf of Mexico

peel back

Gulf Stream

Gulf of Mexico

EXHIBIT D

Topologically Transformed Gulf of Mexico Region

Exhibit D, the Gulf, when transformed topologically (contours closed)
goes from (I) to (II). The process is described: for the Gulf of
Mexico Region ("Gulf Stream") draw an arbitrary boundary (dotted line),
hook thumbs on Florida and Yucatan Peninsula and turn the Gulf back on
itself. Instead of land surrounding water make the water surround the
land. Any discontinuities trapped in the process can be encysted, and
thus worked around.

1.5   The new topological geography created for our region is concep-
tual. This is not to say that it is arbitrary, because hypothetically,
there are more reasons to transform the Austroriparian Biotic Province
into a newly-configured energetic, geopsychic province than there are
not to.

1.5.1   Our new region - "Gulf Stream" - deserves detailed analysis,
study, celebration. It is impossible to do that here. Future work will
have to study the Gulf as a Spanish possession in the late 1700's (actu-
ally our region isn't new if the Spanish colonial empire is considered).
Any future "empires" will have to be thought out. An obvious future
goal is a Gulf Common Market. This does not mean using Mexican oil in
U.S. tractors to grow Guatemalan corn. It should mean using/conserving
resources of the region and working together toward stabilization of
population, elimination of exploitation and achieving heterostatic
equilibrium.

1.5.2   An interim project is to explore the Northern Gulf Coast because
it is an area we know something about. Bookhardt's Geopsychics and
Kasnowski's name permutations are a beginning of a subregional study
called TRISTES SEMI-TROPIQUES.

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New Orleans
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