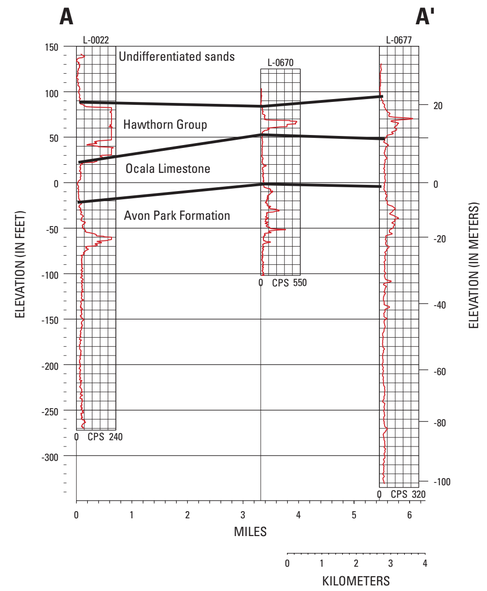
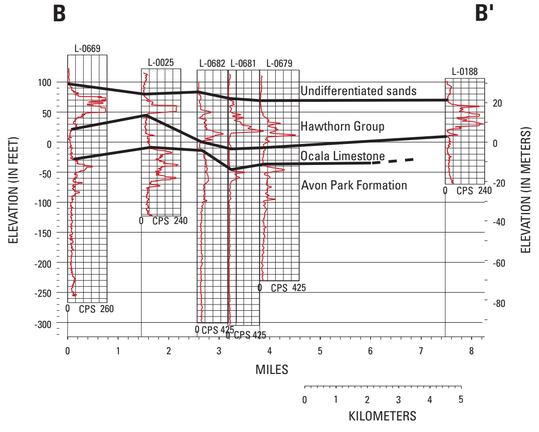
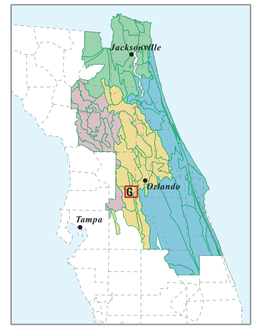
INDEX MAP AND GAMMA LOG

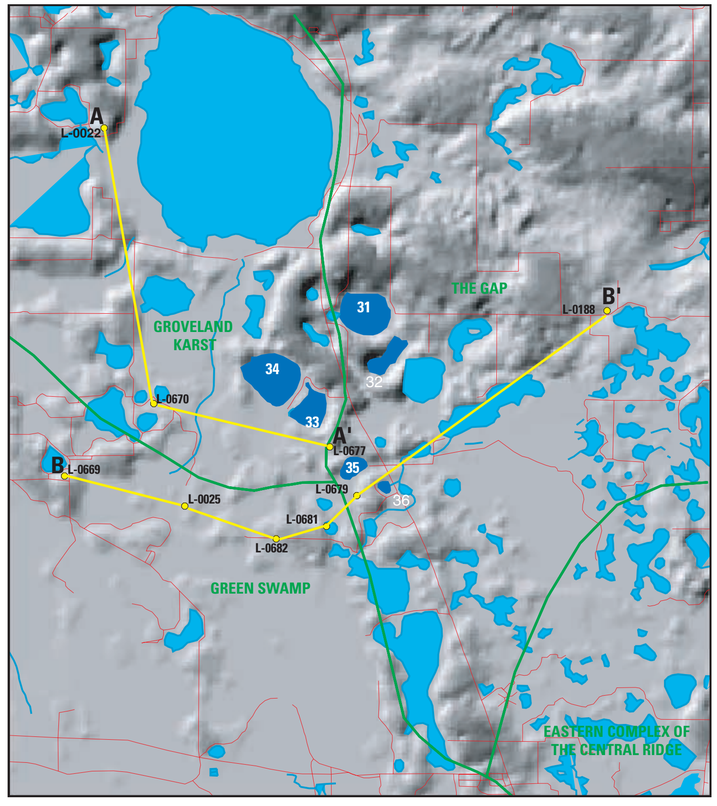
CROSS-SECTIONS, SECTION G





Location of survey area right (red square). Shaded relief map below showing physiographic regions, and location of wells and gamma log cross-section. Gamma Log cross-sections (left) show geologic contacts for correlation to seismic sections.





LEGEND

- Wells, Cross-Sections
- Streams/Rivers
- Major Roads
- Physiographic Province Boundary
- Lakes
- Lakes in Atlas

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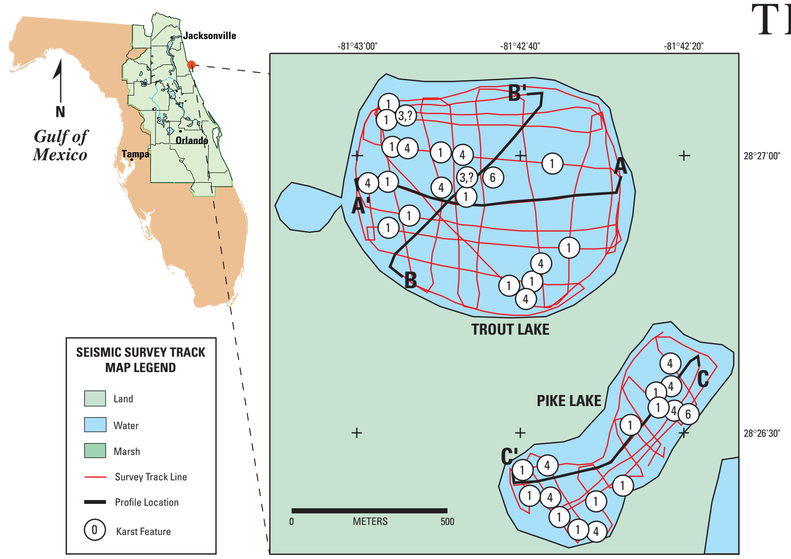
31	Trout Lake	38
32	Pike Lake	38
33	Lake Hammond	39
34	Lake Dixie	40
35	Lake Keene	41
36	Smokehouse Lake	41

0.3 0 0.3 MILES
0.3 0 0.3 KILOMETERS

G

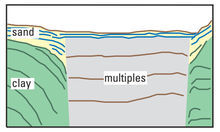
TROUT AND PIKE LAKES

LAKE COUNTY, FLORIDA

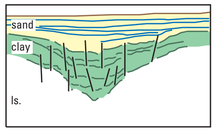


EXPLANATION

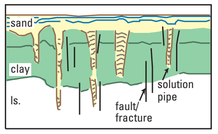
1. Profile obscured by multiples, noise or signal attenuation.



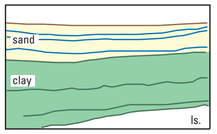
3. Baselevel sinkhole—with near-surface disturbance.



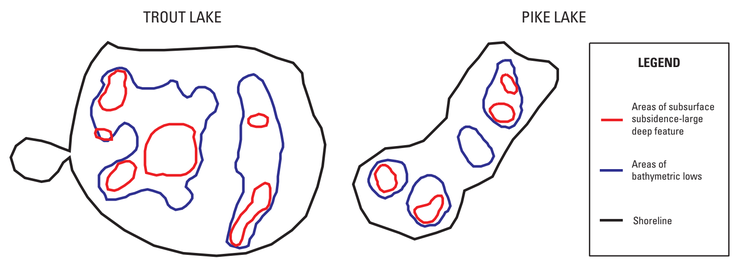
4. Dissolution/solution features.



6. Intact subsurface—minimal karst development.



TROUT & PIKE LAKES
DISTRIBUTION OF FEATURES
(noted from seismic profiles)

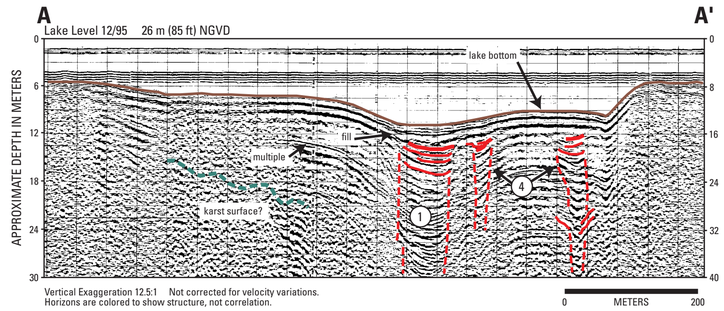


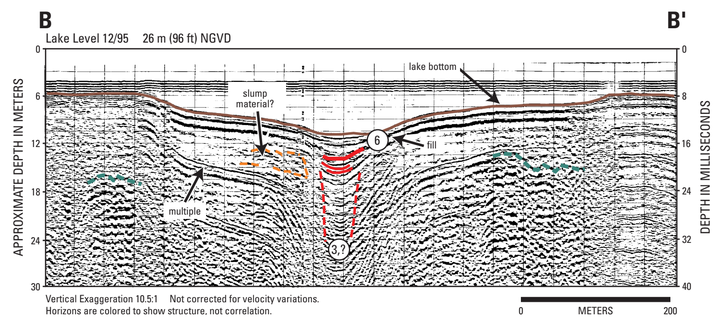
Introduction

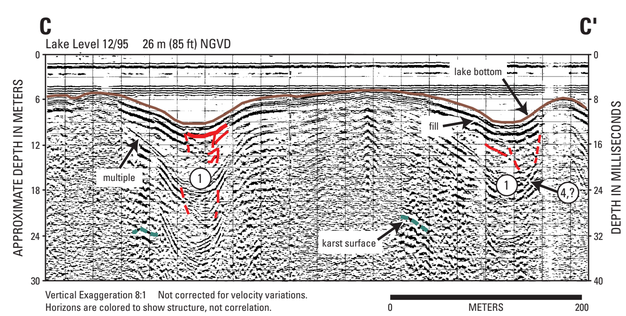
Lakes Trout and Pike are among a cluster of small (<1 km) lakes in southeastern Lake County. The physiography is described by Brooks and Merrit (1981), as The Gap, an area of lower elevation, about 25 to 37 m (85 to 120 ft) between the Sugarloaf Mountain region and No Name Ridge. The lower elevation is a result of increased erosion of the underlying limestone. A number of lakes occupy this lowland, of which Lakes Dixie, Smokehouse and Hammond were also surveyed in this study. The Gap and the flanking highlands are part of the Lake Wales Ridge, which is the topographic crest of Central Florida (Brooks, 1981). The Ridge is characterized by residual sand hills, relic beach ridges and paleo dune fields. The topography on either side of the ridge has been reduced to the water table, forming Green Swamp abour 5 km (3 mi) to the southwest and Sawgrass Bays, 3 km (2 mi) to the southeast. Lake level in December of 1995 was approximately 30 m (98 ft) NGVD. Trout Lake, the larger of the two, is fairly circular, with a perimeter of 19 km (12 mi) and a surface area of about 1 sq km Pike Lake is oblong with an area of 0.6 sq km and a perimeter of about 3.2 km (2 mi).

Subsurface Characterization

Seismic profiles from Trout Lake and Pike Lake show a hard bottom reflection, possibly well sorted sands, infilling a deeper karst surface (type 1, profile A-A'). The strong bottom reflector leads to multiples seen throughout the data that obscure some of the record. The record is also partially obscured in areas where the lake bottom nears the surface. The acoustic characteristics and their interpretation in the two lakes are similar. The subsurface is characterized by numerous small low-angle reflectors with high angle reflectors dipping toward their center (profiles A-A', B-B', C-C', type 4). Concentric reflections extend to depth in the profile. These features may represent solution pipes or small subsidence into the karst subsurface, which is in close proximity to the surface in this area. This condition has a high potential for increased leakage. A distribution plot of these features (red line) shows how they tend to define the areas of deeper water in the lakes (blue line). The areas of subsidence seen within the lakes are well constrained and do not have the appearance of large subsidence or collapse sinkholes seen in other lakes. These localized areas of subsidence may lie directly over centers of active karst development. The competent overburden restricts lateral growth of the unstable region, confining dissolution, yet creating a direct conduit for fluid migration from the surficial waters to the Floridan aquifer. Discrete reflectors at 18 m (profile B-B', green line) and 24 m (profile C-C', green line) may represent a karst surface on top of the Ocala Limestone. Interpretations of a gamma log acquired from a well located approximately 1 mile to the south of the lakes (Index Map G, p. 37, well L-0677) show the top of the Ocala Limestone to be around 50 m (15 ft) NGVD, or about 10 m (30 ft) below lake level. The reflector seen in the profiles (green dashed line) may be associated with this surface. Differential dissolution in the Ocala Limestone could lead to subsequent subsidence in the overlying sediments of the Hawthorn Group and the undifferentiated fill.







Subsurface Characterizations of Selected Water Bodies in the St. Johns River Water Management District, Northeast Florida

Jack L. Kindinger[1], Jeffrey B. Davis[2], and James G. Flocks[1]
2000

[1] Center for Coastal Geology and Regional Marine Studies
U.S. Geological Survey
St.. Petersburg, Florida 33701

[2] St. Johns River Water Management District
Palatka, Florida 32178

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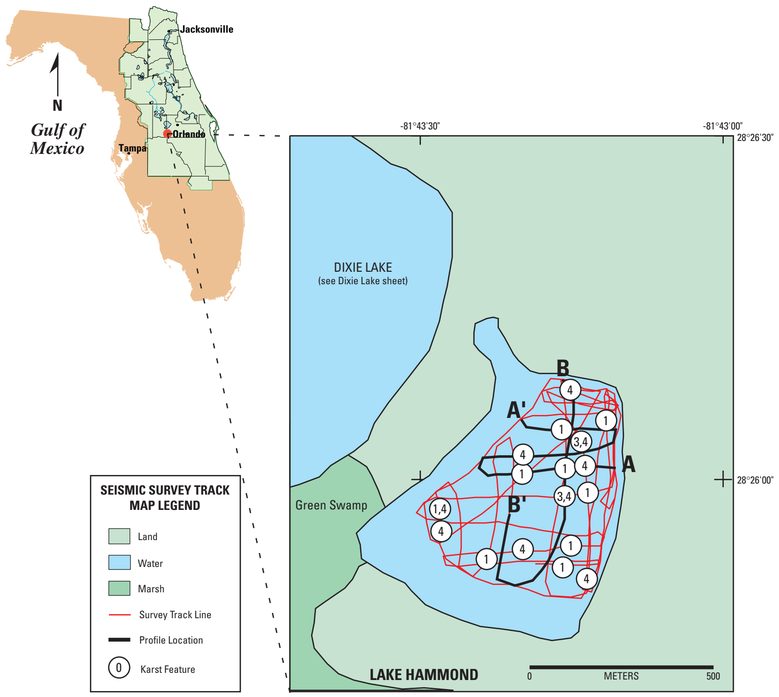
LAKE HAMMOND
LAKE COUNTY, FLORIDA



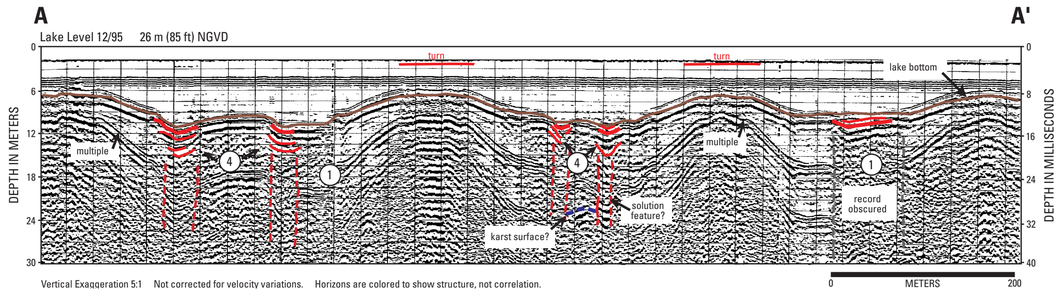
Introduction

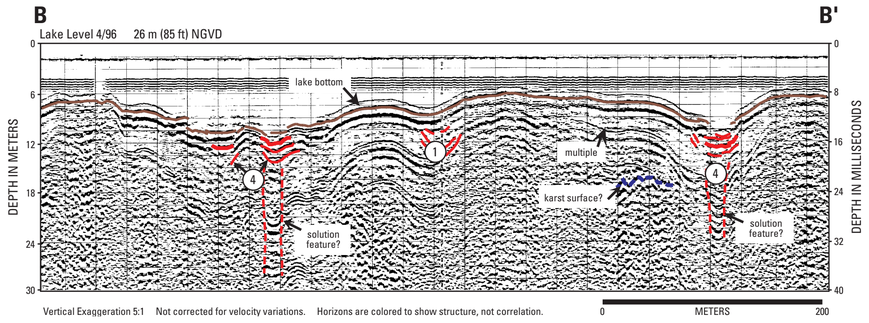
Lake Hammond is among a cluster of small lakes in southeastern Lake County (see Index Map Section G, p.37). The physiography is described by Brooks (1981), as The Gap, an area of lower elevation, about 25 to 37 m (85 to 120 ft) in between the Sugarloaf Mountain region and No Name Ridge. The lower elevation is a result of increased erosion of the underlying limestone. The Gap and the flanking highlands are part of the Lake Wales Ridge, which is the topographic crest of Central Florida (Brooks, 1981). The Ridge is characterized by residual sand hills, relic beach ridges and paleo dune fields. The topography on either side of the ridge has been reduced to the water table, forming Green Swamp to the southwest and Sawgrass Bays to the southeast. Lake level in December of 1995 was 26 m (85 ft) NVGD. Lake Hammond is irregular in shape, with a perimeter of 3 km and a surface area of about 0.5 sq km.

Subsurface Characterization

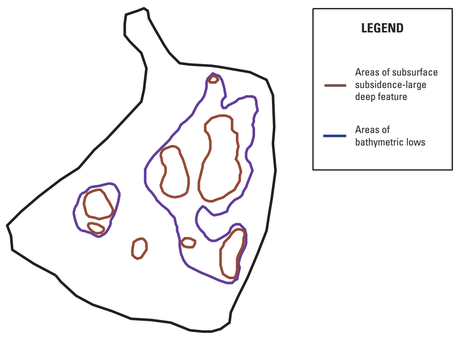
Seismic profiles from Lake Hammond show a strong bottom reflection, possibly from well-sorted sands. The strong bottom reflector results in multiples seen throughout the data that obscure some of the record (profiles A-A', B-B'). Noise below the topographic lows in the profiles also obscure some of the record (gray lines, profile A-A'). This noise could be a result of the accumulation of organic material in the depressions which attenuates the acoustic signal. The subsurface is characterized by numerous small depressions with mid-to low-angle reflectors dipping toward the centers of the depressions (profile B-B'). Concentric reflectors may extend to depth in the profile (marked by red dashed lines in profiles). These features may represent solution pipes dissolved into the karst subsurface. These areas of subsurface depressions have been plotted in the distribution of features map (brown line), relative to bathymetric lows (blue line) to reveal their relationship.

The seismic reflection data from Lake Hammond overall is similar to that of it's neighbor, Lake Dixie. However, perhaps because of the lake's smaller size, the data quality is generally poorer. The deeper reflector seen in Lake Dixie that correlates with gamma logs to represent the top of the Ocala Limestone (see Lake Dixie, p. 40, blue line), cannot be seen as readily in the Lake Hammond profiles. Certain traces of a horizon are apparent in some of the profiles (blue line, profile B-B'), however because of data quality the reflector is difficult to trace. Still, it is possible to assume that differential dissolution in the Ocala Limestone could lead to subsequent subsidence in the overlying sediments of the Hawthorn Group and the undifferentiated fill.





LAKE HAMMOND
DISTRIBUTION OF FEATURES
(noted from seismic profiles)



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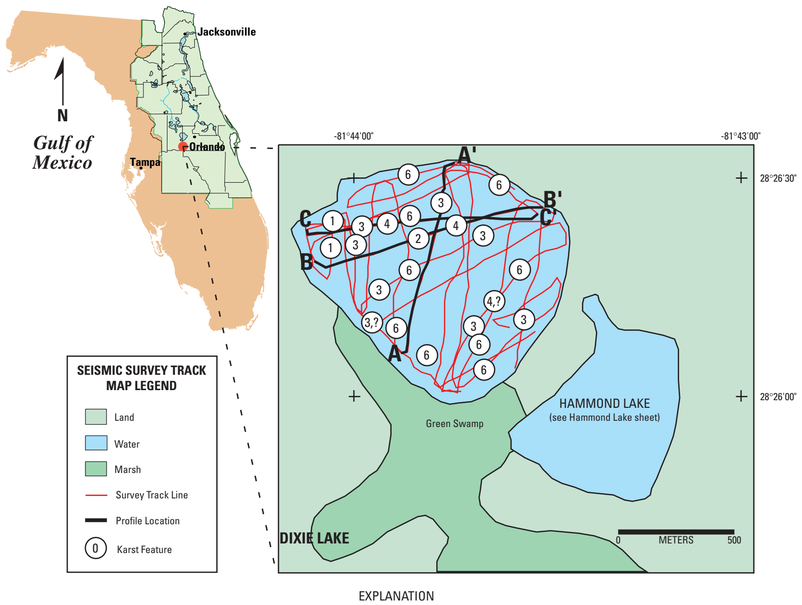
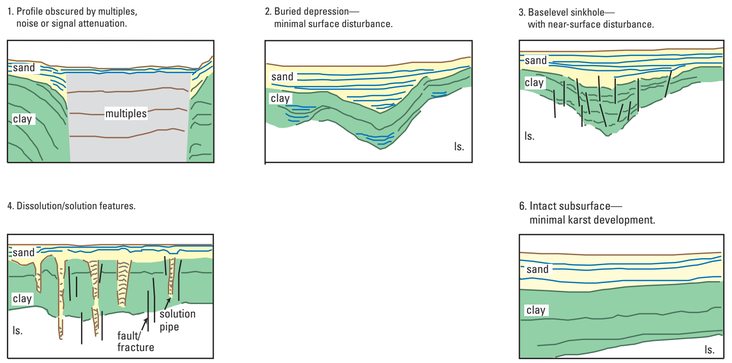
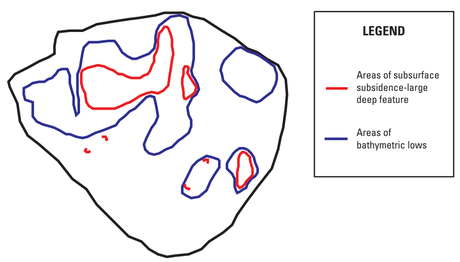
LAKE DIXIE
LAKE COUNTY, FLORIDA



EXPLANATION



LAKE DIXIE
DISTRIBUTION OF FEATURES
(noted from seismic profiles)



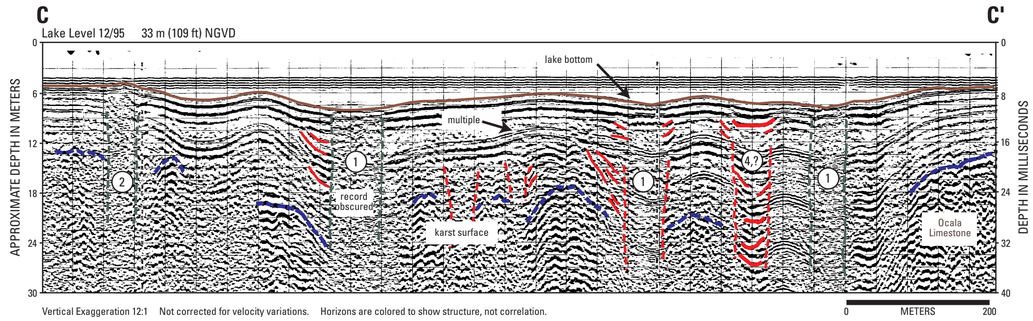
Introduction

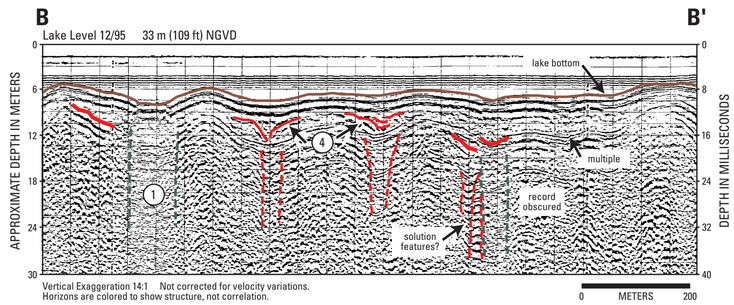
Lake Dixie is among a cluster of small (< 1 km) lakes in southeastern Lake County. The physiography is described by Brooks and Merrit (1981), as The Gap, an area of lower elevation, about 25 to 37 m (85 to 120 ft) between the Sugarloaf Mountain region and No Name Ridge. The lower elevation is a result of increased erosion of the underlying limestone. A number of lakes occupy this lowland, of which Lakes Trout, Pike, Smokehouse and Hammond were also surveyed in this study. The Gap and the flanking highlands are part of the Lake Wales Ridge, which is the topographic crest of Central Florida (Brooks and Merrit, 1981). The Ridge is characterized by residual sand hills, relic beach ridges and paleo dune fields. The topography on either side of the ridge has been reduced to the water table, forming Green Swamp to the southwest and Sawgrass Bays to the southeast. Lake level in December of 1995 was 26 m (85 ft) NGVD. Lake Dixie is roughly circular, with a perimeter of 4 km (2.5 mi) and a surface area of about 1 sq km.

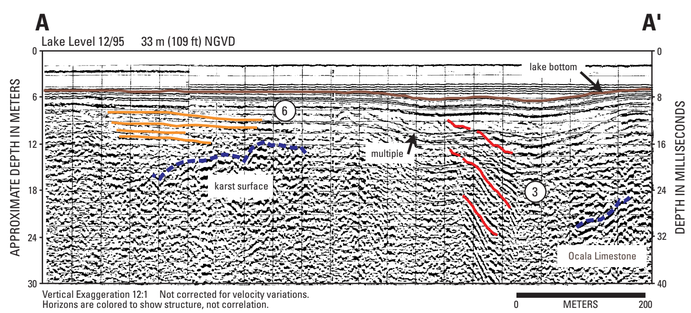
Subsurface Characterization

Seismic profiles from Lake Dixie show a hard bottom reflection, possibly from well sorted sands, infilling a deeper karst surface (Feature 6, profile A-A'). The strong bottom reflector leads to multiples seen throughout the data that obscure some of the record. Noise below the topographic lows in the profiles also obscure some of the record (green lines, profile B-B'). This noise could be a result of the accumulation of organic material in the depressions which attenuates the acoustic signal. Despite the noise in the acoustic record, the proximity of the underlying karst surface to the lake bottom allows for a variety of solution and subsidence type features to be seen. The subsurface is characterized by numerous small depressions with high angle reflectors dipping toward their center (profile C-C'). The high angle reflectors may extend to depth in the profile. These features may represent solution pipes dissolved into the karst subsurface. Larger subsidence features can also be seen in the profiles (type 3, profile A-A'). A plot of their distribution (blue line) shows three distinct areas of subsidence and their influence on the lake's bathymetry (blue line).

A deeper, strong reflector can be seen in many of the subbottom profiles (red line, profiles A-A', B-B'). The highly jagged appearance of this reflector is indicative of an erosional (karst) surface seen in profiles throughout the region. Interpretations of a gamma log acquired from a well located approximately 1.5 km (.9 mi) southeast of the lake (see Section G Hillshade page 37, well L-0677) shows the top of the Ocala Limestone to be around 15 m (50 ft) NGVD. This correlates well with the horizon seen in the profiles. Differential dissolution in the Ocala Limestone could lead to subsequent subsidence in the overlying sediments of the Hawthorn Group and the undifferentiated fill.







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2000

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[2] St. Johns River Water Management District
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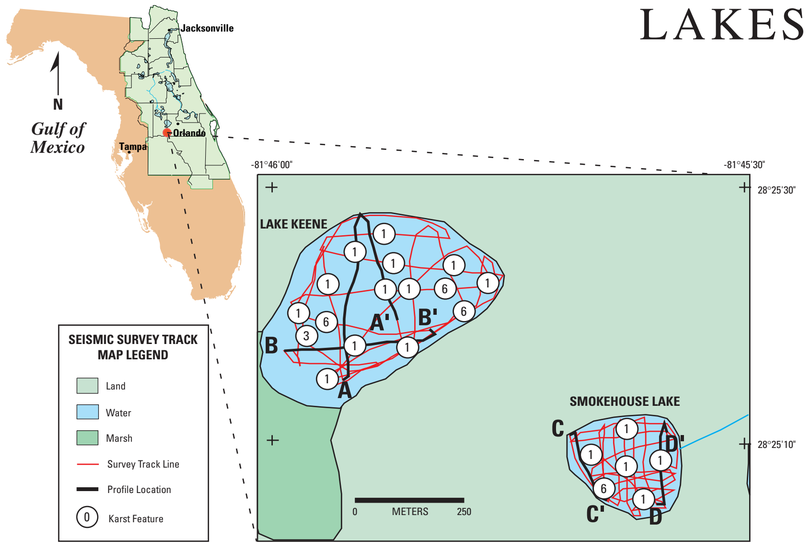
LAKES KEENE AND SMOKEHOUSE

LAKE COUNTY, FLORIDA



Introduction

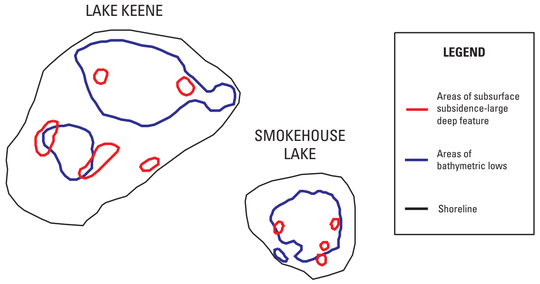
Lakes Smokehouse and Keene are among a cluster of small lakes in southeastern Lake County. The physiography is described by Brooks and Merrit (1981) as The Gap, an area of lower elevation, about 25 to 37 m (85 to 120 ft) between the Sugarloaf Mountain region and No Name Ridge. The lower elevation is a result of increased erosion of the underlying limestone. The Gap and the flanking highlands are part of the Lake Wales Ridge, which is the topographic crest of Central Florida (Brooks and Merrit, 1981). The Ridge is characterized by residual sand hills, relic beach ridges and paleo dune fields. The topography on either side of the ridge has been reduced to the water table, forming Green Swamp about 5 km (3 mi) to the southwest and Sawgrass Bays to the southeast. Lake levels for Lakes Keene and Smokehouse, 3 km (2 mi) in December of 1995 were approximately 34 m (110 ft) and 35 m (114 ft) NGVD, respectively. Lake Keene, the larger of the two, is oblong, with a perimeter of 2.4 km (1.5 mi) and a surface area of about 0.2 sq km. Smokehouse Lake is roughly circular (roundness of 0.92) with an area of 0.1 sq km and a perimeter of about 1 km (0.6 mi). The lake is connected by surface drainage to other small lakes which drain into Sawgrass Lake to the northeast.

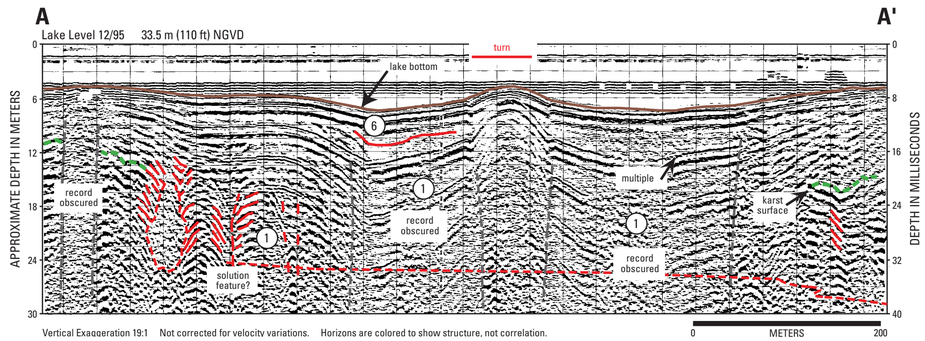
Subsurface Characterization

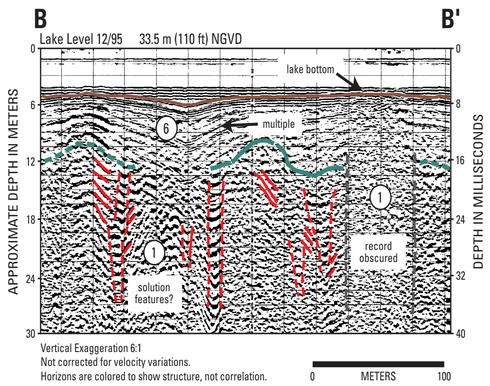
Seismic profiles from Keene and Smokehouse Lakes show a hard bottom reflection, possibly well sorted sands, infilling a deeper karst surface (type 6, profile A-A'). The strong bottom reflector leads to multiples seen throughout the data that obscure some of the record. The record is also partially obscured in areas where the lake bottom nears the surface and in areas of topographic lows (gray lines in profiles). This noise could be a result of the accumulation of organic material in the depressions which attenuates the acoustic signal. The acoustic characteristics and their interpretation in the two lakes are similar. Where the record is not obscured, there are numerous small low angle reflections with high-angle reflections dipping toward their center, where the record is obscured (profiles, type 1). Concentric reflectors extend to depth in the profile. These features may represent solution pipes or small subsidence into the karst subsurface, which is in close proximity to the surface in this area. This condition has a high potential for increased leakage. The distribution of these features (see red outline in plot) shows that they are small and trend along the periphery of the bathymetric lows of the lake (blue line). Other lakes surveyed in The Gap show that the subsurface features better define the bathymetric lows in the lakes (see Lakes Trout [p. 38], Hammond [p. 39], and Dixie [p. 40]). The areas of subsidence seen within the lakes are well constrained and do not have the appearance of large subsidence or collapse sinkholes seen in other lakes. These localized areas of subsidence may lie directly over centers of active karst development. Lake Keene shows some larger solution features at depth in the profiles (type 3, Survey Track Map). These features resemble the subsidence-type features seen in other lakes and could represent a developing sinkhole. Profiles of Gamma-log interpretations across Lake Keene (Index Map Section G, p. 37, wells L-0677 and L-0679) show the top of the Ocala Limestone dropping from +15 m (+50 ft) NGVD to -3 m (-10 ft) NGVD from north to south. Although shallower, the transition between the consistent low angle reflectors in the seismic profiles and the underlying, more jagged reflectors (represented by dashed green lines, A-A' and B-B') may represent this contact. Likewise, the transition may represent a horizon near the contact between the top of the Hawthorn Group and overlying undifferentiated fill. Dissolution in the Ocala Limestone at depth could lead to subsequent subsidence in the overlying sediments of the Hawthorn Group and the undifferentiated fill, as outlined by the red dashed lines in the seismic profiles.

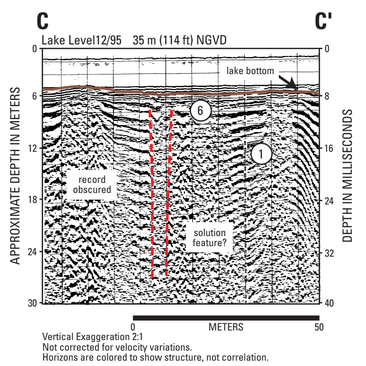
G

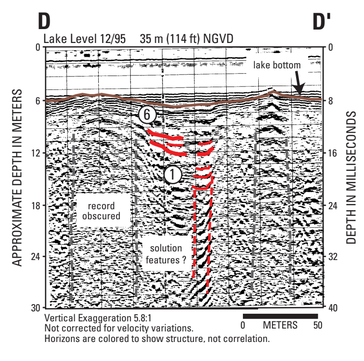
LAKES KEENE & SMOKEHOUSE
DISTRIBUTION OF FEATURES
(noted from seismic profiles)











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