hatch naturally, is inspected periodically. This inspection has revealed that a large number of hatchlings either never come out of the nests or, on coming out, get trapped or fail to find their way to the sea. Many of these are collected alive and taken to the laboratory to join the head-start program, where they grow into healthy juveniles.

Hatchlings released

Still another part of the hawksbill conservation program involves the incubation of the nests in the laboratory and releasing the hatchlings immediately into the natural environment. In the hope of reducing mortality of the young at this stage, the juveniles are settled in patches of sargassum. According to a current theory, hatchlings may spend their initial months of life hidden in floating sargassum where they find protection, food, and flotation. Masses of sargassum are collected in the sea and maintained in tanks until the turtles hatch. Nevertheless, more research on this relationship is necessary.

In summary, all methods of repopulating marine turtles are still in experimental stages. Many years will be needed to determine which is the most adequate. At this point, no massive programs using particular techniques can be recommended. To increase human knowledge about this group of animals, its survival must first be assured. Only as people and governments become aware of the plight of the hawksbill turtle can it receive protection and be rescued from extinction. □

Natural seeps:

SANTA BARBARA on the California coast has to overcome some horrendous natural disasters to remain one of the nation's most attractive communities. It sits — one cannot say rests — on one of the most active earthquake surfaces on the planet. It has floods, mud slides, and rock slides when heavy rains swell the creeks that rush down the Santa Ynez Mountain canyons and across the coastal plain into the Pacific. Brush fires that rage through semirural residential tracts make coast-to-coast headlines. Its 1969 offshore oil spill is widely regarded as the disaster that spawned the environmental movement of the 1970s.

These calamities make news. One, however, that arouses emotions locally but gets little attention elsewhere is offshore oil and gas seeps.

BARE FEET, *blackened by beach tar, are a common sight along the Santa Barbara, California coast. Although commercial offshore oil production and oil spills are frequently blamed for the ugly tar, here natural seeps are one of the major sources.*

Santa Barbara News-Press

Unwanted oil and gas production

by ROBERT SOLLEN

Uncapped gushers

Of the several seep areas in the Santa Barbara Channel, the biggest — generally believed by scientists to be the greatest in the world — is 10 miles west of Santa Barbara. (The Pacific Coast runs east and west there.) The oily waters are off Coal Oil Point, so named a century or more ago because of the odor.

At ocean depths of 30 to 250 feet just off the point, there are more than 2,000 seafloor holes through which oil and gas ooze and bubble up in incredible volumes within a few square miles.

Underwater oil-bearing geologic formations there have little or no caprock. The lid that once covered the ancient deposits of organic material that became oil and gas has been eroded away. Where there is overlying rock, it is often fractured shale that allows oil and gas to rise through.

While the Coal Oil Point seep area appears to be the world's largest, it is by no means the only one. Seeps are found around the world, principally in regions of frequent earthquakes. They are found around almost the entire enormous Pacific Plate, a rim of earthquake activity. Beyond that, the Dead Sea and Asphalt Lake in Trinidad are active seep areas. The Athabasca tar sands in Canada are the remains of a tar seep.

Most marine seeps are along continental margins where sediments are too thin to contain shallow hydrocarbon deposits.

"Natural seeps have been active within the Santa Barbara Basin for at least the last 10,000 years, and perhaps during all of the late Pleistocene time," according to geologist Peter J. Fischer who has looked quite intensively into the phenomenon.

Only sand and mud cover the oil-bearing structure, and that is not enough to contain the lighter-weight oil and gas. The oil and tar rise in inverted tear-shaped blobs, and the gas bubbles pop when they reach the surface.

In moderate amounts, this would not mean much. But the statistics are astounding. Off Coal Oil Point, just

10 miles = 16 kilometers
30 to 250 feet = 9 to 76 meters