

# Past Dead Sea levels and biblical historicity

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We know from archaeological and scientific evidences that the levels of the Dead Sea have changed in biblical times. It is suggested that the Dead Sea levels, as deduced from scientific evidence, agree with those inferred from the Bible, supporting the historicity of the Pentateuch and rejecting liberals' claims that it was a later invention. The Dead Sea levels were low at the time of Sodom and Gomorrah, and again at the time of David. The time of Moses, and a few centuries thereafter (when the political boundaries of the Tribes had been established), saw unusually high Dead Sea levels. None of these levels fits with the post-500 BC time period attributed to the invention of the Pentateuch, according to the modernist JEDP hypothesis.

The Dead Sea (Figure 1), sandwiched between present-day Israel and Jordan, has been known by many different names throughout history: the Salt Sea, Eastern sea, Asphalt Sea, Sea of the 'Arava', and many others. It is the lowest spot of any land area on Earth. Currently, the sea is completely landlocked. Its only sources of water, apart from occasional rainfall, are a few inflowing rivers, especially the Jordan River. The evaporation of water causes dissolved salts to accumulate to levels much higher than any ocean, making it 'dead'. However, its history, as evidenced by changing water levels, is very much alive, and is indirectly chronicled in Scripture.

## Charting the past

Frumkin and Elitzur,<sup>1</sup> two Israeli scholars, conducted a study on the past water levels and past geographic extents of this venerable body of water. Only a few highlights of this research are presented here. Their study of past Dead Sea levels is especially notable in that it uses a multidisciplinary approach, involving archaeology, geology, <sup>14</sup>C dating and a literal acceptance of numerous biblical narratives. It is interesting to note that this research is published in a journal that normally does not address either biblical or archaeological topics. Their work tends to contradict liberal theories that customarily dismiss biblical events as myths written long after they are supposed to have taken place. For these reasons, this review is being published in

this journal, but only as a source of probable interest and further study for *TJ* readers, and without necessarily being endorsed by this writer.

Part of this hesitance stems from the ongoing controversy related to acceptance or rejection of the Egyptian chronology.<sup>2</sup> Although the Frumkin and Elitzur<sup>1</sup> study does not directly address this issue, it does tend to support traditional dates of biblical events. For instance, any date for the Exodus much earlier or much later than the traditional date of ca 1450 BC would be incompatible with the evidences presented by Frumkin and Elitzur.<sup>1</sup>

A second source of reservation stems from problems related to the <sup>14</sup>C dating method. For example, as discussed recently,<sup>3</sup> <sup>14</sup>C dates from archeological materials in this part of the Middle East are commonly one to three centuries too old for the period under consideration. However, the impact of this problem is reduced by the fact that inferences of past Dead Sea levels do not rely solely on <sup>14</sup>C dates,<sup>1,4</sup> and the periods of inferred high stand and low stand Dead Sea levels usually last several centuries (tending to smooth out the less severe <sup>14</sup>C errors). Finally, some readers may find the conclusions of Frumkin and Elitzur<sup>1</sup> to be rather speculative, but then again the same can be said about many other conclusions within so-called inexact sciences such as archaeology (particularly those conclusions that one does not agree with)!

## Inferring past levels of the Dead Sea

Recent levels of the Dead Sea can, of course, be determined from historical records. Consider the 20<sup>th</sup> century. The level of the Dead Sea fell from -390 m amsl (above mean sea level, that is 390 m below sea level) in 1929 to about -410 m amsl in 1992,<sup>5</sup> at least partly as the result of the removal of fresh water from rivers that are responsible for replenishing it. The heavy outline in Figure 1 shows the approximate average extent of the Dead Sea during the earlier part of the 20<sup>th</sup> century, whereas the other lines show the excursions in the size of the Dead Sea during periods of time when its level was either substantially lower or higher than the early 20<sup>th</sup> century reference level.

Throughout the past, the level and corresponding geographic extent of the Dead Sea has been governed primarily by the balance between the amount of precipitation into, and evaporation from, its drainage basin. However, there exists a negative feedback process that prevents excessive variations in the Dead Sea over time:

'When the water rises above -400 m amsl, it inundates the south basin, increasing the lake area almost instantaneously by ~30%. Evaporation increases abruptly at this stage, reducing the probability of still-higher levels, which would require a considerably higher precipitation/evaporation ratio. Similarly, when the level drops below -400 m, the southern basin dries up, reducing the surface area and evaporation significantly, consequently reducing the probability of still-lower levels.'<sup>6</sup>

As we go further and further into the past, we must increasingly rely on indirect methods of inferring the levels of the Dead Sea. Barring direct historical or biblical information, how does one quantify the timing of past episodes of changing sea level? One major set of natural ‘dipsticks’ is a salt karst system<sup>7</sup> occurring on a rising salt diapir in Mount Sedom, which is located in the southwest corner of the Dead Sea. Owing to the fact that salt is very soluble in water, the salt diapir is much more sensitive to the karstification caused by changing water levels than is the more familiar limestone karst surface.

Water carries alluvium and wood fragments into caves, and strands them there. Dating of the wood fragments by the <sup>14</sup>C method provides an upper boundary date for when the Dead Sea receded from this level. However, as noted earlier, this is not the only method of indirect inference. It is also possible to deduce past sea levels from the nature of the bottom of the Dead Sea. For instance, submerged river valleys, when dated, imply a period of low sea levels. Conversely, datable remnants of estuaries related to present rivers imply a period of high sea levels. Archaeological remains of human settlements also come into play. After all, it is rather difficult to have an *in situ* archaeological site if the location in question was under water at the time!

### Summary of past changes in the Dead Sea

Frumkin<sup>4</sup> has divided the history of the Dead Sea into ten stages. The first three of these are prior to 2300 BC (according to conventional dating) and are not considered further. Nor are the four most recent ones, as they occurred, by anyone’s standards, well after the writing of the Old Testament. Stage 4 is placed from 2300 BC to 1500 BC and is believed to have been a time of very low Dead Sea levels (relative to that of the early 20<sup>th</sup> century). In contrast, Stage 5, dated from 1500 BC to 1200 BC, is inferred to have been a period of very high Dead Sea levels. Stage 6 covers the period from 1200 BC to 100 BC. The earliest part is believed to have been a time of low levels comparable to that seen earlier during Stage 4. The balance of Stage 6 (from about 700 BC to its end at 100 BC) sees Dead Sea levels that were not very different from those typical of the first part of the 20<sup>th</sup> century (heavy line, Figure 1), and therefore neither high nor low. It is important to keep in mind that these are geologically based dates, and are therefore completely independent of the Egyptian chronology and any disputes revolving around it.

Frumkin’s studies contend that, not only does the Old Testament agree with the scientific evidence, but this evidence *can only be fully understood by the illumination provided by the biblical accounts*:

‘There are three historically documented phases of the Dead Sea in the Biblical record: low lake levels ca. 2000–1500 B.C.E. (Before Common Era<sup>8</sup>): high lake levels ca. 1500–1200 B.C.E.; and low lake levels between ca. 1000 and 700 B.C.E.



**Figure 1.** Summary of north-south changes in geographic extent of the Dead Sea in the last 4,000 years (east-west changes are relatively small and not shown). Heavy outline: Extent of Dead Sea during most of 20<sup>th</sup> century, corresponding to a water level of -395 m amsl (above mean sea level). Dotted line: The extent of retreat of Dead Sea, with corresponding drying out of its entire southern portion, at low water level (-420 m amsl). Dashed line: Expansion of Dead Sea during periods of high water levels (-375 m amsl). Scale bar: 5 km.

The biblical evidence indicates that during the dry periods the southern basin of the Dead Sea was completely dry, a fact that was not clear from the geological and archaeological data alone.<sup>9</sup> (Note that the dates indicated in this quotation are historically documented subsets of the earlier defined stages and their respective start and end years.)

Each of the relevant stages of Dead Sea level is elaborated below, with emphasis on the biblical accounts.

### Stage 4 (2300–1500 bc). Includes the time of Sodom and Gomorrah

Let us first consider the scientific evidence:

‘Thus, geological evidence indicates a major drop of Dead Sea level ca. 2100–1800 B.C.E., remaining below -390 m amsl until ca. 1500 B.C.E.’<sup>10</sup> (Note that these years represent a segment of Stage 4).

Apart from the aforementioned salt cave evidence, Frumkin<sup>11</sup> cites some salt tongues from the bottom of the Dead Sea as evidence supportive of a very low stand during this period.

Let us now relate these low Dead Sea levels with the events recording in Genesis 14. By way of introduction, Frumkin and Elitzur<sup>12</sup> cite a number of past scholars (Albright, Glueck) and more recent ones (Speiser, Grintz) who support the antiquity and originality of the Genesis



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A view from En Gedi looking south over the Dead Sea.

account. Although Frumkin and Elitzur do not defend (or even mention, for that matter) the Mosaic authorship of the Pentateuch, they present many indirect arguments in favor of such authorship. One of the arguments adduced for the ancient vintage of Genesis 14 is its usage of archaic place names. Second, if Moses wrote (or edited) this part of Genesis, he would have written it at a time (15<sup>th</sup> century BC) when the southern basin of the Dead Sea would be flooded, much as it had been throughout most of the 20<sup>th</sup> century (Figure 1). Yet Moses would be referring to a time, some 500 years before him, when the southern basin was a dry, salt-covered field. Such is indeed the case:

‘Accordingly, the phrase “the vale of Siddim which is the Salt Sea” (Gen. 14:3) is significant. The text describes a battle, which took place before the destruction of Sodom and Gomorrah, in a wide valley or plain (Hebrew *emeq...*) which, at the time of writing or editing, was no longer a valley but had become the *Salt Sea*. The most obvious candidate to fit this description is the southern basin of the Dead Sea.’<sup>6</sup>

‘This has been interpreted during the last 2,000 years as describing an inundation of the previously dry valley by the Dead Sea (e.g. Midrash Tanchuma, Lech-Lecha 8; [Ref.]). Possibly, the southern basin of the Dead Sea (Vale of Siddim) had been dry during Stage 4—the period described in Genesis 14.3—and became submerged by the rising Dead Sea during the moister Stage 5, when the book of Genesis is believed to have been written.’<sup>4</sup>

It is interesting to note that Frumkin and Elitzur suggest that Gen. 14:10 be translated as ‘pits of slime’ instead of ‘wells of asphalt’:

‘This is consistent with a feature known today along the receding Dead Sea shore: pits are formed continuously, and people have fallen into them due to their collapse, just as described in Gen. 14:10: “and the vale of Siddim was full of *be’eroth hemar* and the king of Sodom and the king of Gomorrah fled and fell into them”.’<sup>6</sup>

One must also consider the effects of salinity on the soil previously covered by the Dead Sea. There is, in fact, no inconsistency between the dryness of the southern basin

of the Dead Sea, during the time of Sodom and Gomorrah, and the fact that the vegetation around these two doomed cities was lush (Genesis 13:10). Normal amounts of sea salt can be removed from the soil after as little as one major rainfall,<sup>13</sup> provided that the topography allows for adequate drainage. Of course, the salinity from the Dead Sea is much greater than that of the oceans, and the Dead Sea region is not exactly one that receives a considerable amount of precipitation. In spite of these obstacles, the removal of salt from emergent terrain does take place in fairly short periods of time. Aloni *et al.*<sup>14</sup> have studied the succession of vegetation that takes place in those locations from which the Dead Sea has receded. They find that 4–5 years of rainfall is sufficient to leach enough salt away to allow the pioneer salt-tolerant plants to begin to grow. After a second stage of succession, a stable community of ‘permanent’ vegetation can become established within 15–20 years.

### Stage 5 (1500–1200 BC). Tribal political boundaries

Earlier, it had been noted that a major rise in the Dead Sea levels tends to flood the mouths of the rivers that empty into it, creating estuaries. In accordance with this, Frumkin and Elitzur<sup>15</sup> call attention to the ‘northern tongue of the Salt Sea at the southern end of the Jordan.’ (Joshua 18:19 and Joshua 15:5). ‘Tongue’, according to them, means ‘a narrow, tapering bay’ and not a peninsula. With a rise in the Dead Sea level, (again using the early 20<sup>th</sup> century levels for reference), such a narrow, fingerlike bay comes into existence in the northern part of the Dead Sea (dashed line, Figure 1). With rising Dead Sea levels, a corresponding fingerlike bay must also come into existence in the southern part of the Dead Sea (Figure 1, dashed line), as alluded to in Joshua 15:2.

To support their position, Frumkin,<sup>11</sup> and Frumkin and Elitzur<sup>15</sup> cite a number of scholars who have suggested that Joshua 15:2–5 and Joshua 18 and 19 do not make good sense if 20<sup>th</sup> century Dead Sea levels (or, for that matter, lower ones) are used for geographical reference. One of them, in fact, wrote over a century ago, before the intermittent rise and fall of the Dead Sea had been known. He pointed out that some of the political borders between the Tribes of Israel would form a meaningless loop. By contrast, everything would fall into place if these political boundaries actually refer to a time when the Jordan River canyon had been flooded, forming an estuary. For further details of the locations of the place names relative to the tribal borders, shown superimposed over the erstwhile estuaries, see Figs. 4 and 5 of Frumkin and Elitzur.<sup>15</sup>

### Stage 6 (1200–100 BC). Includes the time of David

The high level of the Dead Sea, occurring during Stage 5, fell to a low level (comparable to that maintained for several centuries during Stage 4), and remained that way

from about 1200 BC to about 700 BC:

‘The designation: “The Vale of Salt” (II Sam., II Kings, Ps., I–II Chron.) indicates that the southern basin of the Dead Sea was at least partly dry during the reigns of David and Amaziah and at the time the relevant books were written/edited.’<sup>16</sup>

Subsequently, the Dead Sea levels rose by a moderate extent, leveling off at a sea level comparable to that of most of the 20<sup>th</sup> century, for the balance of Stage 6 (about 700 BC to 100 BC). Significantly, as elaborated below, this latter part of Stage 6 covers the time when modernists believe that the Pentateuch was ‘invented’.

### Conclusions

According to theological liberals, Moses did not write the Pentateuch. Modernists also insist that the narratives are mythical and parabolic and neither factual nor historic. The Documentary, or JEDP, Hypothesis, asserts that the content of Genesis through Numbers was not written until about 500 to 400 BC.<sup>17</sup> This corresponds to the latter part of Stage 6, when, as noted earlier, the Dead Sea levels had been comparable to those of the earlier part of the 20<sup>th</sup> century (heavy lines, Figure 1) and is as much as 1,600 years after the purported events took place.

Of course, the evidences presented in this article do not in and of themselves prove that Moses wrote the Pentateuch. However, the facts uncovered by Frumkin and Elitzur’s study of past Dead Sea levels are much more consistent with a historical Bible than a mythical one. To begin with, why would a priestly class intent on inventing religious and moral tales even care about such arcane details as the levels of the Dead Sea in times past? And even if it did (considering the fact that the southern portion of the Dead Sea had been emergent for only very brief periods time more recently than about 1500 BC), how could this postulated myth-making group of writers, living at a time when the Dead Sea levels were neither notably high nor low, had known that the southern portion of the Dead Sea had been emergent at what they would call the time of Sodom and Gomorrah, some 1,600 years earlier? Or that it was, contrariwise, submerged at the time they invented for the mythical Moses, and once again emergent (with levels high enough to flood the river canyons and form estuaries) at the time to which they were inventing tales about the Tribes and their make-believe political boundaries?

On the other hand, if the early books of the Bible were written soon after the events in them are recorded, and with attention and care to factual detail (and not just religious or moral content), the correct historic setting (in this case, the relevant Dead Sea level at the time of the event) would be recorded. Such is what we find to be the case. Moreover, the Frumkin and Elitzur study not only shows that the Bible is corroborated by actual historic events, but that these ‘secular’ events can only be fully understood by seeing beyond the ‘spiritual’ aspects of the Bible and appreciat-

ing its factual claims. These corroborated factual claims stand as an open rebuke to modernists and compromising evangelicals, as well as anyone else that would dichotomize the ‘spiritual’ and ‘factual’ aspects of the Bible.

### References

1. Frumkin, A. and Elitzur, Y., Historic Dead Sea level fluctuations calibrated with geological and archaeological evidence, *Quaternary Research* 57: 334–342, 2002.
2. For example, in *TJ* 15(3):48–49 David Down suggests that many biblical events find corroboration only when the timing suggested by the Egyptian chronology, which he suggests is not as absolute as commonly presented, is substantially altered. I also prefer to stick to a strict chronology based on the Bible and do not promote revising the biblical chronology if that is what is necessary to fit any extra-biblical source of information, including the Egyptian chronology in its presently-accepted form.
3. Woodmorappe, J., Large and systematic regional-scale errors in Middle Eastern carbon-14 dating, *TJ* 17(1):13–15, 2003.
4. Frumkin, A., The Holocene history of Dead Sea levels; in: Niemi, T.M. et al. (Eds), *The Dead Sea*, Oxford University Press, New York, Oxford, pp. 237–248, 1997.
5. Niemi, T.M. et al., Dead Sea research—An introduction; in: Niemi et al., Ref. 4, p. 4. See Fig. 1–3 for the annual levels of the Dead Sea for the six decades in question.
6. Frumkin and Elitzur, Ref. 1, p. 337.
7. Frumkin, A., Determining the exposure age of a karst landscape, *Quaternary Research* 46:99–106, 1996.
8. Judaistic writers commonly use BCE (Before Common Era) in lieu of BC (Before Christ). Regrettably, an increasing number of non-Judaistic western authors now also use this convention. This is, not surprisingly, defended on the grounds of tolerance and diversity (what else?), but actually seems to be yet another politically correct repudiation of the West’s Christian heritage.
9. Frumkin and Elitzur, Ref. 1, p. 334.
10. Frumkin and Elitzur, Ref. 1, p. 338.
11. Frumkin, Ref. 4, p. 243.
12. Frumkin and Elitzur, Ref. 1, pp. 339–340.
13. Woodmorappe, J., *Noah’s Ark: A Feasibility Study*, Institute for Creation Research, El Cajon, p. 153, 1996.
14. Aloni, E. et al., The botanical conquest of the newly exposed shores of the Dead Sea; in: Niemi, T.M. et al. (Eds), *The Dead Sea*, Oxford University Press, New York, Oxford, pp. 277–281, 1997.
15. Frumkin and Elitzur, Ref. 1, p. 340.
16. Frumkin and Elitzur, Ref. 1, p. 341.
17. McDowell, J., *More Evidence That Demands a Verdict*, Campus Crusade for Christ, 1975. McDowell provides a good introduction to the JEDP hypothesis (pp. 29–33) and a solid critique of the same.

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