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# TROPICAL CYCLONES OF THE EASTERN NORTH PACIFIC BASIN, 1949-2006

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## 1. INTRODUCTION

This book is a compilation of facts, figures and tracks for tropical cyclones of the eastern North Pacific basin between 1949 and 2006. The eastern North Pacific basin is defined as the Pacific Ocean area north of the equator bounded by 140°W and the west coast of the Americas. Over the 58-year period of record, a total of 769 tropical cyclones of tropical storm strength or greater have been documented; an average of about 13 systems per year. The formation of these storms, and possible intensification into mature hurricanes, takes place over warm tropical waters. Eventual dissipation, averaging less than a week later, typically occurs over the colder waters of the eastern North Pacific, or when the storms move over land and away from the sustaining marine environment.

Figure 1 shows the areal extent of the eastern North Pacific tropical cyclone basin along with the tracks of the 769 tropical cyclones. The eastern North Pacific tropical cyclone basin produces the most tropical cyclones per square mile of any basin worldwide. It is one of seven in the world; others in the Northern Hemisphere are the Atlantic basin, the western North Pacific and the northern Indian Ocean. The Southern Hemisphere basins are the southwestern Indian Ocean, the Australia/southeastern Indian Ocean and the Australia/southwest Pacific Ocean. Two large tropical oceanic areas are virtually devoid of tropical cyclone occurrence--the South Atlantic and the eastern portion of the South Pacific. On rare occasions, tropical cyclones cross from the Atlantic basin to the Pacific basin. An example is Hurricane Cesar (1996) which moved westward across Central America as a tropical storm and then became Hurricane Douglas over the eastern North Pacific.

Tropical cyclones have always been a concern to shipping, and are occasionally documented over remote oceanic areas, even in the 19th century and earlier. Hurd (1929), for example, presents a twenty-year summary of eastern Pacific tropical cyclone activity, with a figure that displays some cyclone tracks before 1900. Mariner reports form the basis of the early part of the record before 1956.

A compilation of tracks and data for the Atlantic tropical cyclones has long been available (McAdie et al. 2009), but a similar book has never been prepared for the eastern Pacific, perhaps because of the offshore nature of most of the tropical cyclone tracks. Numerous publications, technical and non-technical, do describe global and regional tropical cyclone climate on various scales, including the eastern Pacific. One useful study on global tropical cyclone activity is a comprehensive World Meteorological Organization (WMO) text (Elsberry 1995). The technical document contains charts describing tropical cyclone frequency and motion characteristics over the various global basins. In addition, the document presents an instructive and more theoretical treatment of global tropical cyclone climatology, including a discussion of the conditions associated with tropical cyclone development. Many studies on individual basins (or even portions of basins such as for Mexico alone [Servicio Meteorologico Nacional 1981]) can be found in meteorological libraries.

Collection and dissemination of global tropical cyclone data is the responsibility of the National Climatic Data Center (NCDC), Asheville, NC. Data are obtained in an agreed-upon format from WMO-designated Regional Specialized Meteorological Centers (RSMCs), and other global meteorological services. In the United States, the National Hurricane Center (NHC), in Miami, Florida, serves as an RSMC, with responsibility for both the North Atlantic and eastern North Pacific basins.

For the eastern North Pacific, tropical cyclone tracks have generally been published within annual summaries. From 1953 to 1956, yearly

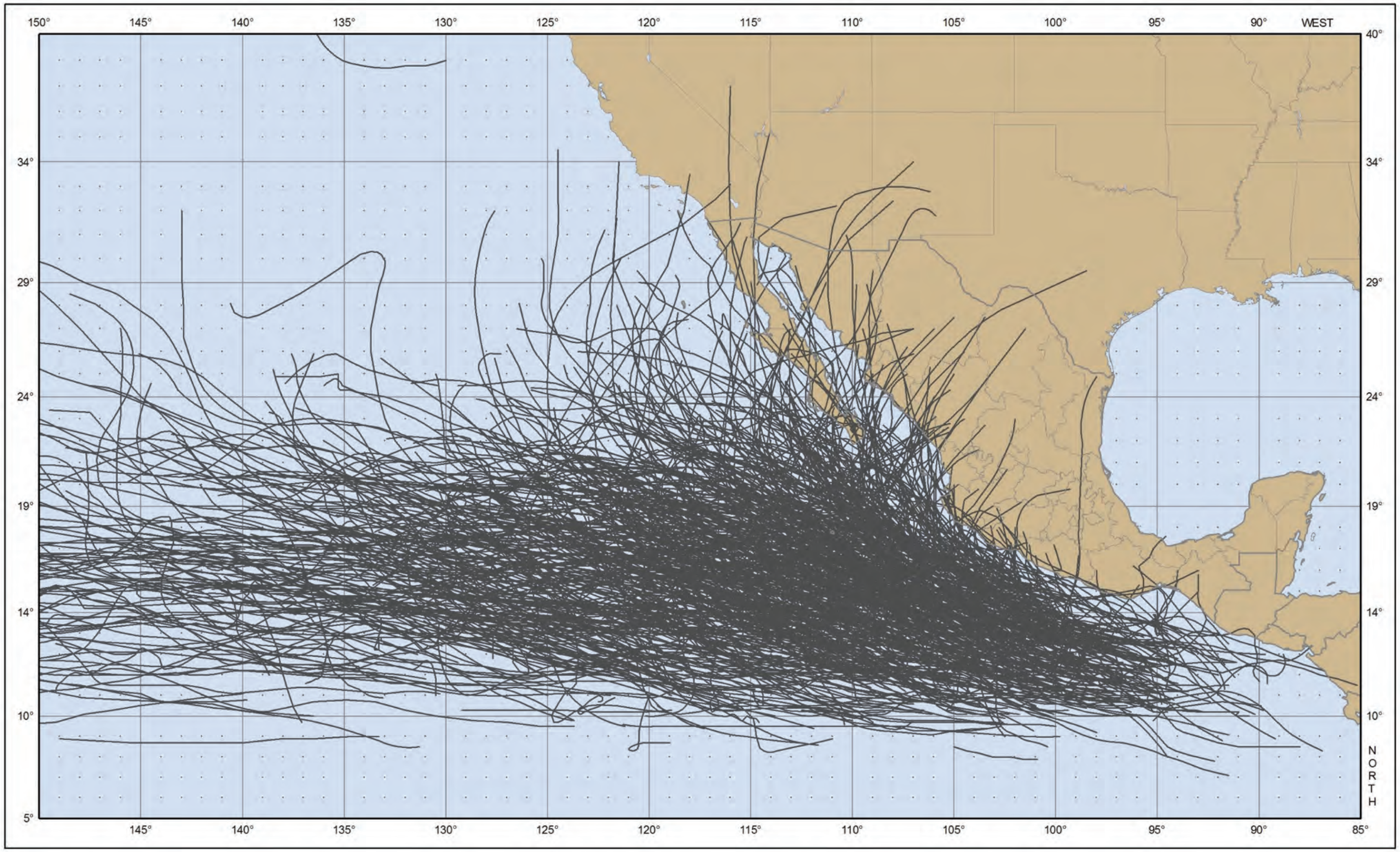



**Figure 1. The tracks of the 769 known eastern North Pacific tropical cyclones reaching at least tropical storm intensity, 1949-2006.**

summaries and occasional tracks of the basin were reported in the annual summary of *Climatological Data*. Since 1957, yearly summaries have been included in *Mariner's Weather Log* articles along with a small figure of the tracks. In 1968, storm tracks and summaries were included in *Monthly Weather Review*, and have continued to present day. Leftwich and Brown (1981) compiled tracks from 1949-1979, and in many ways this book updates and adds to their work.

This book is also a compilation of data from various sources and presents the tracks and data of eastern Pacific tropical cyclones in an easy-to-understand format that is useful for the general public. It is notable that the eastern North Pacific basin is sometimes shortened to the term eastern Pacific in this book. In addition, the Atlantic best track book served as a guide to the structure of this book, but there are some differences between the two publications, which will discussed in the text.

Section 2 discusses the motivation for the book and other important works regarding eastern Pacific tropical cyclones. Section 3 introduces readers to relevant definitions related to a tropical cyclone and the typical lifecycle of a cyclone. Data sources are discussed in Section 4 and the accuracy and precision of these data are covered in Section 5. Section 6 considers the details on how the tracks were produced, and Section 7 covers statistics related to the tracks, in addition to hurricane landfalls in Mexico.

## 2. MOTIVATION

Together with related statistical summaries, this study presents annual tropical cyclone tracks for the period 1949-2006 for the eastern Pacific basin. For more detailed data on individual cyclones, readers are referred to publications that deal specifically with analysis of eastern Pacific tropical cyclones. These include the official summaries published in *Climatological Data*, *Monthly Weather Review* and *Mariner's Weather Log*, along with works by Smith (1986), Warner (1992) and Court (1980) that specifically deal with tropical cyclone effects across the southwestern United States.

Other important works in eastern Pacific climatology include Allard (1984), and Renard and Bowman (1976). Finally, the NHC Internet web site: http://www.nhc.noaa.gov also contains a large amount of information on current and historical tropical cyclones. Information at that site can be used to update this text until additional editions are issued. Also available on the NHC web site are the digitized tracks of all eastern Pacific tropical cyclones since 1949 in a standard format. Charts presented in Chart Series A and B are based on these data.

The motivation of this book was to prepare a track book, similar to the Atlantic track compilation, to be a comprehensive source of eastern Pacific track and statistical data. There has been a dearth of information published since Leftwich and Brown (1981) and, since that time, the dataset has increased by 27 years. This document was made more difficult to prepare because three different government agencies have had forecast responsibilities for the eastern Pacific basin, sometimes with limited references of the procedures of that station. These agencies included the United States Navy before 1970, the Eastern Pacific Hurricane Center (National Weather Service office in Redwood City, California) from 1970-1987, and the NHC from 1988-present.

The NHC annually receives hundreds of requests for tropical cyclone-related information from both official and non-official sources. One of the goals of this publication is to provide readily available, correct, and consistent answers to some of these queries. Knowledge of climatology is important in the forecast process and this publication also provides Hurricane Specialists at the NHC with a reliable source of reference material on eastern Pacific tropical cyclones.

## 3. CLASSIFICATIONS OF EASTERN PACIFIC TROPICAL CYCLONES

It is beyond the scope of this book to discuss the fine details of tropical cyclone characteristics and structure. A few comments and definitions are necessary, however, for proper interpretation of the material presented. The reader is referred to Miller (1967) or Anthes (1982) for further detailed information on tropical cyclones. Texts by Dunn and Miller (1964), Simpson and Riehl (1981), Pielke and Pielke (1997) and Emanuel (2005) are devoted entirely to that topic. Certain specialized topics, such as the operational forecasting of tropical cyclone motion and intensity are discussed by Rappaport et al. (2009) and Sheets (1990).

In the course of their lifecycle, tropical cyclones, like other atmospheric weather systems, pass through stages of genesis, intensification, maturity, and decay or modification. Avila (1991) and Avila and Pasch (1992) specifically address the issue of eastern Pacific cyclogenesis, finding that the majority of tropical cyclones come from tropical waves crossing Central America from the Atlantic basin. The relationship between these waves and eastern Pacific and Atlantic tropical cyclones has been studied by a number of researchers, one of the earliest published by Simpson et al. (1968). Molinari et al. (1997) present theoretical aspects on the issue of eastern Pacific cyclogenesis.

However, not all tropical cyclones come from waves in the eastern Pacific. Other initiation mechanisms have been theorized, including the Intertropical Convergence Zone (ITCZ) breaking down (Ferreira and Schubert 1997) and genesis due to terrain influences of the Sierra Madre mountains of Mexico (Mozer and Zehnder 1996). These mechanisms are not thought to be important in Atlantic basin cyclogenesis. In other basins, however, atmospheric conditions which initiate tropical cyclones may be quite different.

One important difference between the Atlantic and eastern Pacific basins is that subtropical cyclones have not been observed to form in the eastern Pacific. This may be due to the limited poleward area of formation in the eastern Pacific as compared to the Atlantic basin because of the Mexican mainland. The relatively cool water at low latitudes compared to the Atlantic basin also probably inhibits the formation of subtropical systems in the eastern Pacific.

"Remnant low" is a relatively new term (introduced in 2002) that describes a former tropical cyclone that has lost central convection but is still a well-defined low pressure system. Before 2002, these systems were usually characterized as weak tropical depressions in the best track database (McAdie, personal communication). The remnant low phase is rather common for many eastern Pacific tropical cyclones to enter immediately after their demise as tropical cyclones but before the dissipation of the low pressure area. The remnant low stage typically occurs due to the cold waters present north of 20°N west of 115°W.

Some tropical cyclones, after moving out of the tropical environment, may lose their tropical characteristics and become extratropical. While the primary purpose of this publication is to discuss tropical systems, it is necessary, for completeness, to discuss extratropical cyclones as well. It is worth noting that extratropical transition happens much less frequently in the eastern Pacific than the Atlantic basin, probably because low-latitude Pacific tropical cyclones less frequently interact with the middle-latitude westerlies, reducing any chance of extratropical or hybrid storm formation.

### 3.1 Tropical Cyclones

Any closed circulation, in which the winds rotate counterclockwise in the Northern Hemisphere or clockwise in the Southern Hemisphere, is called a cyclone. Tropical cyclones are technically defined as warm-core, non-frontal, synoptic-scale[2] cyclones, originating over tropical or subtropical waters, with organized deep convection and a closed surface wind circulation about

[2] Synoptic-scale refers to large-scale weather systems as distinguished from local systems such as thunderstorms.

a well-defined center (OFCM 2009). Further classification depends upon the maximum wind speed near the center of the system. The terms "tropical depression," "tropical storm," or "hurricane" are assigned depending whether the sustained winds are, respectively, less than 34 knots, 34 to 63 knots or greater than 63 knots. Tropical cyclones are not named unless they reach at least tropical storm strength.

The term, "sustained wind," as used in the United States hurricane program, refers to the highest near-surface (10-meter) wind averaged over 1-minute associated with the cyclone circulation. Shorter period gusts or lulls in the wind, perhaps only a few seconds duration, can be much higher or lower than the sustained wind. In some other countries, the averaging period defining a sustained wind can be longer than 1-minute, and is usually near a 10-minute average in accordance to WMO standards. The wind criteria separating the various stages of tropical cyclones are rigidly defined, but the ability to measure the winds with the precision implied by the definitions seldom exists. In practice, a maximum sustained wind is assigned by the hurricane analyst after considering all available evidence.

Tropical cyclones, with their energy derived from the latent heat of condensation of water vapor, are generally smaller in extent than extratropical cyclones and typically range from 100 to 600 nautical miles in diameter at maturity. Winds normally increase radially inward near the center of tropical cyclones with sustained speeds sometimes exceeding 100 knots. Occasionally, sustained winds exceeding 140 knots may occur in well-developed systems. Apart from the wind, other destructive features of tropical cyclones include torrential rains over a large area, and coastal storm tides of 15 to 30 feet above normal in extreme cases. Coastal inundation from the storm surge and extreme rainfall has been primarily responsible for deaths and damages from storms across the world. Landsberg (1960) and Emanuel (2005) pointed out that these storms may be a major factor in maintaining the atmospheric heat and moisture balance between the Tropics and the higher latitudes; they may be thought of as providing a kind of "safety valve" that limits the continued buildup of heat and energy in tropical regions.

A unique feature of more intense tropical cyclones is the central "eye", which commonly has a diameter of 10 to 50 miles across. This central region area of the storm is typically associated with light winds, minimal cloud cover and lowest sea-level pressure. The eye (note the distinct eye of Hurricane Linda on the book's cover) provides a convenient visual and physical entity that can be tracked with the aid of aircraft, satellite or radar.

### 3.2 Subtropical Cyclones

A subtropical cyclone is defined as a non-frontal low pressure system that has characteristics of both tropical and extratropical cyclones. In comparison to tropical cyclones, such systems have a relatively broad zone of maximum winds that is located farther from the center, and typically have a less symmetric wind field and distribution of convection (OFCM 2009). Although no subtropical cyclones have been noted in the eastern Pacific basin, a subtropical formation was noted in the central Pacific basin in 1975 (Burtt and Haller 1976). For more information on subtropical cyclones, see McAdie et al. (2009), Hebert (1973) or Hebert and Poteat (1975).

### 3.3 Extratropical Cyclones

During the final stages of their life cycle, eastern Pacific tropical cyclones are infrequently classified as extratropical. These cyclones which typically form outside of the Tropics have structures, energetics, and appearances (when viewed from weather satellites or radar) that are different from tropical cyclones. They derive their energy primarily from large-scale horizontal contrasts of temperature and are typically associated with cold and warm fronts. The transformation from a tropical cyclone to an extratropical cyclone is a gradual process: the size of the circulation usually expands, the speed of the maximum wind typically decreases, and the distribution of winds, rainfall, and temperatures around the center becomes increasingly asymmetric.

While these characteristic features develop, some tropical features, such as a small area of strong winds near the center, the remnants of an eye, and extremely heavy rainfall may be retained for a considerable time. Extratropical cyclones are relatively rare in the eastern Pacific, with only three noted in the database (Kevin 1991, Guillermo and Ignacio, 1997). Cold waters west of Baja California, as well as the limited poleward extent of the basin, are thought to limit extratropical transitions to only rare cases.

There are no wind speed criteria associated with the term extratropical and such systems may indeed have hurricane-force winds. Usually, when storms move out of the Tropics, wind speeds near the center of a storm gradually subside. In some cases, however, re-intensification of the system may occur when mechanisms conducive to extratropical development predominate.

## 4. DATA SOURCES

For the early part of the NHC best track record, 1949-1975, the best tracks were obtained from the U.S. Navy at 12 hour intervals (Leftwich and Brown 1981) and interpolated to 6 hour intervals based on Akima (1970). These early period tracks appear to be closely based on advisories issued by the United States Navy Fleet Weather Center in Alameda, California up to 1970. During that era, Rosendal (1962) provided data and discussion on hurricanes from 1947-1961, some of which were included in the final best track.

Intensity values in the early part of the record have been assigned in multiple ways. Before 1954, only the maximum intensity of a storm is used for the entire track of the storm, similar to the 1886-1898 years of an older version of the Atlantic track book (Neumann et al. 1999). Between 1954 and 1964, some wind information was found in *Mariner's Weather Log, Monthly Weather Review*, and *Climatological Data* and was incorporated into the best-track file, along with advisory information from the U.S. Navy. These wind data increased in 1965 with more detailed summary information and more observational capability in 1966 with the launch of geostationary satellites. However, for most of the systems prior to 1970, cyclones were categorized as a tropical depression, tropical storm or hurricane, and given average intensities of 25, 45, or 75 kt respectively.

From 1970-1975, advisories were issued by the Eastern Pacific Hurricane Center, part of the National Weather Service (NWS) office in San Francisco, California. Advisories/warnings were issued in coordination with the United States Navy Fleet Weather Center in Alameda and the Air Force Hurricane Liaison Officer at McClellan Air Force Base in California (D. Roberts, personal communication). The NWS advisories formed the basis of best tracks during that six year period, and the works of Hansen (1972), Baum and Rausch (1975) and Renard and Bowman (1976) provided more data for inclusion or modification of the best tracks.

The lack of specific intensity documentation before 1970 should not be interpreted as a complete lack of knowledge about these early storms. Indeed, portions of many of these tracks were well documented if they were associated with disasters either ashore or at sea. For example, the category five hurricane of October 1959 (number 12), which brought devastation to southwestern Mexico, is described in Crooks (1959). Persons seeking specific information on this, and on other hurricane events occurring in later years, should consult the references given in Section 10.

The best track database from 1976-1987 was based on advisories issued by the Eastern Pacific Hurricane Center in Redwood City, California. Some in-house modification of tracks and intensities was performed by Arthur Pike after the NHC assembled the best track database in 1976 (Neumann, personal communication). Other best track files were modified and extended based on a study by Court (1980). Operational responsibility for the eastern Pacific was assumed by the NHC in 1988, and the NHC has maintained the best tracks database to present day. Annual summaries of storms issued by the NHC and published in *Monthly Weather Review* are the definitive source of information since 1988. However, there have been few recent official summary publications on tropical cyclone tracks over the eastern Pacific. Baum and Rausch (1975) digitized tropical cyclone track data from 1961-1974. Brown and Leftwich (1982) provided a short summary of eastern Pacific data, along with a composite of all tropical cyclones observed in the basin.

The tropical cyclone tracks presented here are technically referred to as "best-tracks." They represent the best estimate of the smoothed path of the circulation center as it moves across the earth's surface (Jarvinen et al. 1984). Smoothing is necessary to remove small-scale oscillatory motions of the storm center, which can deviate some 5 to 30 nautical miles from a mean path (Lawrence and Mayfield 1977). These smaller scale motions are transitory and are not representative of the more conservative motion of the entire storm envelope. Storm tracks in Chart Series A and B should therefore be considered as the average path of the larger-scale storm circulation center rather than a precise location of the eye at any given time.

## 5. ACCURACY OF TRACKS AND INTENSITY CLASSIFICATIONS

Tropical cyclones often traverse thousands of miles but spend most of their lives over the ocean. Before the era of aircraft reconnaissance and weather satellites, the detection of these storms depended on chance encounters with shipping or populated land areas. Over the eastern Pacific, the intersection of mean tropical cyclone tracks with shipping lanes is somewhat limited and major storms could have gone completely undetected before the satellite era. Even with the knowledge of a storm's presence, however, it is difficult, without additional observational platforms, to specify the exact location and/or the exact intensity.

The first aircraft reconnaissance flights into eastern Pacific tropical storms were made in 1956. Before the operational availability of satellite data in 1961, these flights proved to be important in the early detection of storms. It is worth noting that these flights were more sporadic in the eastern Pacific than the Atlantic basin and were only dispatched after a disturbance was noted. It is probable that many storms and hurricanes went undetected in the early years of the dataset since most eastern Pacific tropical cyclones remain out to sea and away from significant shipping lanes.

After the introduction of continuous weather satellite surveillance in the late 1960s, there was a high probability that the location of a storm was determined with a reasonable degree of accuracy. Since the storm tracks for the 1966 through 2006 eastern Pacific hurricane seasons were prepared with the benefit of geostationary satellite imagery (as well as some aircraft reconnaissance typically near land and other conventional data), the track accuracy should be good, considering the scale of the maps and the large-scale of the motion depicted.

Agencies responsible for determining earlier storm tracks and intensities did not have the benefit of regular satellite data before 1966. In addition, the observations of a tropical cyclone simply did not exist or were very uncertain in the early years. Consequently, these earlier tracks are subject to considerable uncertainties. Today, a widespread network of land stations, ships, aircraft, radar, satellites, drifting buoys, etc., along with sophisticated instrumentation and communication, is available for the detection, tracking and understanding of tropical cyclones. The reader is referenced to McAdie et al. (2009) that further details the changing technology involved in tropical cyclone observation.

One specific problem with the eastern Pacific dataset before 1971 is the lack of major hurricanes (greater than or equal to Category 3 intensity on the Saffir-Simpson Hurricane Scale, see Table 3), compared to the modern era. It is thought that a few factors contribute to this issue, in addition to the lack of any satellite data before 1961. The first is the small amount of ship traffic and other oceanic data compared to other basins such as the Atlantic and the western Pacific. This would reduce the likelihood of a chance encounter with a strong hurricane. The second factor is that regular visible satellite pictures were not available until the early 1970s over the eastern Pacific, with improved picture quality. This upgraded quality and quantity allowed the forecaster, using techniques developed for Atlantic tropical cyclones (Velden et al. 2006), to accurately diagnose higher intensities. Another possible reason for the data disparity is that the official agency that prepared the best tracks changed in 1970.

Thus, the intensity data are quite suspect for the early years (see also Section 4) and little attention should be paid to the exact intensities in the best track in the early part of the record, especially before 1966. Although there are still some questions about the accuracy of data in the 1970s, the year 1971 is considered a good starting point for more reliable records. Around that year, consistent, quality satellite imagery was also available for analysis and better satellite intensity estimation techniques were in use by forecasters by that time, e.g. Dvorak (1973).

In addition to observational deficiencies, it is known that large-scale atmospheric conditions such as El Niño or variations in sea-surface temperatures, in general, can influence tropical cyclone frequency and intensity. La Niña generally diminishes tropical activity in the eastern Pacific Ocean, and El Niño typically enhances tropical cyclone activity. Some of these factors are discussed by Gray (1984).

## 6. EASTERN NORTH PACIFIC TROPICAL CYCLONE TRACKS

The tracks of all recorded eastern Pacific tropical cyclones for each year from 1949 through 2008 are presented in Chart Series A (Appendix A). Extremely active years are separated into two or three charts for legibility. These tracks come exclusively from the best track database (HURDAT), as currently maintained by the NHC in November 2007. To be included on these charts, a tropical cyclone had to reach tropical storm status within the eastern Pacific, or be initially classified as a depression in the eastern Pacific and become a tropical storm or hurricane in the Central Pacific waters east of 150°W. An example of the latter case is Hurricane Iniki of 1992.

The objective of the charts was to depict accurately, throughout their existence, the position and intensity of each tropical cyclone that formed in the eastern Pacific basin, and attained storm strength east of 150°W. Unfortunately, the quality of some of the data prevented full realization of this goal; many positions and intensities, particularly for the earlier years, are estimates, reflecting consideration of various data sources.

For the years 1949-1964, the data are rather fragmented, and for most cases, the assigned track intensity is assumed to be the maximum attained by the system at some point along the track. Intensity and classification criteria were given in Section 3.

One specific problem with the tracks in the eastern Pacific prior to 1988 is the premature termination of some tracks at landfall. One example of this problem is Hurricane Paul of 1982 (page 78). This hurricane made landfall in mainland Mexico and the track of the cyclone ends at hurricane strength just inland. A full reanalysis needs to be done to correct this problem in the eastern Pacific database.

Before 1960, there was no formal nomenclature for the identification of cyclones. Noteworthy storms were informally designated by such descriptive terms as "Great Hurricanes". Female names were first given to storms in the eastern Pacific in the 1960 season. Unlike today, the names in the early 1960s were used sequentially, such that if the last storm of a year was the "H" storm, then the first storm of the next year would be the "I" storm. This process was continued until the 1966 season, when four lists of names were created. These names were rotated every year until 1978, when six new annual lists of names replaced the previous four lists, and incorporated both male and female names.

In Chart Series A, certain storms lack names, even after the formal naming of tropical cyclones began. Some of these storms were found after the season due to late-arriving ship reports that confirmed their presence (e.g. Storm 1 of 1956 [Quinn 1956] or Storms 4 and 8 of 1962 [Benkman 1962]). In a few cases, the storms were thought to have developed west of 140°W and were given names from the Central Pacific, but the start of the tracks were later extended eastward into the eastern Pacific (e.g. Kanoa of 1957).

Chart Series B provides storm tracks according to selected intraseasonal periods. This series is similar to work presented by Leftwich and Brown

(1981) and the Atlantic track book (McAdie et al. 2009). These charts are presented for months May through December and for 10- (or 11-) day periods, May through November. Figure 1, illustrating the entire storm sample, can also be considered as part of Series B. This rendition of the entire 769 storm sample shows the bounds of the eastern North Pacific tropical cyclone basin. The relative frequency of storms in any given area can be roughly identified by the track density.

The tracks in Chart Series B are presented without regard to identification other than they are assigned to the period in which they first became a tropical cyclone. Additional labels would clutter the chart and detract from their main purpose: the identification of spatial and temporal shifts in tropical cyclone occurrence.

All tracks were drawn by means of a computer interpolation routine using GIS technology and the 6-hourly storm positions in the best track file. With these positions as anchor points, a reasonably faithful rendition of a hand-drawn track can be expected. In a few cases, however, the 6-hourly points are insufficient to define tight loops or sudden changes in direction.

## 7. FREQUENCY OF EASTERN NORTH PACIFIC TROPICAL CYCLONES

### 7.1 Monthly and Annual Frequencies

Tables 1, 2 and 3 present monthly and annual frequencies of recorded eastern Pacific tropical cyclones, excluding the tropical depression stage (if any). Storm counts are determined by the date a particular status was first attained: for example, a storm reaching tropical storm strength on August 31, reaching hurricane strength on September 5 and dissipating on September 10, would be counted as an August tropical storm but as a September hurricane.

Based on all eastern Pacific tropical cyclone tracks east of 140°W from 1949 through 2006, the average duration of a tropical cyclone was 4 days, but as shown in Figure 2, may vary from less than 1 to as many as 18 full days (i.e., a storm which begins at 0600 UTC on one day and ends 0600 UTC on the next would be assigned a duration of 1 day rather than 2). The ability to detect tropical cyclones has improved in recent years such that the distribution shown in Figure 2 may be somewhat biased toward higher values.

Long duration tropical cyclones include Tina of 1992, Trudy of 1990, and Kevin of 1991, all of which lasted longer than two weeks. These systems formed at low-latitude east of 100°W, and travelled slowly westward due to weakening steering currents late in the year. The maximum duration noted in the eastern Pacific is far below the Atlantic basin, which has had tropical cyclones almost lasting a month (e.g. Ginger of 1971). Many tropical storms have been observed to last less than a day in the eastern Pacific, most recently Rosa of 2006.

The number of storms occurring in any given year varies widely. Frequency distributions of tropical storms and hurricanes are presented in Figure 3 and 4, with a year-by-year summary in Figure 5. Only four tropical storms were documented in 1953, while 24 storms occurred in 1992. Only one storm reached hurricane strength in 1964 and 1965 while 16 hurricanes occurred in 1990. A number of hurricane seasons has never observed a major hurricane (last noted in 2003), while 8 major hurricanes occurred in 1983, 1992 and 1993. Note that the minimum activity records are in question before the age of continuous satellite imagery. Since 1971, the minimum number of tropical storms and hurricanes observed in a year is 8 and 4, respectively, in 1977. Only twice, in 1977 and 2003, have no major hurricanes been noted in the geostationary satellite era.

**Table 1. Number of recorded eastern Pacific tropical cyclones that reached tropical storm intensity in specified month and year, 1949-2006. Refer to Table 4 for summaries of these data. Data are probably incomplete before 1966.**

| Year | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | All | Year | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | All |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1949** | 0 | 2 | 0 | 0 | 4 | 0 | 0 | 0 | 6 | **1978** | 1 | 3 | 4 | 6 | 2 | 2 | 0 | 0 | 18 |
| **1950** | 0 | 1 | 2 | 2 | 0 | 1 | 0 | 0 | 6 | **1979** | 0 | 2 | 2 | 2 | 1 | 2 | 1 | 0 | 10 |
| **1951** | 1 | 2 | 1 | 2 | 2 | 0 | 1 | 0 | 9 | **1980** | 0 | 3 | 5 | 2 | 2 | 2 | 0 | 0 | 14 |
| **1952** | 1 | 1 | 2 | 0 | 2 | 1 | 0 | 0 | 7 | **1981** | 1 | 1 | 3 | 4 | 2 | 4 | 0 | 0 | 15 |
| **1953** | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 4 | **1982** | 1 | 1 | 6 | 5 | 3 | 3 | 0 | 0 | 19 |
| **1954** | 0 | 1 | 3 | 0 | 5 | 2 | 0 | 0 | 11 | **1983** | 1 | 1 | 6 | 3 | 4 | 4 | 1 | 1 | 21 |
| **1955** | 0 | 2 | 1 | 0 | 1 | 2 | 0 | 0 | 6 | **1984** | 2 | 3 | 3 | 4 | 4 | 1 | 1 | 0 | 18 |
| **1956** | 2 | 2 | 2 | 1 | 3 | 1 | 0 | 0 | 11 | **1985** | 0 | 5 | 7 | 4 | 4 | 2 | 0 | 0 | 22 |
| **1957** | 0 | 0 | 1 | 2 | 4 | 3 | 0 | 0 | 10 | **1986** | 1 | 2 | 3 | 5 | 5 | 1 | 0 | 0 | 17 |
| **1958** | 0 | 2 | 4 | 1 | 3 | 2 | 0 | 0 | 12 | **1987** | 0 | 1 | 6 | 5 | 3 | 3 | 0 | 0 | 18 |
| **1959** | 0 | 2 | 3 | 3 | 2 | 2 | 0 | 0 | 12 | **1988** | 0 | 2 | 6 | 3 | 1 | 1 | 0 | 0 | 13 |
| **1960** | 0 | 2 | 1 | 2 | 1 | 1 | 0 | 0 | 7 | **1989** | 0 | 3 | 4 | 6 | 4 | 0 | 0 | 0 | 17 |
| **1961** | 0 | 1 | 3 | 1 | 1 | 2 | 2 | 0 | 10 | **1990** | 1 | 4 | 4 | 3 | 5 | 3 | 0 | 0 | 20 |
| **1962** | 0 | 1 | 1 | 3 | 3 | 1 | 0 | 0 | 9 | **1991** | 1 | 3 | 2 | 2 | 3 | 2 | 1 | 0 | 14 |
| **1963** | 0 | 1 | 2 | 0 | 3 | 1 | 0 | 0 | 7 | **1992** | 0 | 3 | 6 | 5 | 5 | 5 | 0 | 0 | 24 |
| **1964** | 0 | 0 | 3 | 1 | 1 | 0 | 0 | 0 | 5 | **1993** | 0 | 2 | 3 | 5 | 3 | 1 | 0 | 0 | 14 |
| **1965** | 0 | 4 | 0 | 3 | 3 | 0 | 0 | 0 | 10 | **1994** | 0 | 3 | 4 | 4 | 5 | 1 | 0 | 0 | 17 |
| **1966** | 0 | 1 | 0 | 4 | 6 | 2 | 0 | 0 | 13 | **1995** | 0 | 1 | 3 | 3 | 3 | 0 | 0 | 0 | 10 |
| **1967** | 0 | 3 | 4 | 3 | 3 | 3 | 0 | 0 | 16 | **1996** | 1 | 2 | 2 | 0 | 4 | 0 | 0 | 0 | 9 |
| **1968** | 0 | 1 | 4 | 8 | 3 | 3 | 0 | 0 | 19 | **1997** | 0 | 3 | 4 | 3 | 5 | 1 | 1 | 0 | 17 |
| **1969** | 0 | 0 | 3 | 2 | 4 | 1 | 0 | 0 | 10 | **1998** | 0 | 2 | 3 | 3 | 2 | 3 | 0 | 0 | 13 |
| **1970** | 1 | 3 | 6 | 4 | 1 | 2 | 1 | 0 | 18 | **1999** | 0 | 1 | 2 | 3 | 2 | 1 | 0 | 0 | 9 |
| **1971** | 1 | 1 | 6 | 5 | 2 | 2 | 1 | 0 | 18 | **2000** | 1 | 2 | 2 | 5 | 4 | 2 | 1 | 0 | 17 |
| **1972** | 0 | 1 | 1 | 6 | 2 | 1 | 1 | 0 | 12 | **2001** | 1 | 1 | 3 | 1 | 5 | 4 | 0 | 0 | 15 |
| **1973** | 0 | 3 | 4 | 1 | 3 | 1 | 0 | 0 | 12 | **2002** | 1 | 1 | 3 | 3 | 2 | 2 | 0 | 0 | 12 |
| **1974** | 1 | 3 | 3 | 6 | 2 | 2 | 0 | 0 | 17 | **2003** | 1 | 2 | 3 | 4 | 3 | 3 | 0 | 0 | 16 |
| **1975** | 0 | 2 | 4 | 5 | 3 | 1 | 1 | 0 | 16 | **2004** | 1 | 0 | 3 | 4 | 2 | 2 | 0 | 0 | 12 |
| **1976** | 0 | 2 | 4 | 3 | 4 | 1 | 0 | 0 | 14 | **2005** | 1 | 2 | 2 | 4 | 6 | 0 | 0 | 0 | 15 |
| **1977** | 1 | 1 | 1 | 1 | 3 | 1 | 0 | 0 | 8 | **2006** | 1 | 0 | 4 | 6 | 2 | 3 | 2 | 0 | 18 |

**Table 2. Number of recorded eastern Pacific tropical cyclones that reached at least hurricane intensity in specified month and year, 1949-2006. Refer to Table 4 for summaries of these data. Data before 1971 are probably incomplete.**

| Year | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | All | | Year | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | All |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1949** | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | | **1978** | 1 | 2 | 3 | 3 | 2 | 1 | 0 | 0 | 12 |
| **1950** | 0 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 5 | | **1979** | 0 | 1 | 1 | 2 | 1 | 1 | 0 | 0 | 6 |
| **1951** | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | | **1980** | 0 | 2 | 1 | 3 | 1 | 0 | 0 | 0 | 7 |
| **1952** | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 3 | | **1981** | 0 | 1 | 1 | 3 | 1 | 2 | 0 | 0 | 8 |
| **1953** | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 2 | | **1982** | 0 | 0 | 4 | 3 | 3 | 1 | 0 | 0 | 11 |
| **1954** | 0 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 4 | | **1983** | 1 | 1 | 2 | 1 | 3 | 3 | 0 | 1 | 12 |
| **1955** | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | | **1984** | 1 | 3 | 2 | 2 | 4 | 0 | 0 | 0 | 12 |
| **1956** | 1 | 2 | 1 | 1 | 2 | 0 | 0 | 0 | 7 | | **1985** | 0 | 2 | 1 | 2 | 4 | 2 | 0 | 0 | 11 |
| **1957** | 0 | 0 | 1 | 1 | 1 | 3 | 0 | 0 | 6 | | **1986** | 1 | 1 | 2 | 1 | 2 | 2 | 0 | 0 | 9 |
| **1958** | 0 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 5 | | **1987** | 0 | 0 | 2 | 2 | 4 | 1 | 0 | 0 | 9 |
| **1959** | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 3 | | **1988** | 0 | 0 | 2 | 3 | 1 | 0 | 0 | 0 | 6 |
| **1960** | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 5 | | **1989** | 0 | 2 | 2 | 2 | 3 | 0 | 0 | 0 | 9 |
| **1961** | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | | **1990** | 1 | 2 | 4 | 3 | 4 | 2 | 0 | 0 | 16 |
| **1962** | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | | **1991** | 0 | 2 | 2 | 1 | 2 | 2 | 1 | 0 | 10 |
| **1963** | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 0 | 4 | | **1992** | 0 | 1 | 4 | 2 | 5 | 2 | 0 | 0 | 14 |
| **1964** | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | | **1993** | 0 | 1 | 3 | 4 | 2 | 0 | 0 | 0 | 10 |
| **1965** | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | | **1994** | 0 | 1 | 2 | 2 | 2 | 1 | 0 | 0 | 8 |
| **1966** | 0 | 1 | 0 | 3 | 2 | 0 | 0 | 0 | 6 | | **1995** | 0 | 1 | 2 | 1 | 3 | 0 | 0 | 0 | 7 |
| **1967** | 0 | 1 | 0 | 2 | 1 | 2 | 0 | 0 | 6 | | **1996** | 0 | 2 | 1 | 0 | 1 | 1 | 0 | 0 | 5 |
| **1968** | 0 | 0 | 0 | 3 | 2 | 1 | 0 | 0 | 6 | | **1997** | 0 | 0 | 3 | 2 | 2 | 1 | 1 | 0 | 9 |
| **1969** | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 4 | | **1998** | 0 | 1 | 2 | 2 | 1 | 3 | 0 | 0 | 9 |
| **1970** | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 4 | | **1999** | 0 | 1 | 1 | 2 | 2 | 0 | 0 | 0 | 6 |
| **1971** | 1 | 1 | 4 | 3 | 2 | 1 | 0 | 0 | 12 | | **2000** | 1 | 1 | 1 | 2 | 1 | 0 | 0 | 0 | 6 |
| **1972** | 0 | 1 | 0 | 6 | 0 | 1 | 0 | 0 | 8 | | **2001** | 1 | 0 | 1 | 1 | 3 | 1 | 1 | 0 | 8 |
| **1973** | 0 | 1 | 3 | 0 | 1 | 2 | 0 | 0 | 7 | | **2002** | 1 | 0 | 2 | 2 | 0 | 1 | 0 | 0 | 6 |
| **1974** | 0 | 2 | 2 | 4 | 2 | 1 | 0 | 0 | 11 | | **2003** | 0 | 0 | 0 | 2 | 2 | 3 | 0 | 0 | 7 |
| **1975** | 0 | 1 | 2 | 3 | 1 | 1 | 0 | 0 | 8 | | **2004** | 0 | 0 | 2 | 1 | 3 | 0 | 0 | 0 | 6 |
| **1976** | 0 | 2 | 1 | 2 | 2 | 1 | 0 | 0 | 8 | | **2005** | 1 | 0 | 0 | 2 | 4 | 0 | 0 | 0 | 7 |
| **1977** | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 4 | | **2006** | 0 | 0 | 3 | 4 | 1 | 1 | 1 | 0 | 10 |

Table 3. Number of recorded eastern Pacific tropical cyclones that reached major hurricane intensity (≥ category 3) in specified month and year, 1949-2006. Refer to Table 4 for summaries of these data. Data before 1971 are considered suspect.

| Year | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | All | | Year | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | All |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1949** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1978** | 0 | 2 | 3 | 0 | 1 | 0 | 0 | 0 | 6 |
| **1950** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1979** | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 4 |
| **1951** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1980** | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 3 |
| **1952** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1981** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| **1953** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1982** | 0 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 4 |
| **1954** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1983** | 0 | 1 | 1 | 0 | 3 | 3 | 0 | 0 | 8 |
| **1955** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1984** | 0 | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 6 |
| **1956** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1985** | 0 | 1 | 2 | 0 | 3 | 1 | 0 | 0 | 7 |
| **1957** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | | **1986** | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 3 |
| **1958** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1987** | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 4 |
| **1959** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | | **1988** | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| **1960** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1989** | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 4 |
| **1961** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1990** | 0 | 0 | 2 | 1 | 2 | 1 | 0 | 0 | 6 |
| **1962** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1991** | 0 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 5 |
| **1963** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1992** | 0 | 1 | 3 | 0 | 2 | 2 | 0 | 0 | 8 |
| **1964** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1993** | 0 | 0 | 2 | 3 | 3 | 0 | 0 | 0 | 8 |
| **1965** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1994** | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 4 |
| **1966** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1995** | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 3 |
| **1967** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | | **1996** | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 2 |
| **1968** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1997** | 0 | 0 | 2 | 2 | 2 | 1 | 0 | 0 | 7 |
| **1969** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1998** | 0 | 1 | 1 | 3 | 0 | 1 | 0 | 0 | 6 |
| **1970** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **1999** | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
| **1971** | 0 | 0 | 2 | 1 | 2 | 1 | 0 | 0 | 6 | | **2000** | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| **1972** | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 3 | | **2001** | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 |
| **1973** | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | | **2002** | 1 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 5 |
| **1974** | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | | **2003** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **1975** | 0 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 4 | | **2004** | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 3 |
| **1976** | 0 | 1 | 0 | 2 | 1 | 1 | 0 | 0 | 5 | | **2005** | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| **1977** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | **2006** | 0 | 0 | 2 | 2 | 1 | 0 | 0 | 0 | 5 |

Another record of interest is the maximum number of hurricanes in consecutive years. The data are found in the annual totals given in Table 2:

**26 hurricanes were observed in 1990-1991 (2 consecutive years);**
**40 hurricanes were observed in 1990-1992 (3 consecutive years);**
**50 hurricanes were observed in 1990-1993 (4 consecutive years);**
**59 hurricanes were observed in 1989-1993 (5 consecutive years)**.

The area of the eastern Pacific basin experiencing the maximum amount of activity is near 17°N, 108°W (approximately 240 nautical miles southwest of Manzanillo, Mexico). Tropical cyclones (hurricanes) have passed within 60 nautical miles of this location 133 (59) times from 1949 through 2006.

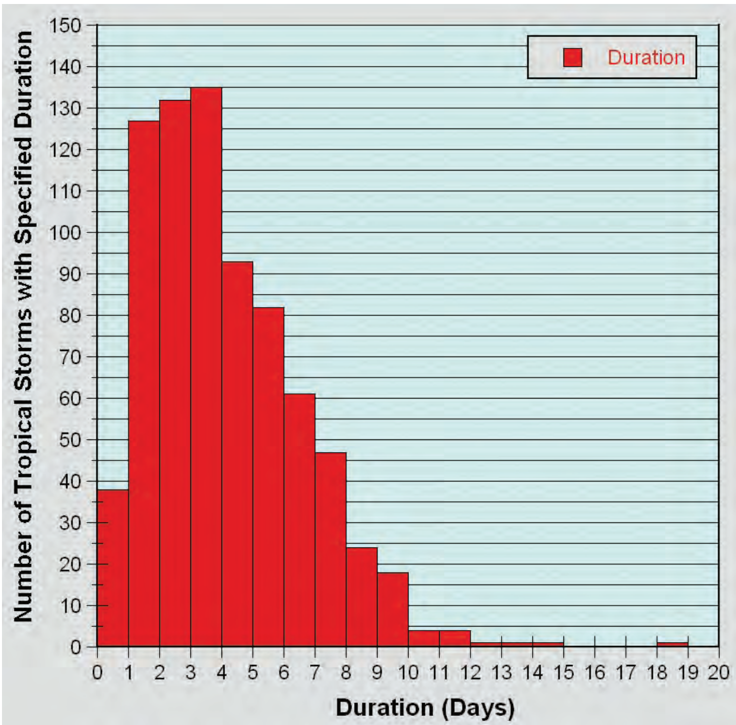


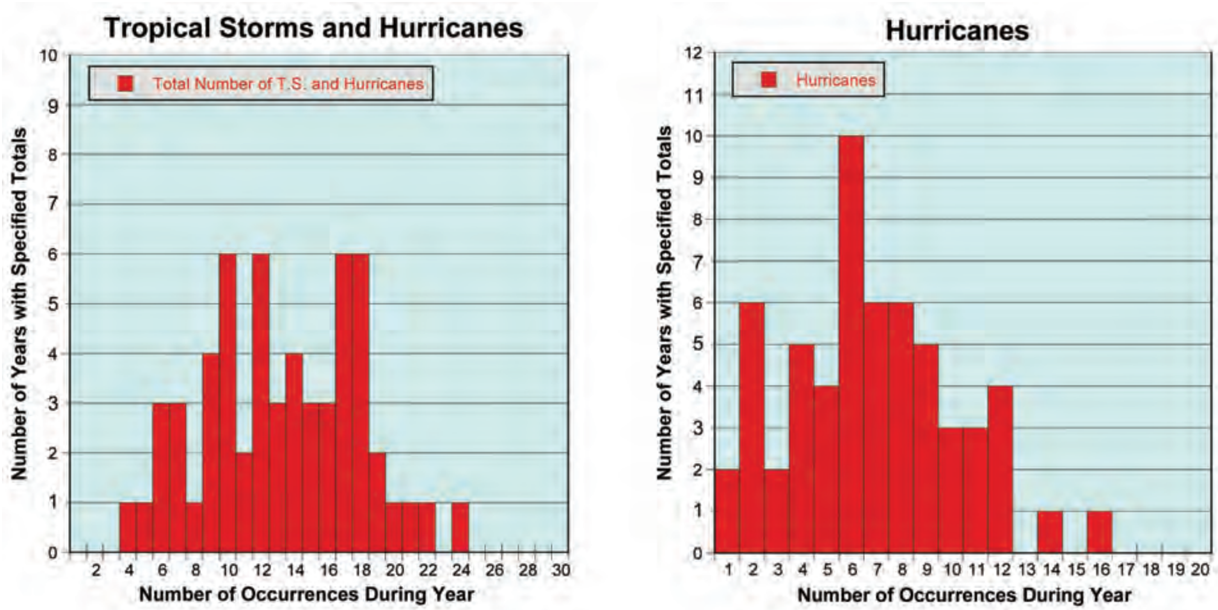

**Figure 2. Distribution of the duration of tropical cyclones east of 140°W, excluding depression stage, 1949-2006.**

Long-term upward or downward trends in the frequency of tropical cyclones, if not accounted for, make the average frequency a function of the period of record. To illustrate, Table 4 uses data from Tables 1-3 averaged over two periods: 1949-2006 and 1971-2006. The first period contains years with serious observational deficiencies in addition to a lack of regular satellite pictures. The final period begins with the introduction of regular, high-quality satellite pictures. Note the extreme differences in major hurricanes and hurricanes between the two periods, suggesting that the early part of the best tracks database is severely lacking information. The substantial differences in the figures for the final two periods appear in Table 4. The period 1971 through 2006 probably best represents eastern Pacific tropical cyclone frequencies as they currently exist.

### 7.2 Daily Frequencies

Figure 6 illustrates the daily frequency of tropical cyclones over the eastern Pacific basin for the 8-month period that tropical cyclones have been observed. This plot has been smoothed using a 9-day moving average, eliminating much of the noise inherent in the raw data, yet preserving the larger-scale intraseasonal cycles.

The daily frequencies in Figure 6 help define seasonal fluctuations in tropical cyclone frequency over the eastern Pacific. These intraseasonal changes include a slight maximum around mid-June, followed by a slight decline until early July. This decline is followed by a steep increase in frequency until mid-July, then a substantial drop in activity is noted through mid-August. It is interesting that forecasters from the 1960s often said that August brings a lull in tropical storm activity (Gustafson 1969). A rapid increase in activity occurs by the third week in August, attaining a level a little higher than the July peak. The frequency remains relatively steady until the end of September, where it trails off rapidly, save a slight increase in activity in the third week of October. In general, the season starts a few weeks earlier than the Atlantic basin, but also ends a few weeks earlier. It is also of note that the hurricane and major hurricane frequency from early July to late September is rather steady, except for the large drop in activity from late July to mid-August. Figure 6 is somewhat




**Figures 3 and 4. Distribution of the annual number of tropical storms and hurricanes (left) and hurricanes only (right), 1949-2006. Data derived from Tables 1 and 2.**

similar to one presented by Leftwich and Brown (1981) using limited data, and still shows the mid-season minimum in activity during late July and early August.

It is noted in Figures 6-8 that the storm frequency on any given day is specified in units of estimated number of storms per 100 years. This unit of measurement is convenient for comparing eastern Pacific storm frequencies with similarly normalized charts for other basins having dissimilar periods of record. In preparing these figures, multiple storm occurrences on single days were included in the overall totals. Thus, the occurrence of three storms on a given date in a single year and none on that day during the next two years, for example, would yield the same average as a single storm on the same date for each of three successive years.

This counting methodology needs to be considered when making interpretations of these data. It should be noted on Figures 7 and 8 that multiple storm and hurricane occurrences on a single day are reasonably common during a large portion of the middle of hurricane season.

The maximum multiple occurrence event depicted on these figures is the “at least three” category for tropical storms and the “at least two” category for hurricanes. The maximum number of simultaneous tropical storm occurrences on a single day over the eastern Pacific is four although such an event is quite rare; in fact, it has only been observed in one year. This 4-storm event occurred in 1974 when four tropical storms or hurricanes were in existence during the periods from August 23-24 and August 26-27. Ione, Joyce, Kirsten and Lorraine were observed in the first period, and Joyce, Kirsten, Lorraine and Maggie were active simultaneously during the second period. The only

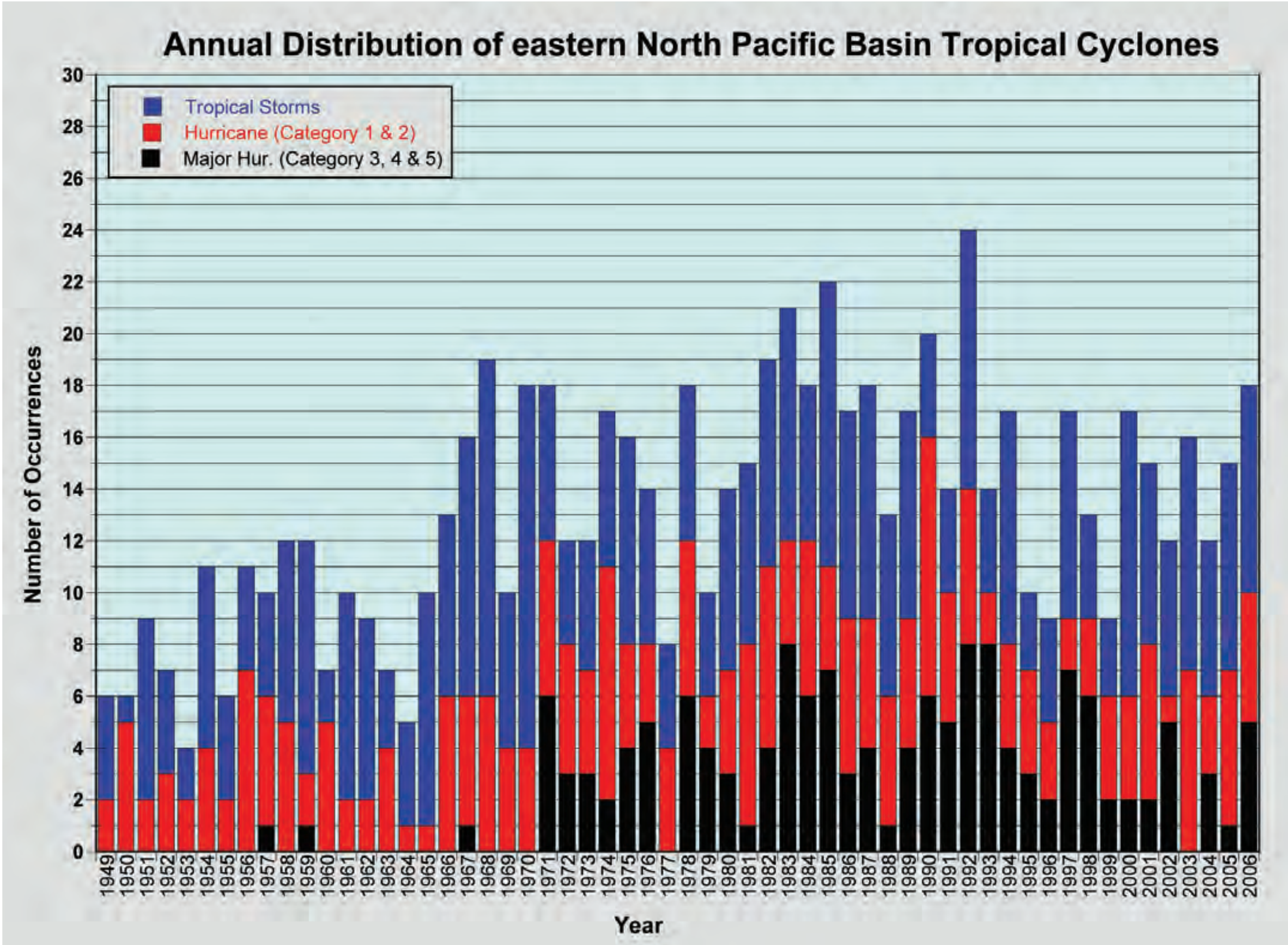


**Figure 5. Eastern North Pacific basin tropical storms, hurricanes and major hurricanes by year, 1949-2006.**

other time that the eastern Pacific basin was close to having four storms active at once was on September 18, 2005, when Jova, Kenneth, Lidia and Max were all active, but Lidia weakened into a tropical depression at the same time that Max became a tropical storm.

Insofar as hurricanes alone are concerned, there were only two years (1974, 1992) when 3 hurricanes existed simultaneously. Hurricanes Ione, Kirsten, Joyce were active on August 23-24 for twelve hours, and 18 years later the record was matched by Roslyn, Seymour and Tina.

**Table 4. Total and average number of tropical storms, hurricanes and major hurricanes beginning each month in two periods.**

| 1949 - 2006 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | YEAR |
| | | | | | | | | | |
| TROPICAL STORMS | 25 | 104 | 177 | 177 | 172 | 98 | 15 | 1 | 769 |
| AVERAGE OVER PERIOD | 0.4 | 1.8 | 3.1 | 3.1 | 3.0 | 1.7 | 0.3 | * | 13.3 |
| | | | | | | | | | |
| HURRICANES | 11 | 48 | 84 | 95 | 96 | 56 | 5 | 1 | 396 |
| AVERAGE OVER PERIOD | 0.2 | 0.8 | 1.4 | 1.6 | 1.7 | 1.0 | 0.1 | * | 6.8 |
| | | | | | | | | | |
| MAJOR HURRICANES | 2 | 14 | 37 | 32 | 38 | 23 | 0 | 0 | 146 |
| AVERAGE OVER PERIOD | * | 0.2 | 0.6 | 0.6 | 0.7 | 0.4 | 0.0 | 0.0 | 2.5 |
| | | | | | | | | | |
| 1971 - 2006 | | | | | | | | | |
| | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | YEAR |
| | | | | | | | | | |
| TROPICAL STORMS | 20 | 72 | 131 | 134 | 115 | 67 | 11 | 1 | 551 |
| AVERAGE OVER PERIOD | 0.6 | 2.0 | 3.6 | 3.7 | 3.2 | 1.9 | 0.3 | * | 15.3 |
| | | | | | | | | | |
| HURRICANES | 10 | 36 | 69 | 79 | 76 | 39 | 4 | 1 | 314 |
| AVERAGE OVER PERIOD | 0.3 | 1.0 | 1.9 | 2.2 | 2.1 | 1.1 | 0.1 | * | 8.7 |
| | | | | | | | | | |
| MAJOR HURRICANES | 2 | 14 | 37 | 32 | 38 | 20 | 0 | 0 | 143 |
| AVERAGE OVER PERIOD | * | 0.4 | 1.0 | 0.9 | 1.1 | 0.6 | 0.0 | 0.0 | 4.0 |
| | | | | | | | | | |
| Note: Data have been summarized from Tables 1-3. Asterisk (*) indicates less than 0.05 storms | | | | | | | | | |

The official eastern Pacific hurricane season extends from May 15 to November 30. Very rarely does the season begin or end outside of those dates, unlike the Atlantic basin. Figure 9 presents a cumulative percentage frequency distribution (Burlington and May 1957) of the beginning and ending dates of the eastern Pacific tropical cyclone season. The figure shows that only about 3% of activity occurs out of the hurricane season. Figure 9 also shows that the median (50% cumulative percentage frequency) starting date is June 2 while the median ending date is October 24.

There is a modest negative correlation between the beginning and ending dates of a season (r = -0.39). Seasons that begin early tend to end late, and vice versa. As might be expected, there is also a moderate correlation

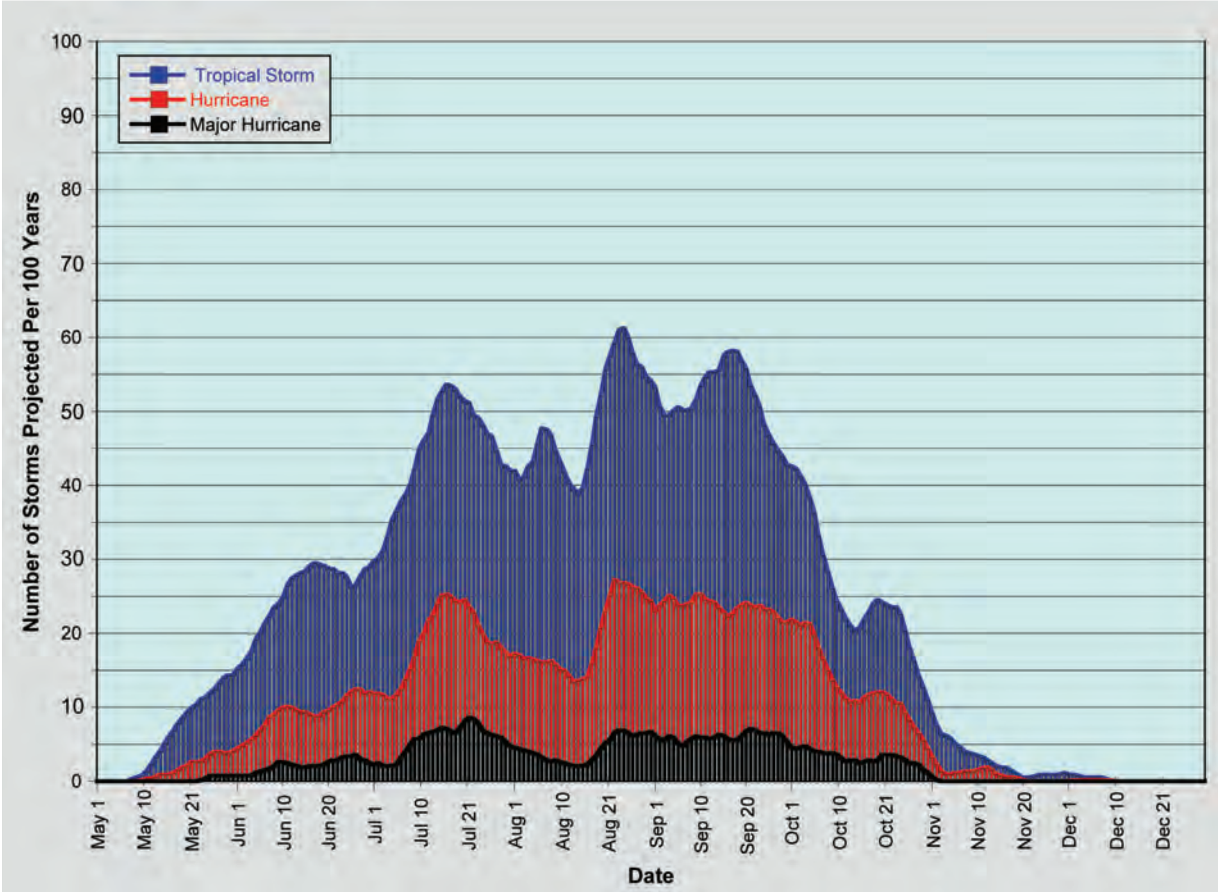



**Figure 6. Intraseasonal variations in the 100-year expectancy of tropical cyclone occurrence, based on data from 1949-2006. The blue bar is for tropical storms, the red bar is for hurricanes and the black bar is for major hurricanes. The data has been smoothed by a 9-day running mean.**

between starting date and the number of storms. Seasons that begin early tend to have more storms than those that begin late. The linear correlation coefficient (-0.47) indicates that the starting date explains about 23% of the variance in the number of tropical storms.

### 7.3 Areas of Formation

Seasonal shifts in the formation areas in the eastern Pacific are generally more subtle than those documented in the Atlantic basin (Neumann et al. 1999). Chart Series B shows the monthly tracks of all of the tropical cyclones.

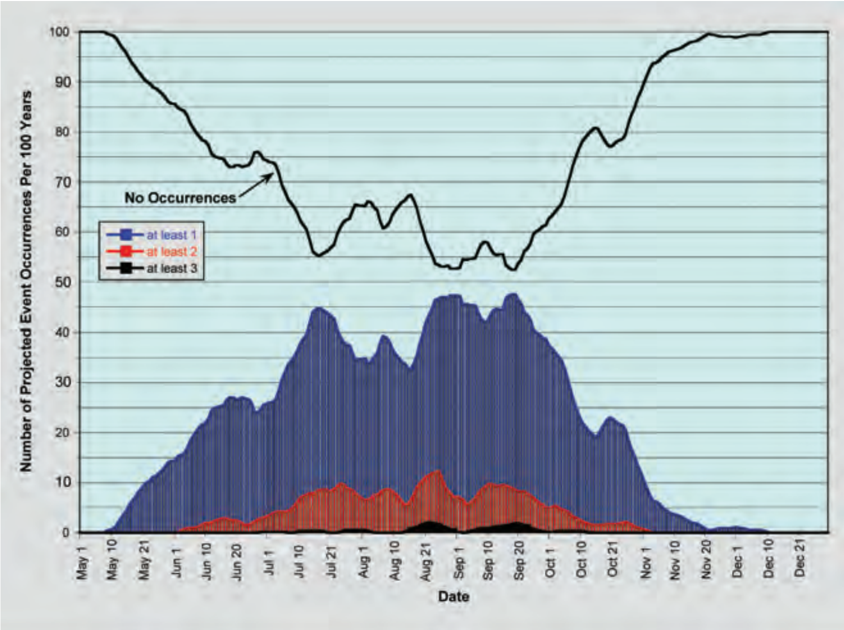



**Figure 7. Intraseasonal variation in the expected 100-year frequency of tropical storms.**

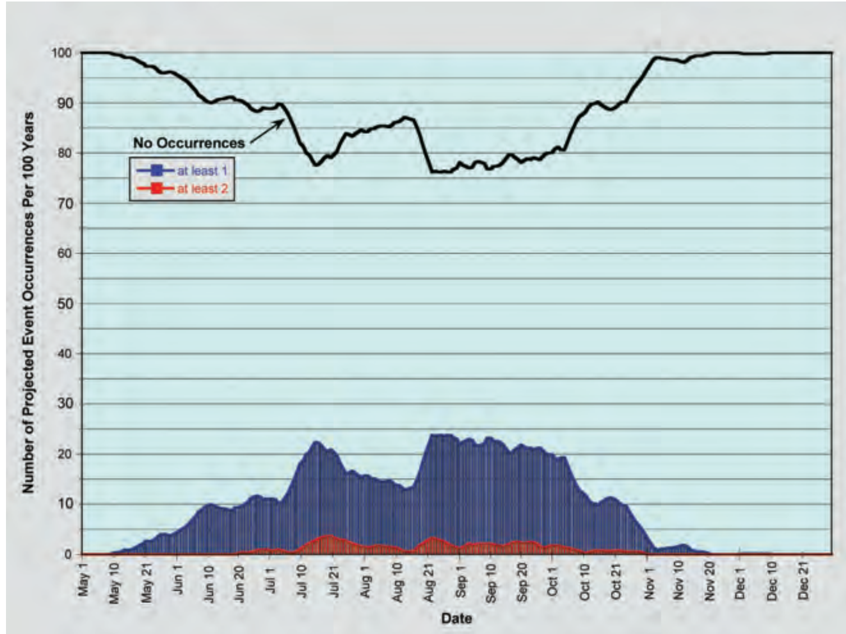



**Figure 8. Same as Figure 7 except for hurricanes.**

Some distinguishing characteristics can be noted. Tropical cyclone development in May and June generally occurs in the eastern part of the basin, south of Mexico. June cyclones form at a slightly higher latitude than May, probably due to the northward seasonal migration of the Intertropical Convergence Zone (ITCZ).

The area of tropical cyclone formation expands greatly westward in July, with a large area of formations noted from July through September, reaching the highest latitude in September. The genesis area retreats eastward somewhat in September, with both the latitude of formation and number of cyclones significantly diminishing in October. May and November formation areas are similar to one another. Many additional features relating to temporal and spatial variations in storm frequency can be identified by careful analysis of Chart Series B. It is often helpful to consider these charts in conjunction with Figures 6 and 7, depicting the daily frequencies.

### 7.4 Mainland Tropical Cyclone Landfalls

Of the 769 tropical cyclones of at least storm strength that have been recorded over the eastern Pacific tropical cyclone basin, 1949-2006, a total of 151 or about 20% are estimated to have caused at least tropical storm force winds along the Mexican coastline. For marginal cases, or those systems that brushed the coast, a review of the data along with the tropical cyclone reports or published seasonal summaries in *Monthly Weather Review* was used to make a determination of the maximum wind speeds that likely occurred on the coast.

Tropical storms affecting land areas other than Mexico in the eastern Pacific basin are quite rare. In fact, there are only four tropical storms that have affected areas of the Pacific coast of Central America (Simone 1968, Olivia 1971, Miriam 1988, Adrian 2005). Two of these systems, Olivia and Miriam,

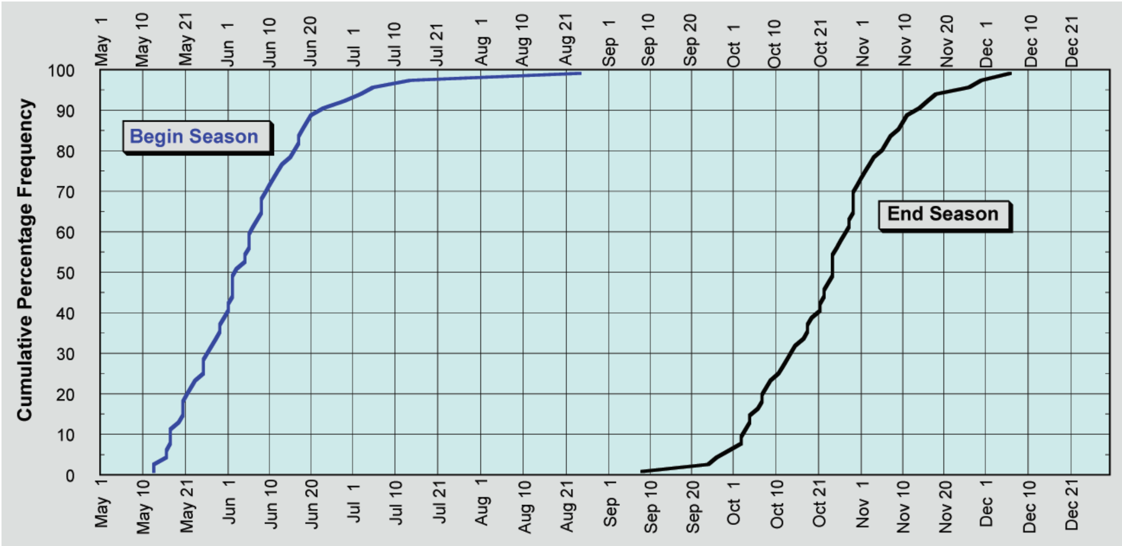



**Figure 9. Cumulative percentage frequency distribution of beginning and ending dates of eastern Pacific tropical cyclone season, 1949-2006. (Dates are of first and last recorded position with at least tropical storm strength.)**

were former Atlantic hurricanes that quickly redeveloped after entering the eastern Pacific.

Seventy-one hurricane strikes (a hurricane strike is defined as a hurricane that is estimated to have caused sustained hurricane-force winds on the coastline, but does not necessarily make landfall in the area of hurricane-force winds) have been noted along with ten landfalling major hurricanes. All of these hurricanes struck Mexico. Figure 10 shows the year-to-year distribution of these systems, including all tropical storms. The long-term record for hurricane strikes seems to be more reliable than the basin-wide records, with little trend in numbers indicated.

It is also of note that most of the hurricanes and major hurricanes occur late in the season, with a sharp maximum in September and October (Figure 11). These two months account for about 60% of the seasonal strikes. June has a secondary maximum in hurricane impacts, but the maximum is smaller than either September or October. In terms of major hurricanes, October is by far the most dangerous month for Pacific coastal residents of Mexico, with 8 out of 10 recorded systems observed in that month. These systems have tended to approach Mexico from the south or southwest as the mid-latitude westerlies dip far enough to the south to allow recurvature of the major hurricanes.

### 7.5 Coastal Variation of Hurricane Threat

Many factors relate to the geographical variation of coastal tropical cyclone frequency and intensity. Since the intensity of a hurricane depends on a continuous supply of warm and very moist air near the surface, a marine environment with warm sea-surface temperatures is an important factor. Thus, in general, storms hitting the northern Baja California coast are likely to be less frequent and less intense than those hitting the other areas of Mexico. Another factor is the location and orientation of the coastline in relation to mean storm tracks. There is a significant clustering of hurricane landfall points (Figure 12)

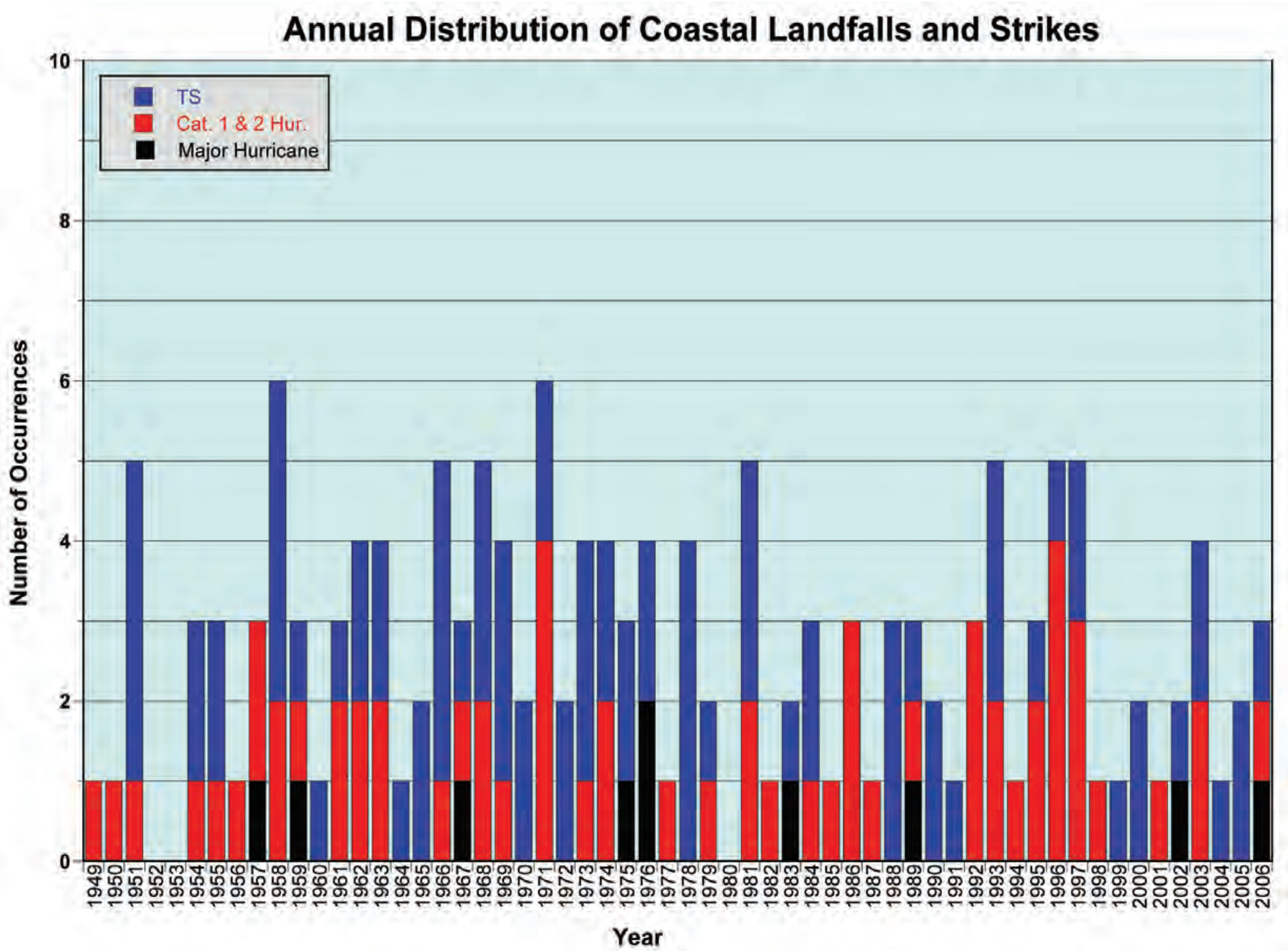



**Figure 10. Central American and Mexican landfalls and strikes, 1949-2006.**

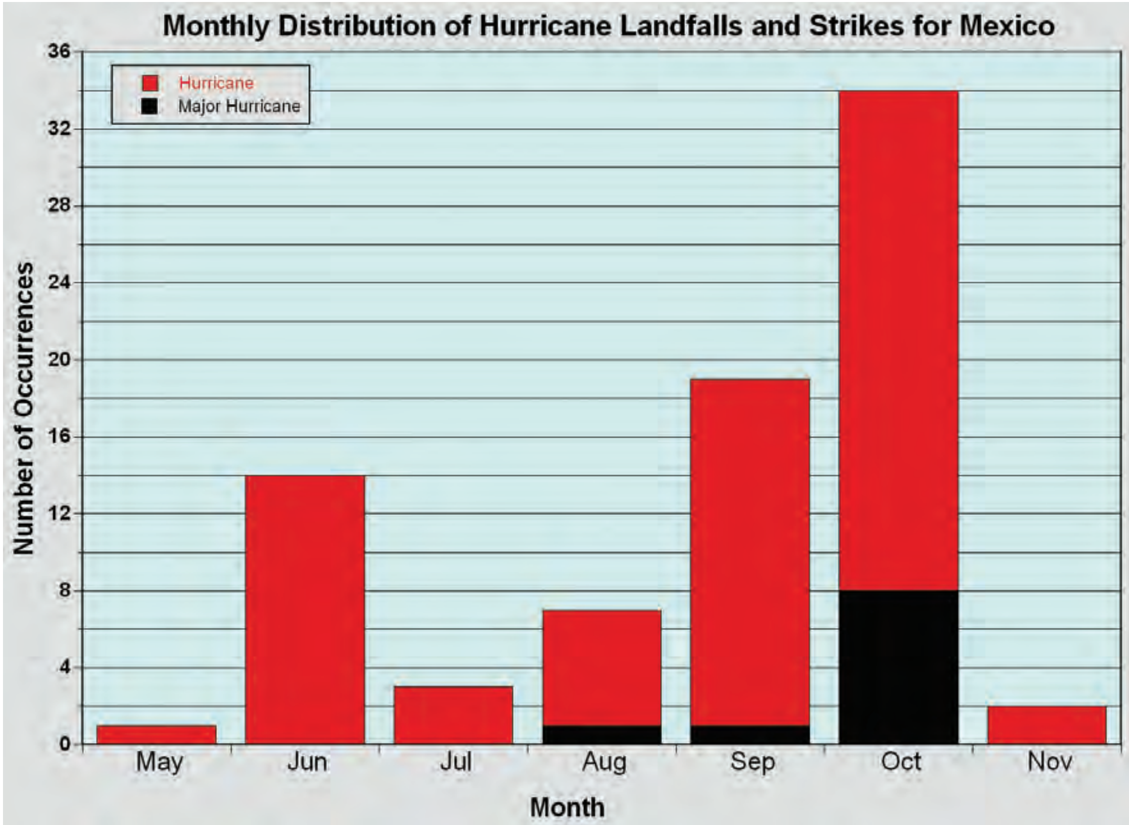



**Figure 11. Monthly distribution of hurricane and major hurricane landfalls and strikes for Mexico, 1949-2006.**

in southern Mexico near Manzanillo and in the Mexican state of Sinaloa. Note that eleven major hurricane landfall points are shown on Figure 12 because one storm impacted both Baja California and Sinaloa as a major hurricane. The figure does not specifically address tropical cyclones that do not cross the coast but still cause coastal hurricane-force winds, although there is a reasonably good correlation between hurricane strikes and the frequencies shown on the figure.

Locations of the tropical cyclones referred to in Figure 10 can be found on the appropriate yearly map in Chart Series A. In regard to impacts, the weather is usually very asymmetrical about the point of landfall. Looking in the direction of storm motion, the worst weather is normally to the storm's right side where rotational winds and translational (forward) motion are complementary; thus, for a hurricane moving into southern Mexico from the south,

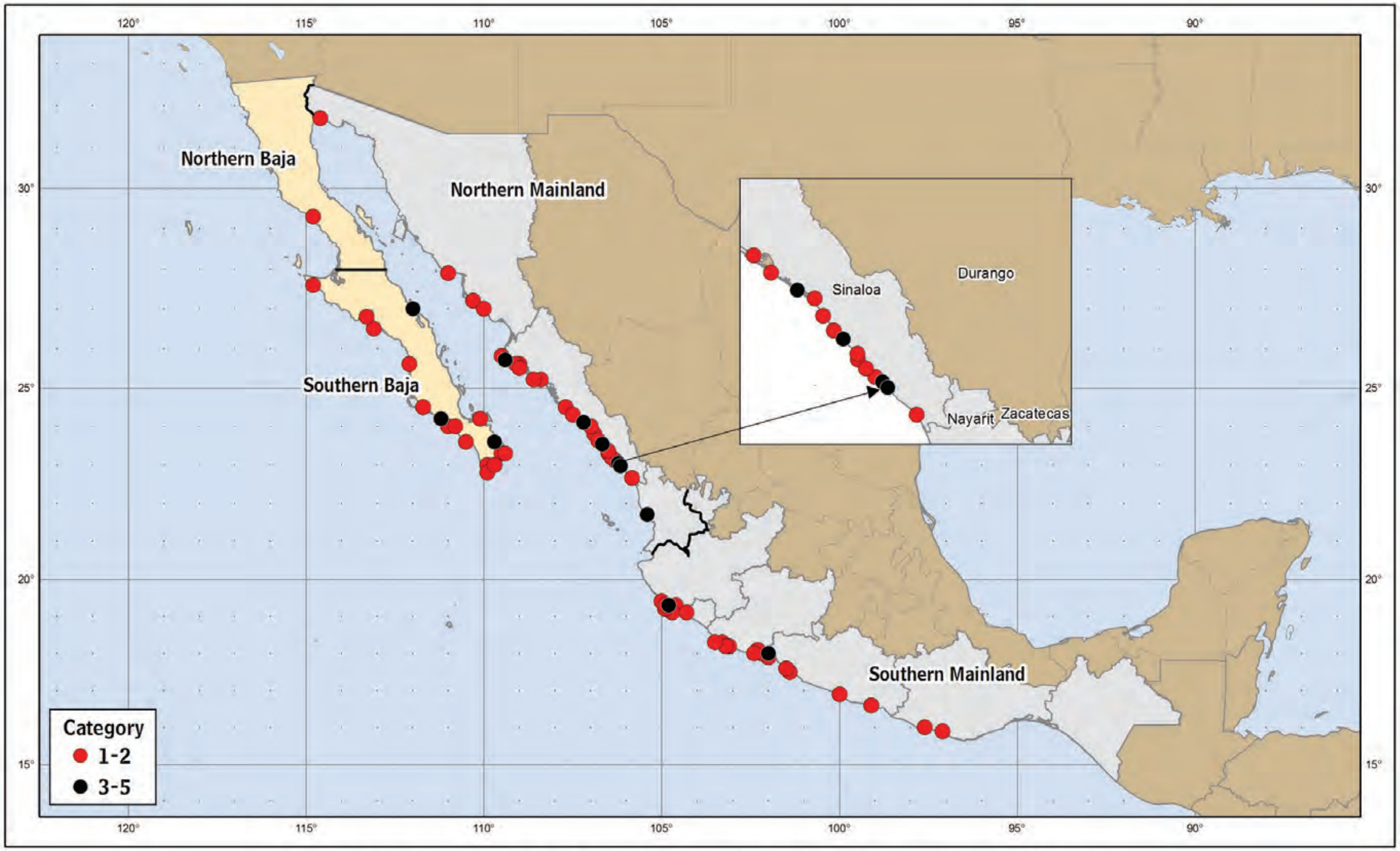



**Figure 12. Distribution of hurricane (red) and major hurricane (black) landfall points in Mexico.**

strongest winds and storm surge would normally be on the right (east) side; for a storm moving into the Mexican west coast from the west, maximum wind and storm surge would be expected south of the landfall point.

Other meteorological conditions and terrain features also contribute to wind, wind gusts, weather and storm surge asymmetries such that it is difficult to speculate on the extent and nature of storm damage at a particular site given only the storm track and storm classification. In addition, building standards vary from location to location. Accordingly, persons desiring to know the specific effect or potential effect of past or future storms on a given site should seek further meteorological or engineering advice.

**7.6 Hurricane Damage Potential**

A previous section (7.4) dealt with all tropical cyclones greater than storm strength. This section concerns only hurricanes. The amount of damage caused by hurricanes is highly variable and depends on a number of factors. Obviously, more intense storms can be expected to cause more damage. However, there are numerous other factors which need be considered such as wind gusts, storm size, the speed of translational motion (affecting rainfall and fresh-water flooding), storm surge (affected by offshore water depth and coastal configuration), astronomical tide, terrain features, local building codes, etc.

In 1972, the U.S. National Weather Service accepted a hurricane damage scale devised by Herbert Saffir, and later expanded upon by Robert Simpson. The Saffir-Simpson hurricane scale (Simpson 1974), as it has come to be known, relates the strength of hurricane-force winds and associated storm surge with potential damage. The scale is now widely used in public awareness programs and by the news media. It gives the public and disaster preparedness officials a good estimate of what can be expected from various levels of intensity (Table 5).

Operationally, the assignment of category is solely based on the sustained wind speed. For this publication, the Saffir-Simpson hurricane scale value shown in Table 6 is taken from the maximum sustained winds at landfall in the eastern Pacific tropical cyclone best track database. For marginal cases, or those systems that brushed the coast, a review of the data along with the tropical cyclone reports or published seasonal summaries in *Monthly Weather Review* was used to make a determination of the maximum wind speeds that likely occurred on the coast.

The data presented in Table 6 are summarized by region in Table 7. Entries in Table 7 may be made for the same hurricane more than once if it affected more than one section; thus, sectional totals cannot be summed to get national totals. The initial line of Table 7 is an actual count of the number of hurricanes that have affected Mexico from 1949-2006, where only the highest Saffir-Simpson category in any individual state is used.

Thus, over the 58-year period 1949 through 2006, a total of 71 hurricanes have struck the Mexican coastline. This is an average of a little more than one hurricane per year. The maximum number of strikes was 4 in 1996, and the minimum observed is zero in numerous years, mostly recently in 2005.

**Table 5. The Saffir-Simpson Hurricane Scale.**

| |
|---|
| Scale No. 1--Winds of 74 to 95 miles per hour. Likely effects include: Damage primarily to shrubbery, trees, foliage, and unanchored mobile homes. No real damage to other structures. Some damage to poorly constructed signs. Storm surge 4 to 5 feet above normal. Low-lying coastal roads inundated, minor pier damage, some small craft in exposed anchorage torn from moorings. |
| |
| Scale No. 2--Winds of 96 to 110 miles per hour. Likely effects include: Considerable damage to shrubbery and tree foliage; some trees blown down. Major damage to exposed mobile homes. Extensive damage to poorly constructed signs. Some damage to roofing materials and buildings; some window and door damage. Storm surge 6 to 8 feet above normal. Coastal roads and low-lying escape routes inland cut by rising water 2 to 4 hours before arrival of hurricane center. Considerable damage to piers. Marinas flooded. Small craft in unprotected anchorages torn from moorings. Evacuation of some shoreline residences and low-lying island areas required. |
| |
| Scale No. 3--Winds of 111 to 130 miles per hour. Likely effects include: Foliage torn from trees; large trees blown down. Practically all poorly constructed signs blown down. Some structural damage to roofing materials of buildings; some window and door damage. Some structural damage to small buildings. Mobile homes destroyed. Storm surge 9 to 12 feet above normal. Serious flooding at coast and many smaller structures near coast destroyed; larger structures near coast damaged by battering waves and floating debris. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives. Flat terrain 5 feet or less above sea level flooded 8 miles or more. Evacuation of low-lying residences within several blocks of shoreline possibly required. |
| |
| Scale No. 4--Winds of 131 to 155 miles per hour. Likely effects include: Shrubs and trees blown down; all signs down. Extensive damage to roofing materials, windows and doors. Complete failure of roofs on many small residences. Complete destruction of mobile homes. Storm surge 13 to 18 feet above normal. Flat terrain 10 feet or less above sea level flooded inland as far as 6 miles. Major damage to lower floors of structures near shore due to flooding and battering by waves and floating debris. Low-lying escape routes inland cut by rising water 3 to 5 hours before hurricane center arrives. Major erosion of beaches. Massive evacuation of all residences within 500 yards of shore possibly required, and of single-story residences on low ground within 2 miles of shore. |
| |
| Scale No. 5--Winds greater than 155 miles per hour. Likely effects include: Shrubs and trees blown down; considerable damage to roofs of buildings; all signs down. Very severe and extensive damage to windows and doors. Complete failure of roofs on many residences and industrial buildings. Extensive shattering of glass in windows and doors. Some complete building failures. Small buildings overturned or blown away. Complete destruction of mobile homes. Storm surge greater than 18 feet above normal. Major damage to lower floors of all structures less than 15 feet above sea level within 500 yards of shore. Low-lying escape routes inland cut by rising waters 3 to 5 hours before hurricane center arrives. Massive evacuation of residential areas on low ground within 5 to 10 miles of shore possibly required. |

**Table 6. Chronological listing of hurricane landfalls and strikes and coastal states affected, 1949-2006. Geographical areas are defined as southern mainland Mexico (states of Chiapas, Oaxaca, Guerrero, Michoacan, Colima, and Jalisco), northern mainland Mexico (states of Nayarit, Sinaloa, and Sonora), southern Baja Peninsula (state of Baja California Sur), and northern Baja Peninsula (state of Baja California Norte). The asterisk means that the center stayed offshore.**

| Storm Number | Name (if any) | Year | Month | Coastal region Affected (*strike) | Highest category | Storm Number | Name (if any) | Year | Month | Coastal region Affected (*strike) | Highest category |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | Unnamed | 1949 | Sep | southern Baja (1) | 1 | 16 | Pauline | 1968 | Oct | southern Baja (1) | 1 |
| 1 | Unnamed | 1950 | Jun | southern mainland (1)*<br>northern mainland (1)* | 1 | 10 | Jennifer | 1969 | Oct | northern mainland (1) | 1 |
| 2 | Unnamed | 1951 | Jun | southern mainland (1) | 1 | 1 | Agatha | 1971 | May | southern mainland (1) | 1 |
| 3 | Unnamed | 1954 | Jul | southern Baja (1) | 1 | 2 | Bridget | 1971 | Jun | southern mainland (2) | 2 |
| 6 | Unnamed | 1955 | Oct | southern mainland (1) | 1 | 12 | Lily | 1971 | Aug | southern mainland (1) | 1 |
| 4 | Unnamed | 1956 | Jun | southern mainland (1) | 1 | 16 | Priscilla | 1971 | Oct | southern mainland (1)*<br>northern mainland (1)* | 1 |
| 5 | Unnamed | 1957 | Sep | southern mainland (1) | 1 | 9 | Irah | 1973 | Sep | southern Baja (1) | 1 |
| 8 | Unnamed | 1957 | Oct | southern Baja (1)<br>northern mainland (1) | 1 | 4 | Dolores | 1974 | Jun | southern mainland (1) | 1 |
| 10 | Unnamed | 1957 | Oct | northern mainland (4) | 4 | 15 | Orlene | 1974 | Sep | northern mainland (1) | 1 |
| 1 | Unnamed | 1958 | Jun | southern Baja (1)* | 1 | 15 | Olivia | 1975 | Oct | northern mainland (3) | 3 |
| 10 | Unnamed | 1958 | Oct | southern Baja (1)<br>northern mainland (1) | 1 | 12 | Liza | 1976 | Oct | southern Baja (3)*<br>northern mainland (3) | 3 |
| 9 | Unnamed | 1959 | Sep | southern Baja (1)*<br>northern Baja (1) | 1 | 13 | Madeline | 1976 | Oct | southern mainland (4) | 4 |
| 12 | Unnamed | 1959 | Oct | southern mainland (5) | 5 | 4 | Doreen | 1977 | Aug | southern Baja (1) | 1 |
| 1 | Iva | 1961 | Jun | southern mainland (1) | 1 | 1 | Andres | 1979 | Jun | southern mainland (1) | 1 |
| 10 | Tara | 1961 | Nov | southern mainland (1) | 1 | 14 | Norma | 1981 | Oct | northern mainland (2) | 2 |
| 1 | Valerie | 1962 | Jun | southern mainland (1)*<br>northern mainland (1) | 1 | 15 | Otis | 1981 | Oct | southern mainland (1)* | 1 |
| 9 | Doreen | 1962 | Oct | southern Baja (1)*<br>northern mainland (1) | 1 | 16 | Paul | 1982 | Sep | southern Baja (2)<br>northern mainland (2) | 2 |
| 1 | Emily | 1963 | Jun | southern mainland (1) | 1 | 19 | Tico | 1983 | Oct | northern mainland (3) | 3 |
| 7 | Mona | 1963 | Oct | northern mainland (1) | 1 | 16 | Odile | 1984 | Sep | southern mainland (1)* | 1 |
| 1 | Adele | 1966 | Jun | southern mainland (1) | 1 | 21 | Waldo | 1985 | Oct | northern mainland (2) | 2 |
| 10 | Katrina | 1967 | Aug, Sep | southern Baja (1)<br>northern Baja (1)*<br>northern mainland (1) | 1 | 14 | Newton | 1986 | Sep | southern Baja*<br>northern mainland (1) | 1 |
| 14 | Olivia | 1967 | Oct | southern Baja (3) | 3 | 16 | Paine | 1986 | Oct | southern Baja*<br>northern mainland (1) | 1 |
| 14 | Naomi | 1968 | Sep | northern mainland (1) | 1 | 17 | Roslyn | 1986 | Oct | northern mainland (1) | 1 |

**Table 6 (continued). Chronological listing of hurricane landfalls and strikes and coastal states affected, 1949-2006.**

| Storm Number | Name (if any) | Year | Month | Coastal region Affected (*strike) | Highest category |
|---|---|---|---|---|---|
| 5 | Eugene | 1987 | Jul | southern mainland (2) | 2 |
| 3 | Cosme | 1989 | Jun | southern mainland (1) | 1 |
| 11 | Kiko | 1989 | Aug | southern Baja (3) | 3 |
| 12 | Lester | 1992 | Aug | southern Baja (1) | 1 |
| 21 | Virgil | 1992 | Oct | southern mainland (2) | 2 |
| 22 | Winifred | 1992 | Oct | southern mainland (2) | 2 |
| 3 | Calvin | 1993 | Jul | southern mainland (2)<br>northern mainland (1) * | 2 |
| 12 | Lidia | 1993 | Sep | northern mainland (2) | 2 |
| 17 | Rosa | 1994 | Oct | northern mainland (2) | 2 |
| 8 | Henriette | 1995 | Sep | southern Baja (2) | 2 |
| 9 | Ismael | 1995 | Sep | northern mainland (1) | 1 |
| 2 | Alma | 1996 | Jun | southern mainland (2) | 2 |
| 3 | Boris | 1996 | Jun | southern mainland (1) | 1 |
| 7 | Fausto | 1996 | Sep | southern Baja (1)<br>northern mainland (1) | 1 |
| 9 | Hernan | 1996 | Oct | southern mainland | 1 |
| 14 | Nora | 1997 | Sep | southern Baja (1)<br>northern Baja (1) | 1 |
| 16 | Pauline | 1997 | Oct | southern mainland (3)*<br>southern mainland (2) | 3 |
| 17 | Rick | 1997 | Nov | southern mainland (1) | 1 |
| 9 | Isis | 1998 | Sep | northern mainland (1) | 1 |
| 10 | Juliette | 2001 | Sep | southern Baja (1)* | 1 |
| 11 | Kenna | 2002 | Oct | northern mainland (4) | 4 |
| 9 | Ignacio | 2003 | Aug | southern Baja (1) | 1 |
| 13 | Marty | 2003 | Sep | southern Baja (2) | 2 |
| 10 | John | 2006 | Sep | southern Baja (2) | 2 |
| 12 | Lane | 2006 | Sep | northern mainland (3) | 3 |

**Table 7. Number of hurricanes striking Mexico, 1949-2006, categorized according to the Saffir-Simpson hurricane scale. Regional definitions are found in Table 6.**

| | Category Number | | | | | | Major Hurricanes |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | All | (≥3) |
| Mexico | 46 | 15 | 6 | 3 | 1 | 71 | 10 |
| Southern Mainland | 21 | 7 | 0 | 1 | 1 | 30 | 2 |
| Northern Mainland | 18 | 5 | 4 | 2 | 0 | 29 | 6 |
| Southern Baja California | 18 | 4 | 3 | 0 | 0 | 25 | 3 |
| Northern Baja California | 3 | 0 | 0 | 0 | 0 | 3 | 0 |

Notes: Data are summarized from Table 6.

## 8. ACKNOWLEDGMENTS AND OTHER COMMENTS

In any document of this type, it is impossible to acknowledge all persons and agencies who have contributed their time, effort and expertise. Documentation of tropical cyclone tracks and the transfer of these data from analog to digital form has been underway at the NHC for many years. Some of this work was accomplished by part-time students assigned to the NHC on various work/study, cooperative education or international exchange programs. Colin McAdie, Chris Landsea, and Charlie Neumann, recent authors of a similar Atlantic best track book, provided invaluable suggestions. Valuable computer assistance was given by Chris Sisko. Hurricane specialists at the NHC provided thorough reviews and significantly improved the text. Many thanks also go to the graphics team at NCDC for outstanding work on this project.

The work of George Cry, lead- or co-author of the earliest editions of the Atlantic track book text, is acknowledged. Indeed, he structured much of the framework about which later editions were patterned (Cry 1959). The late Dr. Arthur Pike of TPC/NHC is acknowledged for his work on the best track database in the eastern North Pacific.

## 9. LIST OF ACRONYMS AND ABBREVIATIONS

**HURDAT** Hurricane Data from the best tracks database at the National Hurricane Center.

**ITCZ** Intertropical Convergence Zone.

**kt** knots (nautical miles per hour). Multiply knots by 1.152 to obtain miles per hour.

**m/s** meters per second - Multiply m/s by 1.94 to obtain knots.

**mph** miles per hour - Multiply mph by 0.868 to obtain knots.

**NCDC** National Climatic Data Center, Asheville, NC (a branch of NOAA).

**NHC** National Hurricane Center.

**NOAA** National Oceanographic and Atmospheric Administration (parent agency of NHC).

**NWS** National Weather Service.

**RSMC** Regional Specialized Meteorological Center (an agency designated by WMO as a major forecasting Center).

**UTC** Universal Time Coordinated Global time system (formerly Greenwich Mean Time or Z time).

**WMO** World Meteorological Organization (an agency of the United Nations).

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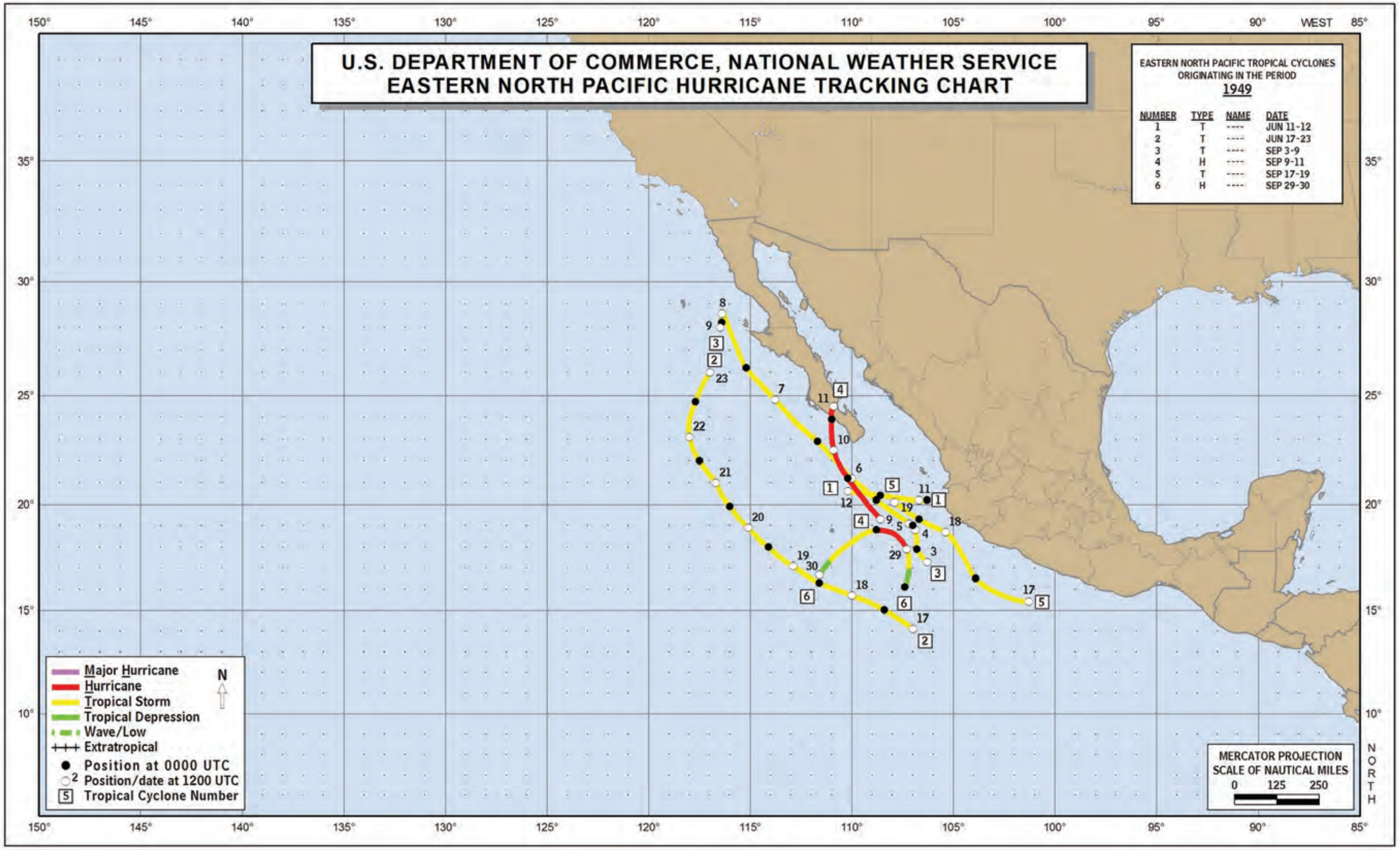
# APPENDIX A

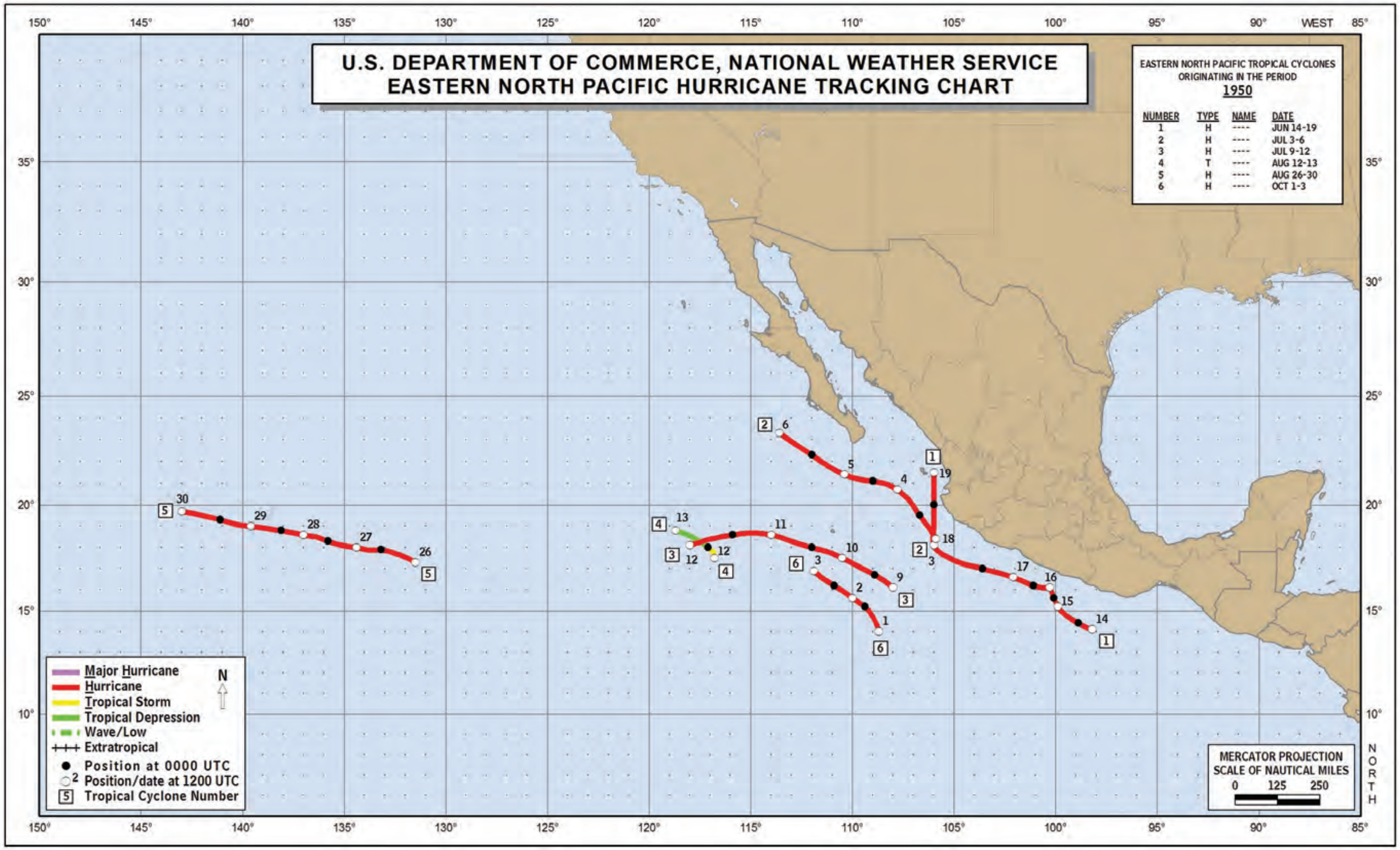
# TRACKS OF EASTERN NORTH PACIFIC TROPICAL CYCLONES BY YEARS, 1949-2008 (CHART SERIES A)

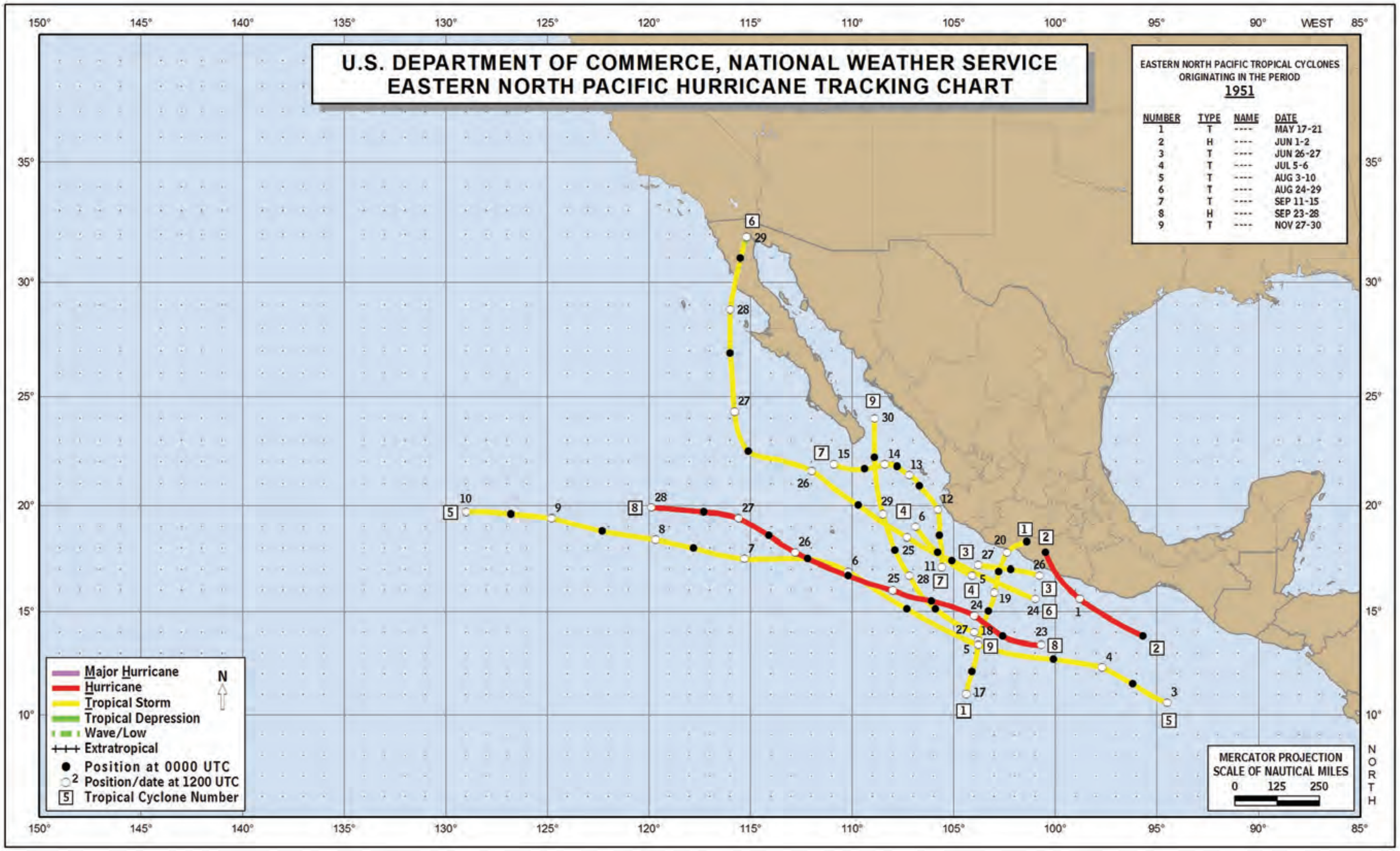
INFORMATION INCLUDED ON CHART
(See Section 3 for definition of various stages)

| YEARS | |
|---|---|
| 1949-1964 | Track type shown usually indicates maximum intensity believed to have been attained at some point along with a reasonable dissipation for systems that impact land. A few storms have a full lifecycle but they are the minority. Major hurricanes are rarely indicated. |
| 1965-2008 | Tropical depression, tropical storm, hurricane, major hurricane, extratropical, and low stages are commonly indicated. Major hurricanes are rarely indicated before 1971. The low stage is used much more often after 2001. |
| Notes: | In the storm description box, under the TYPE column, occasionally two storm classes are listed. The first one is the maximum intensity attained while the system was in the eastern Pacific, and the second one in parenthesis is the maximum intensity attained during the storm's entire life cycle outside of the eastern Pacific. |
| | Before 1988, storms were often tracked to the coast of Mexico and then no longer tracked (e.g. Paul 1982). The reader should be aware of this problem, and there is ongoing work to fix this systematic error in the best tracks. |

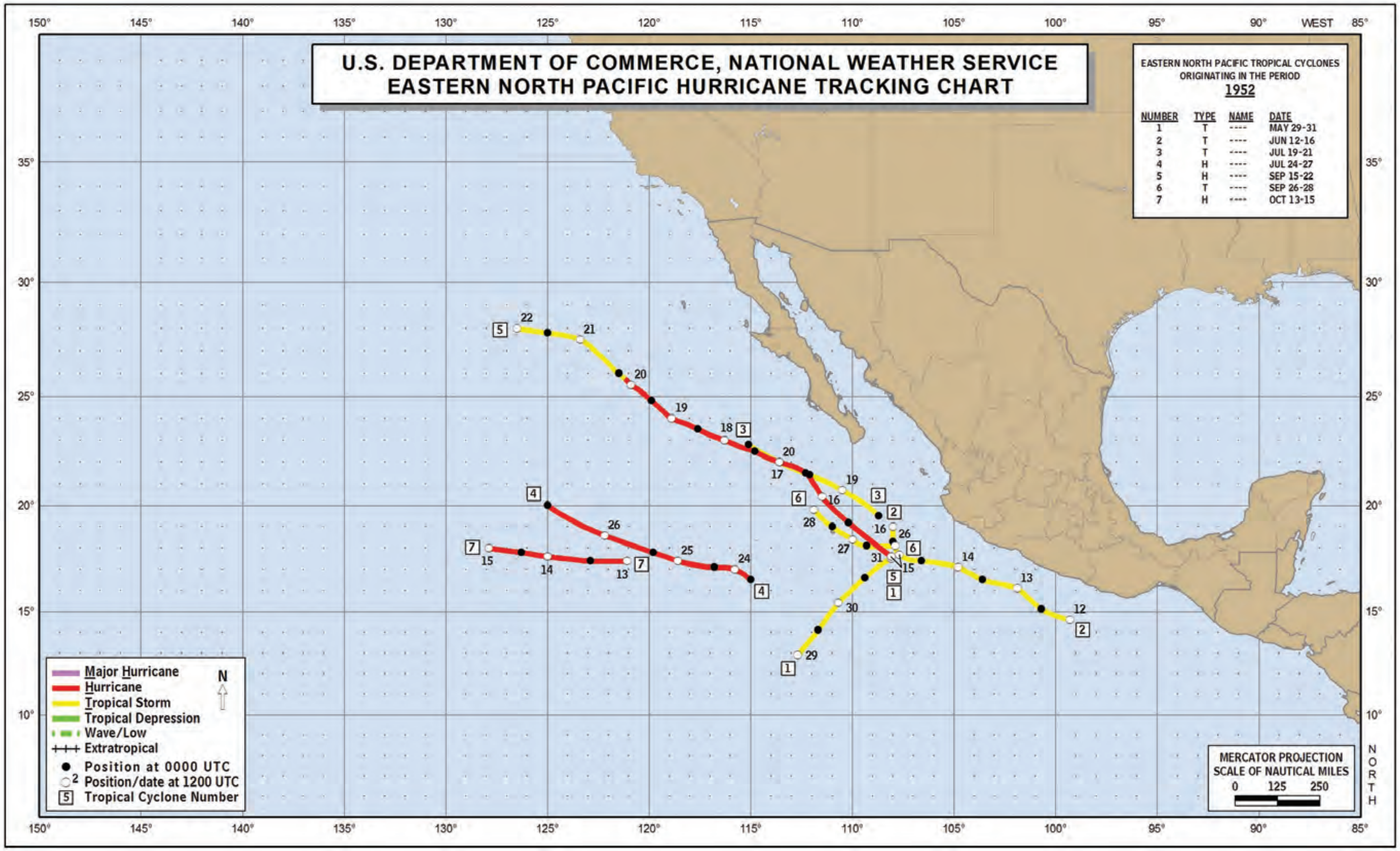
**Following the 2008 season, a set of blank pages has been provided for displaying later charts. These are normally published in *Monthly Weather Review* or available at http://www.nhc.noaa.gov**

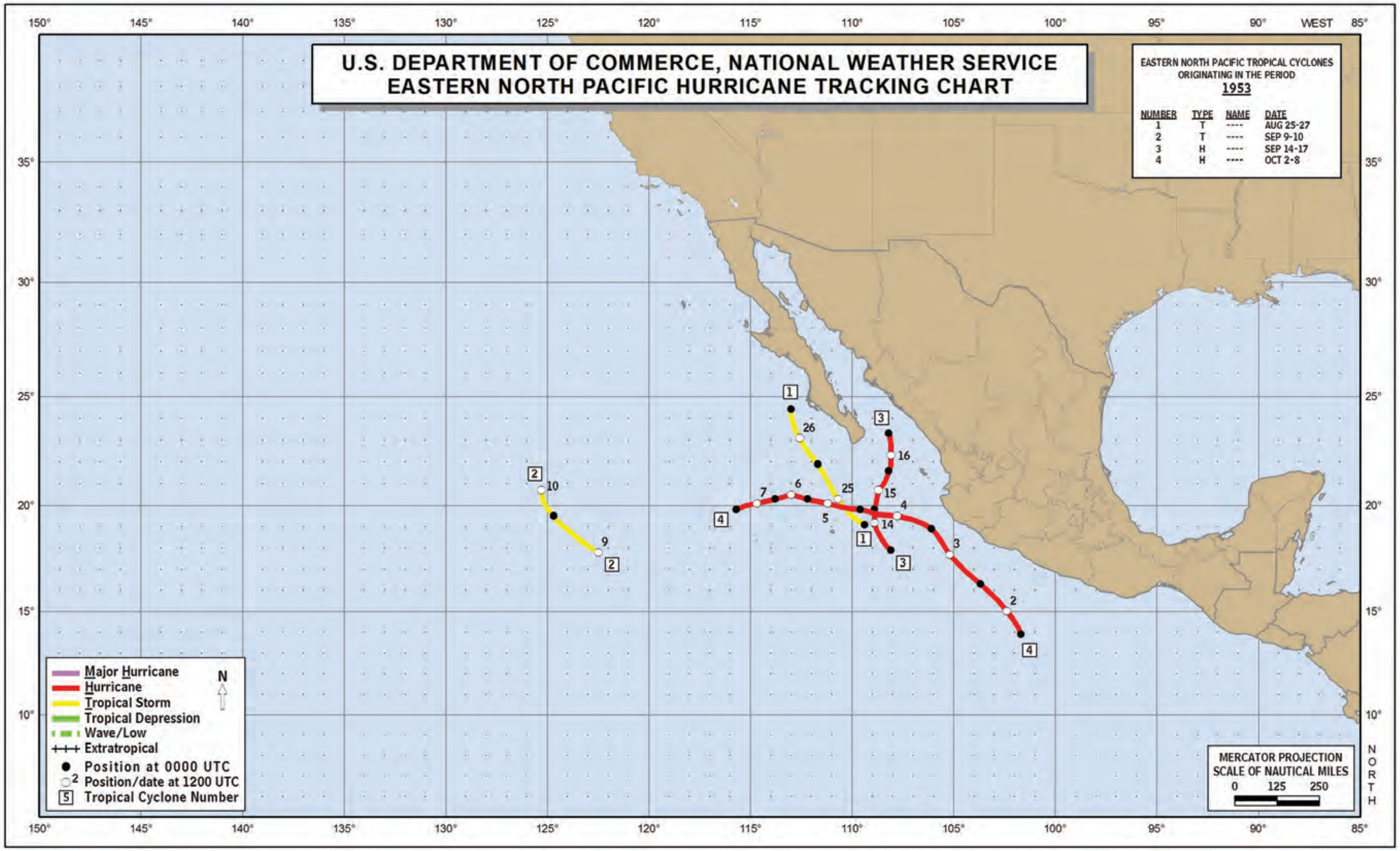

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1949
NUMBER TYPE NAME DATE
1 T ---- JUN 11-12
2 T ---- JUN 17-23
3 T ---- SEP 3-9
4 H ---- SEP 9-11
5 T ---- SEP 17-19
6 H ---- SEP 29-30
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

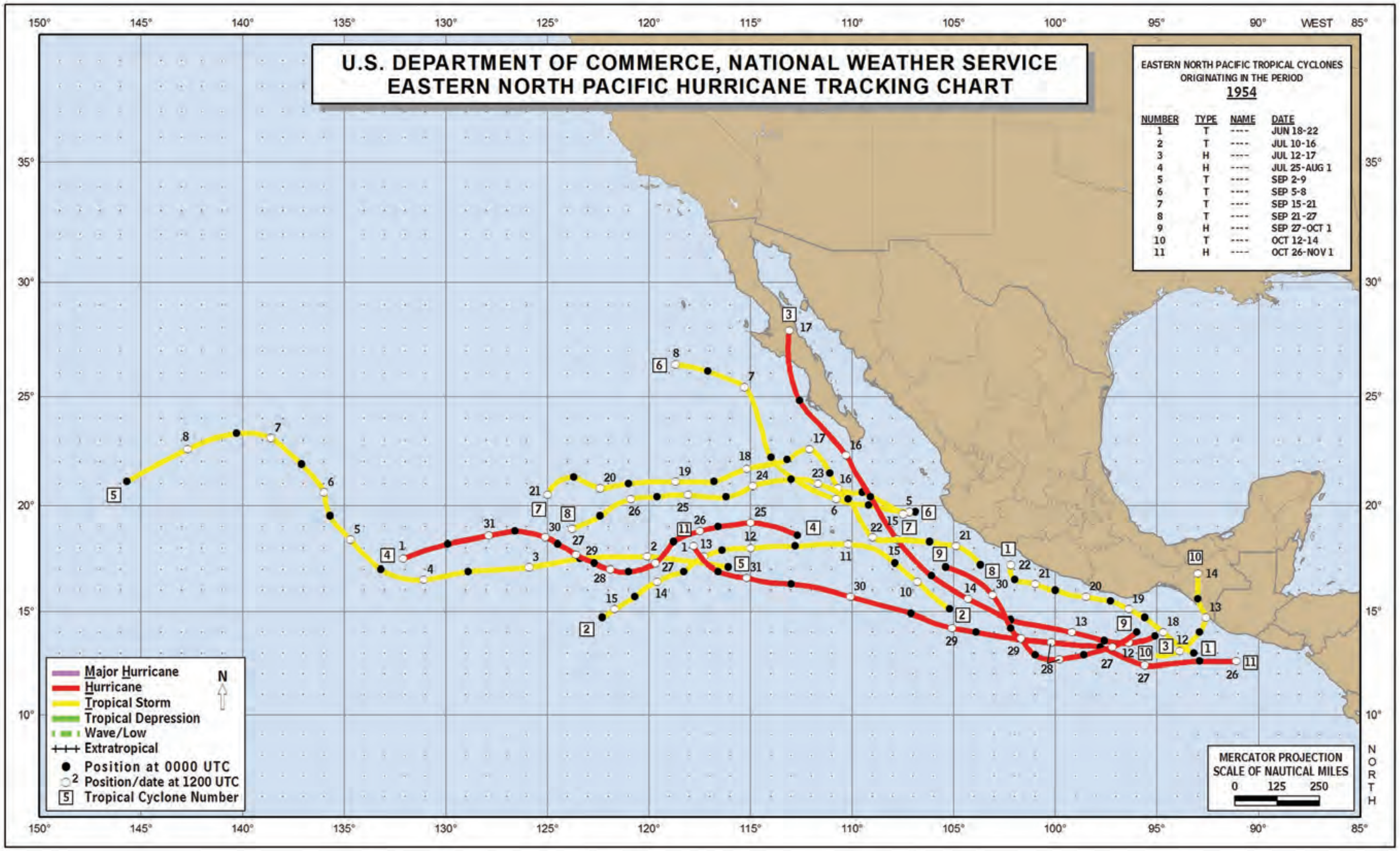

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1950
NUMBER TYPE NAME DATE
1 H ---- JUN 14-19
2 H ---- JUL 3-6
3 H ---- JUL 9-12
4 T ---- AUG 12-13
5 H ---- AUG 26-30
6 H ---- OCT 1-3
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

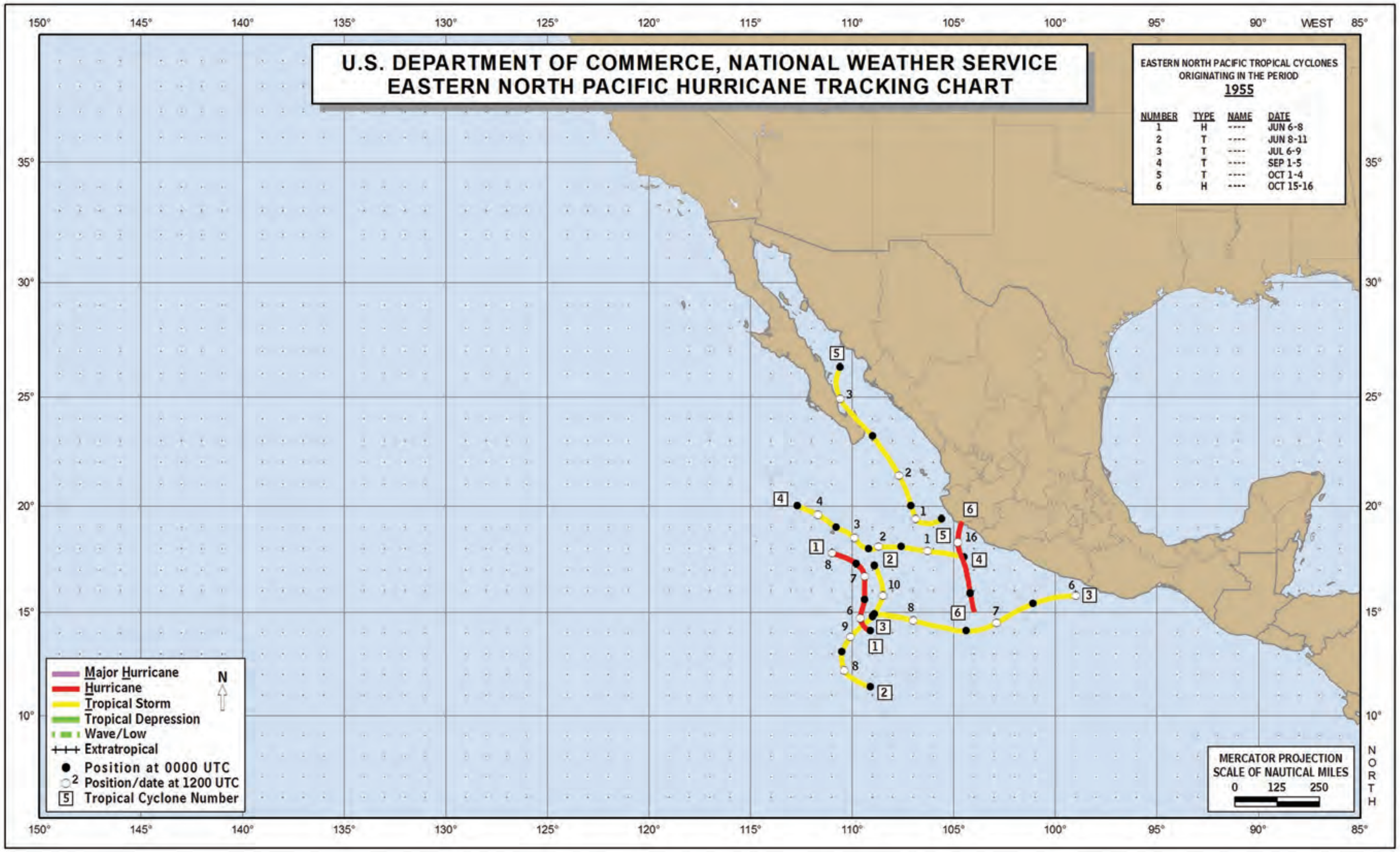


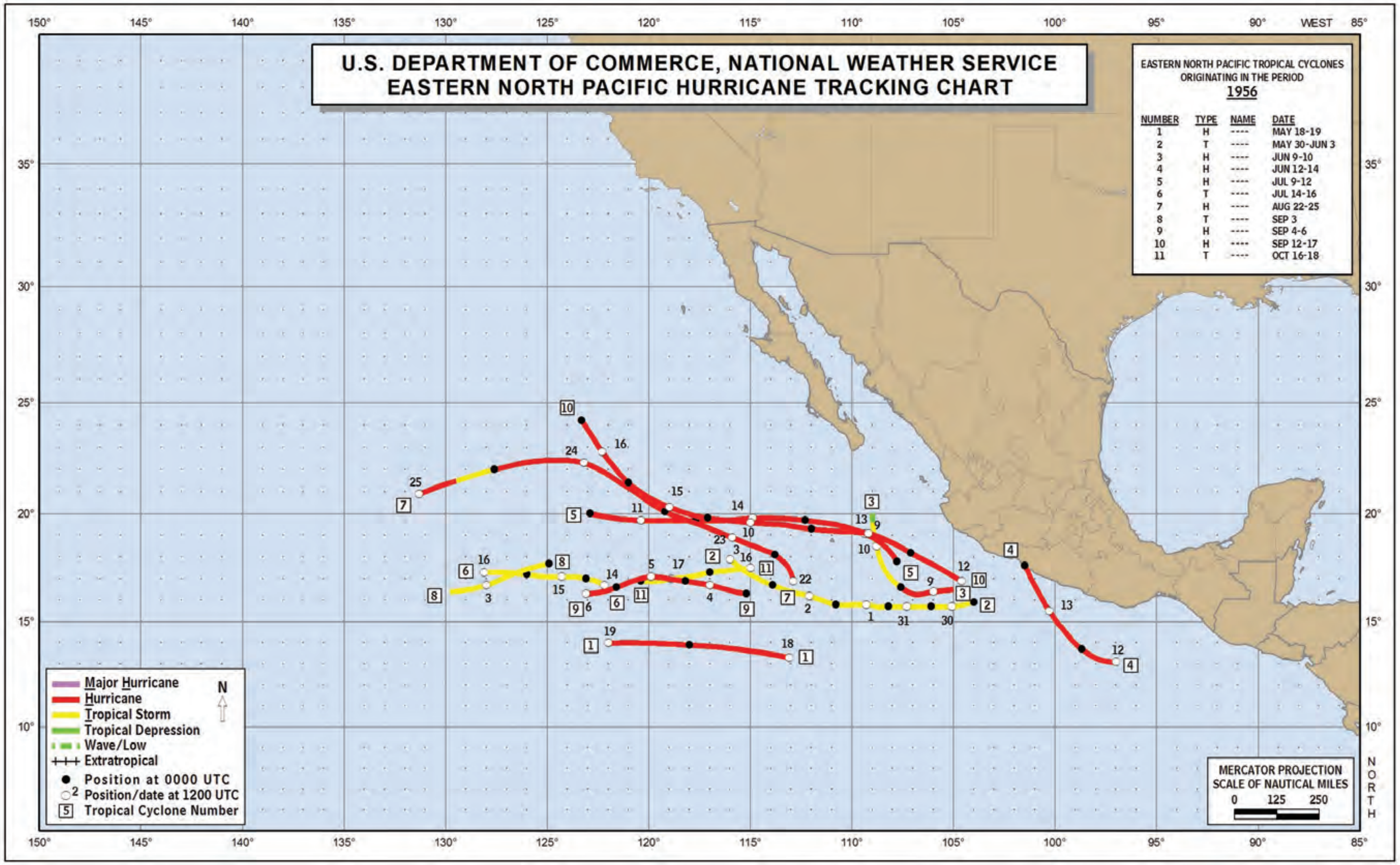
U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1951
NUMBER TYPE NAME DATE
1 T ---- MAY 17-21
2 H ---- JUN 1-2
3 T ---- JUN 26-27
4 T ---- JUL 5-6
5 T ---- AUG 3-10
6 T ---- AUG 24-29
7 T ---- SEP 11-15
8 H ---- SEP 23-28
9 T ---- NOV 27-30
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

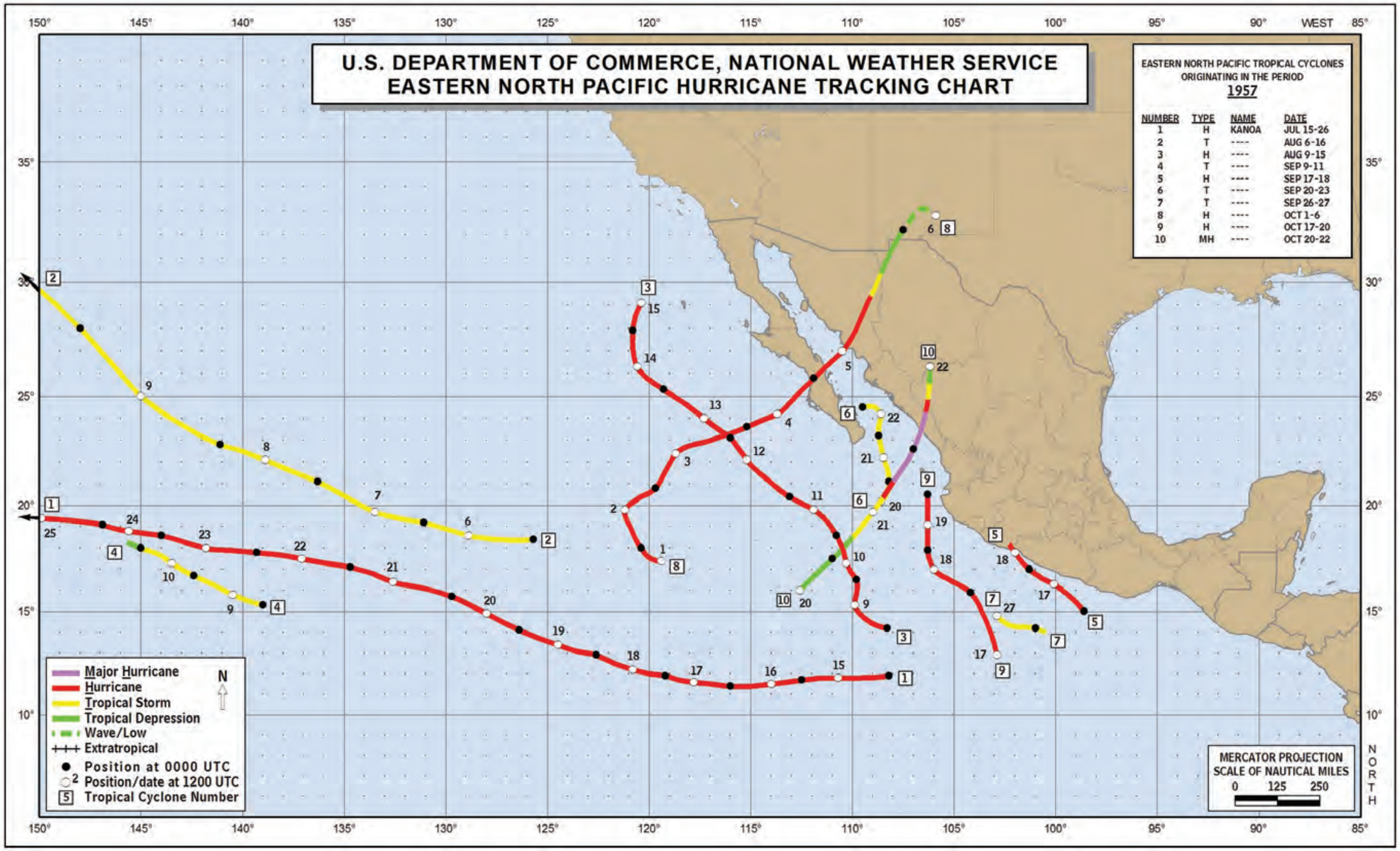

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1952
NUMBER TYPE NAME DATE
1 T ---- MAY 29-31
2 T ---- JUN 12-16
3 T ---- JUL 19-21
4 H ---- JUL 24-27
5 H ---- SEP 15-22
6 T ---- SEP 26-28
7 H ---- OCT 13-15
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

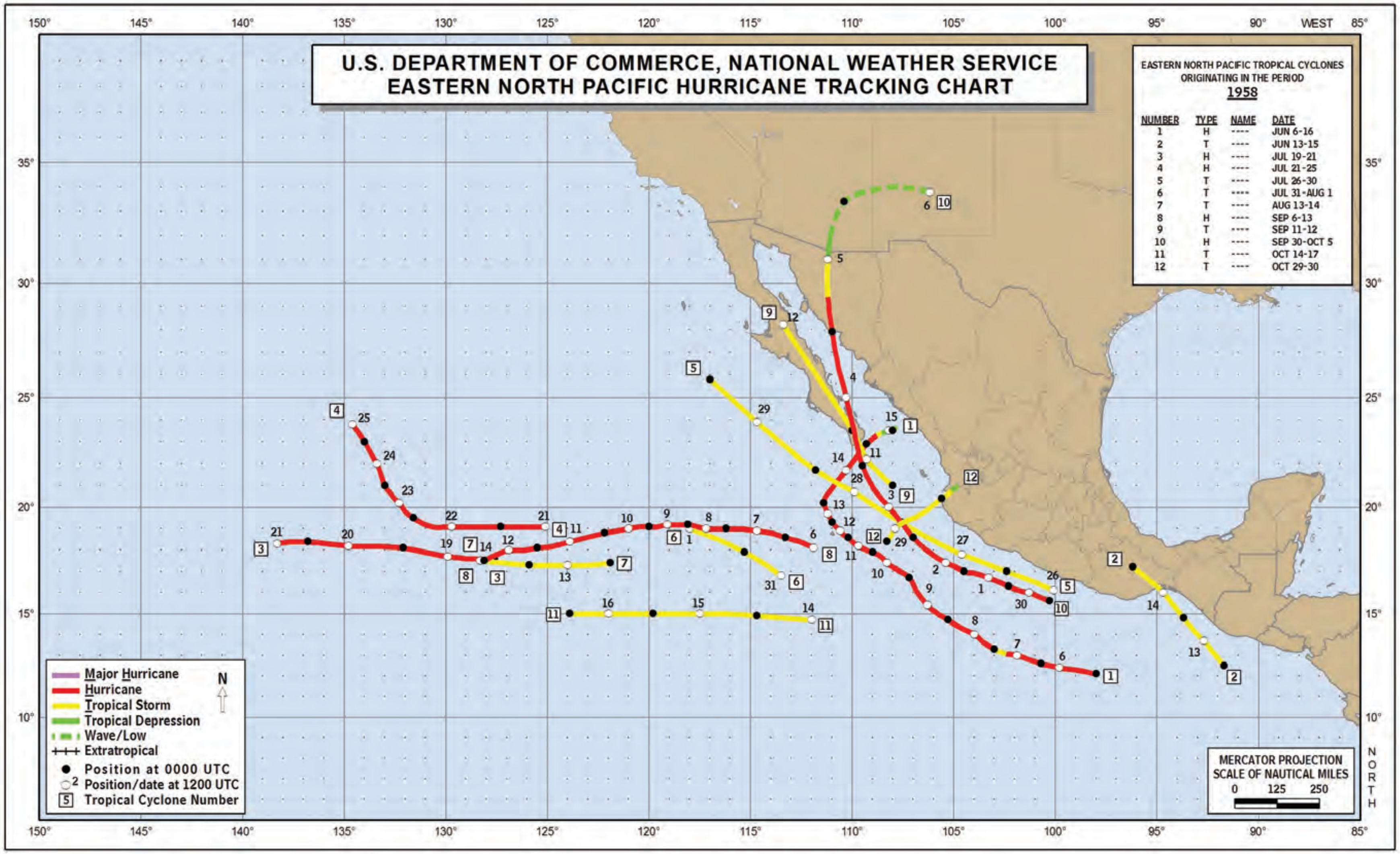

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1953
NUMBER TYPE NAME DATE
1 T ---- AUG 25-27
2 T ---- SEP 9-10
3 H ---- SEP 14-17
4 H ---- OCT 2-8
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

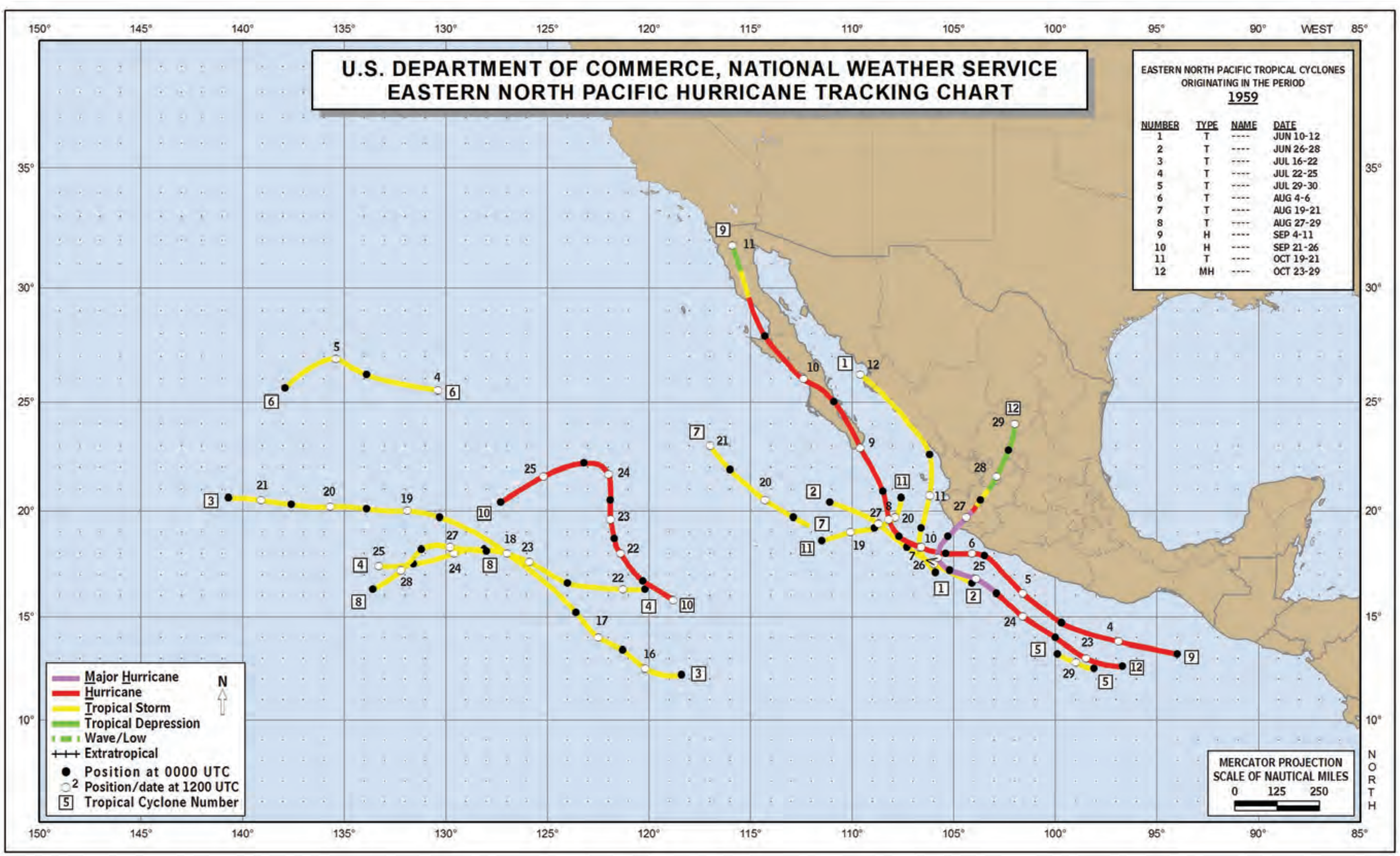

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1954
NUMBER TYPE NAME DATE
1 T ---- JUN 18-22
2 T ---- JUL 10-16
3 H ---- JUL 12-17
4 H ---- JUL 25-AUG 1
5 T ---- SEP 2-9
6 T ---- SEP 5-8
7 T ---- SEP 15-21
8 T ---- SEP 21-27
9 H ---- SEP 27-OCT 1
10 T ---- OCT 12-14
11 H ---- OCT 26-NOV 1
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

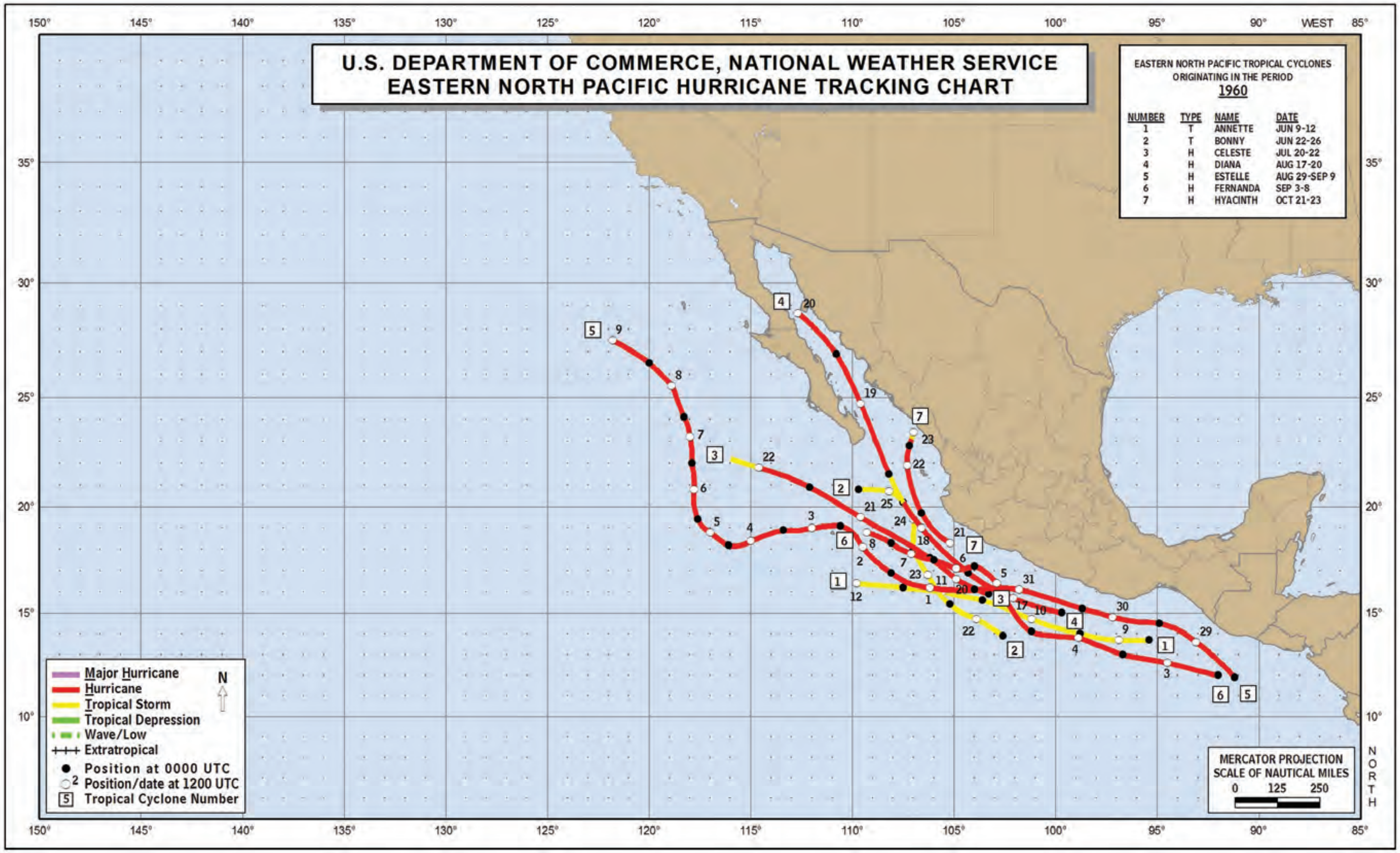

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1955
NUMBER TYPE NAME DATE
1 H ---- JUN 6-8
2 T ---- JUN 8-11
3 T ---- JUL 6-9
4 T ---- SEP 1-5
5 T ---- OCT 1-4
6 H ---- OCT 15-16
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

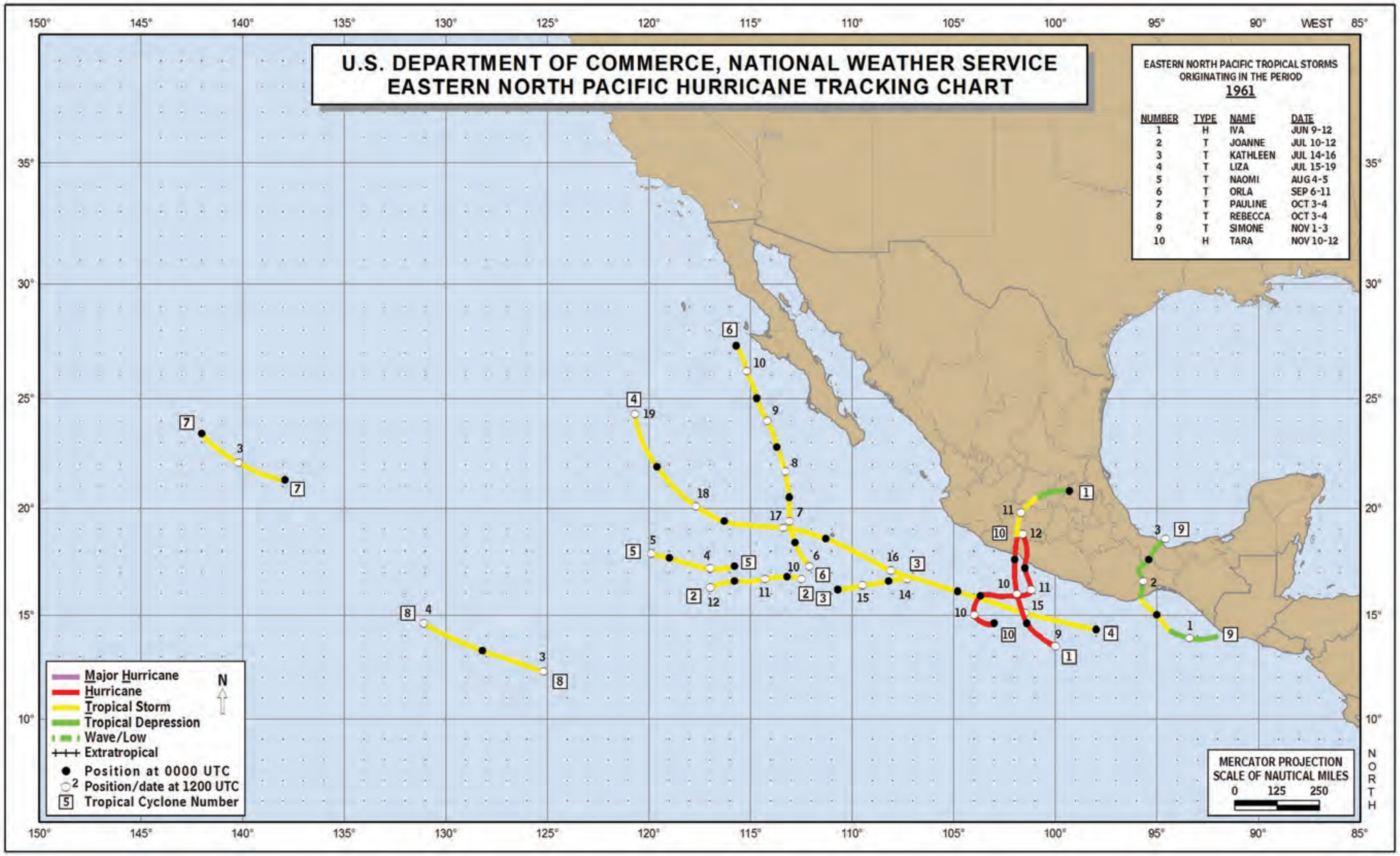

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1956
NUMBER TYPE NAME DATE
1 H ---- MAY 18-19
2 T ---- MAY 30-JUN 3
3 H ---- JUN 9-10
4 H ---- JUN 12-14
5 H ---- JUL 9-12
6 T ---- JUL 14-16
7 H ---- AUG 22-25
8 T ---- SEP 3
9 H ---- SEP 4-6
10 H ---- SEP 12-17
11 T ---- OCT 16-18
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°

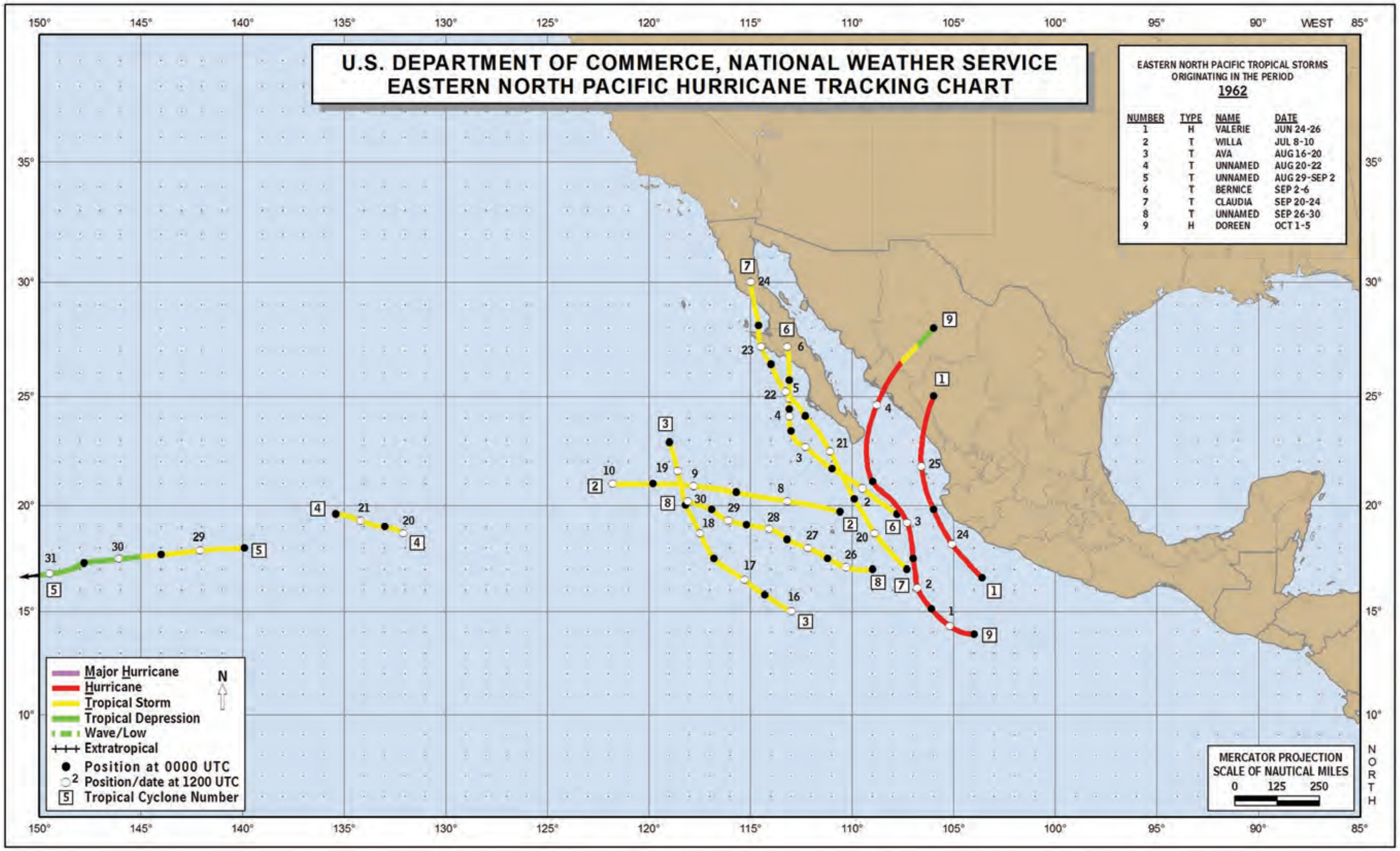

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1957
NUMBER TYPE NAME DATE
1 H KANOA JUL 15-26
2 T ---- AUG 6-16
3 H ---- AUG 9-15
4 T ---- SEP 9-11
5 H ---- SEP 17-18
6 T ---- SEP 20-23
7 T ---- SEP 26-27
8 H ---- OCT 1-6
9 H ---- OCT 17-20
10 MH ---- OCT 20-22
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

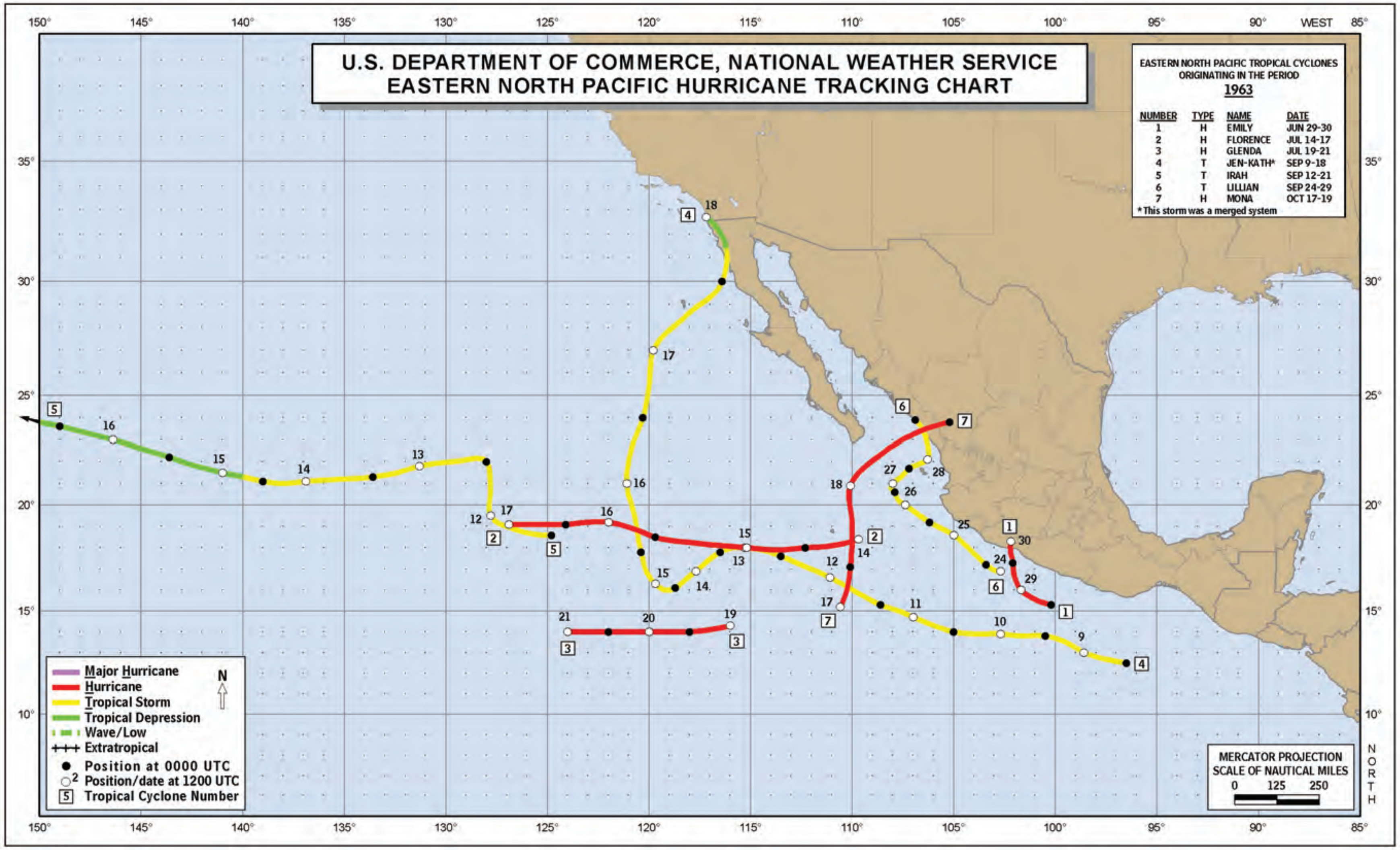

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1958
NUMBER TYPE NAME DATE
1 H ---- JUN 6-16
2 T ---- JUN 13-15
3 H ---- JUL 19-21
4 H ---- JUL 21-25
5 T ---- JUL 26-30
6 T ---- JUL 31-AUG 1
7 T ---- AUG 13-14
8 H ---- SEP 6-13
9 T ---- SEP 11-12
10 H ---- SEP 30-OCT 5
11 T ---- OCT 14-17
12 T ---- OCT 29-30
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

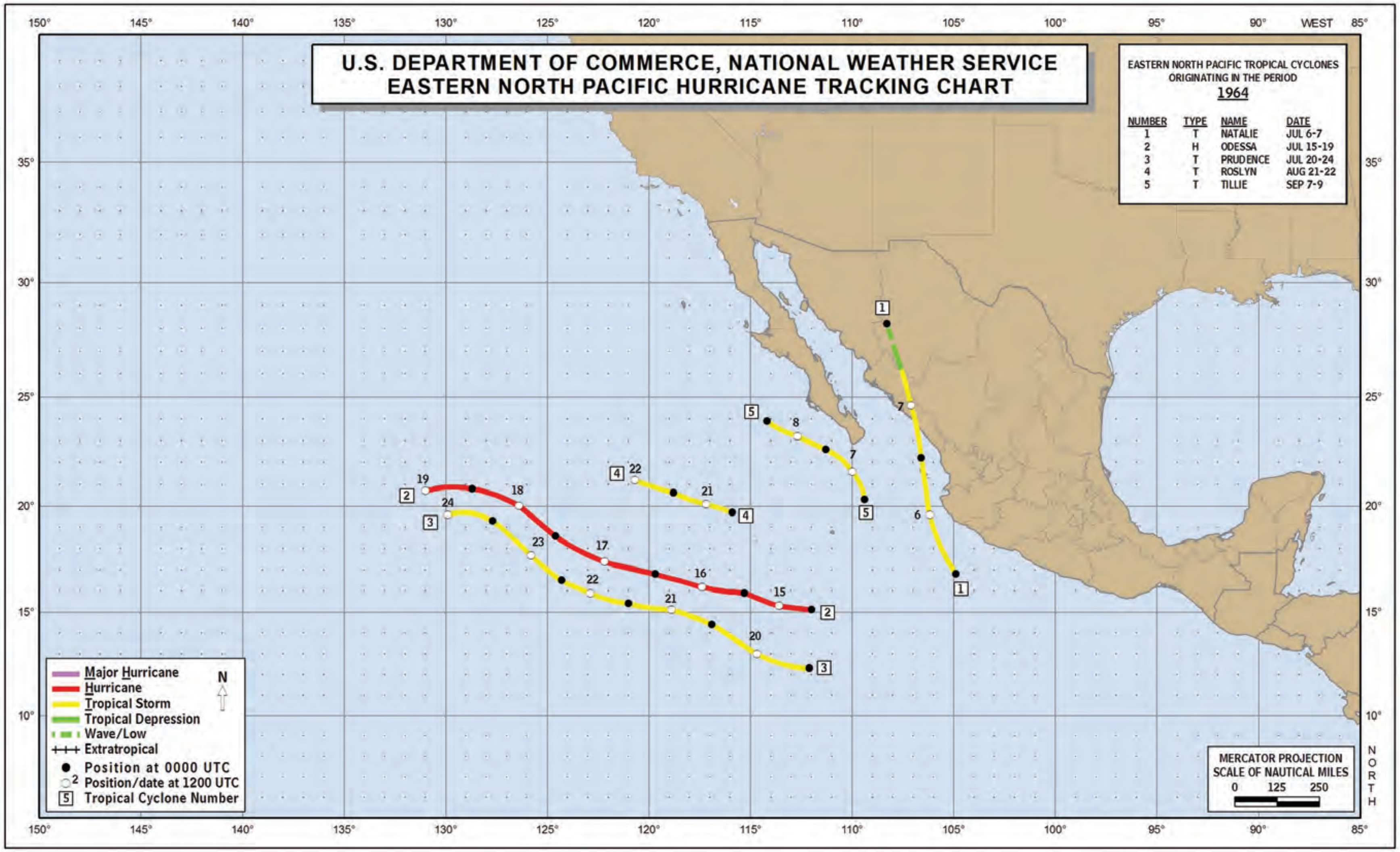

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1959
NUMBER TYPE NAME DATE
1 T ---- JUN 10-12
2 T ---- JUN 26-28
3 T ---- JUL 16-22
4 T ---- JUL 22-25
5 T ---- JUL 29-30
6 T ---- AUG 4-6
7 T ---- AUG 19-21
8 T ---- AUG 27-29
9 H ---- SEP 4-11
10 H ---- SEP 21-26
11 T ---- OCT 19-21
12 MH ---- OCT 23-29
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

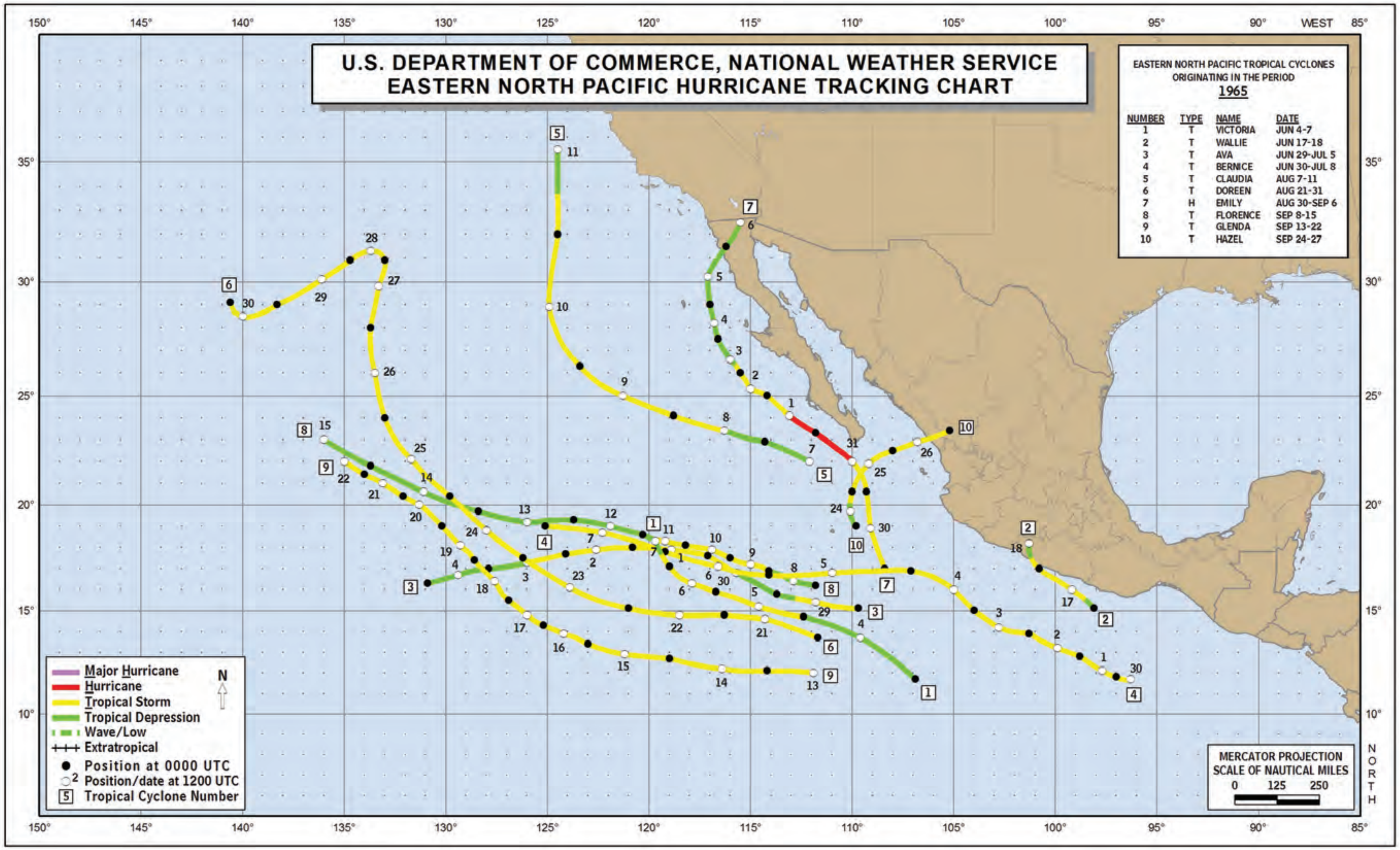

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1960
NUMBER TYPE NAME DATE
1 T ANNETTE JUN 9-12
2 T BONNY JUN 22-26
3 H CELESTE JUL 20-22
4 H DIANA AUG 17-20
5 H ESTELLE AUG 29-SEP 9
6 H FERNANDA SEP 3-8
7 H HYACINTH OCT 21-23
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

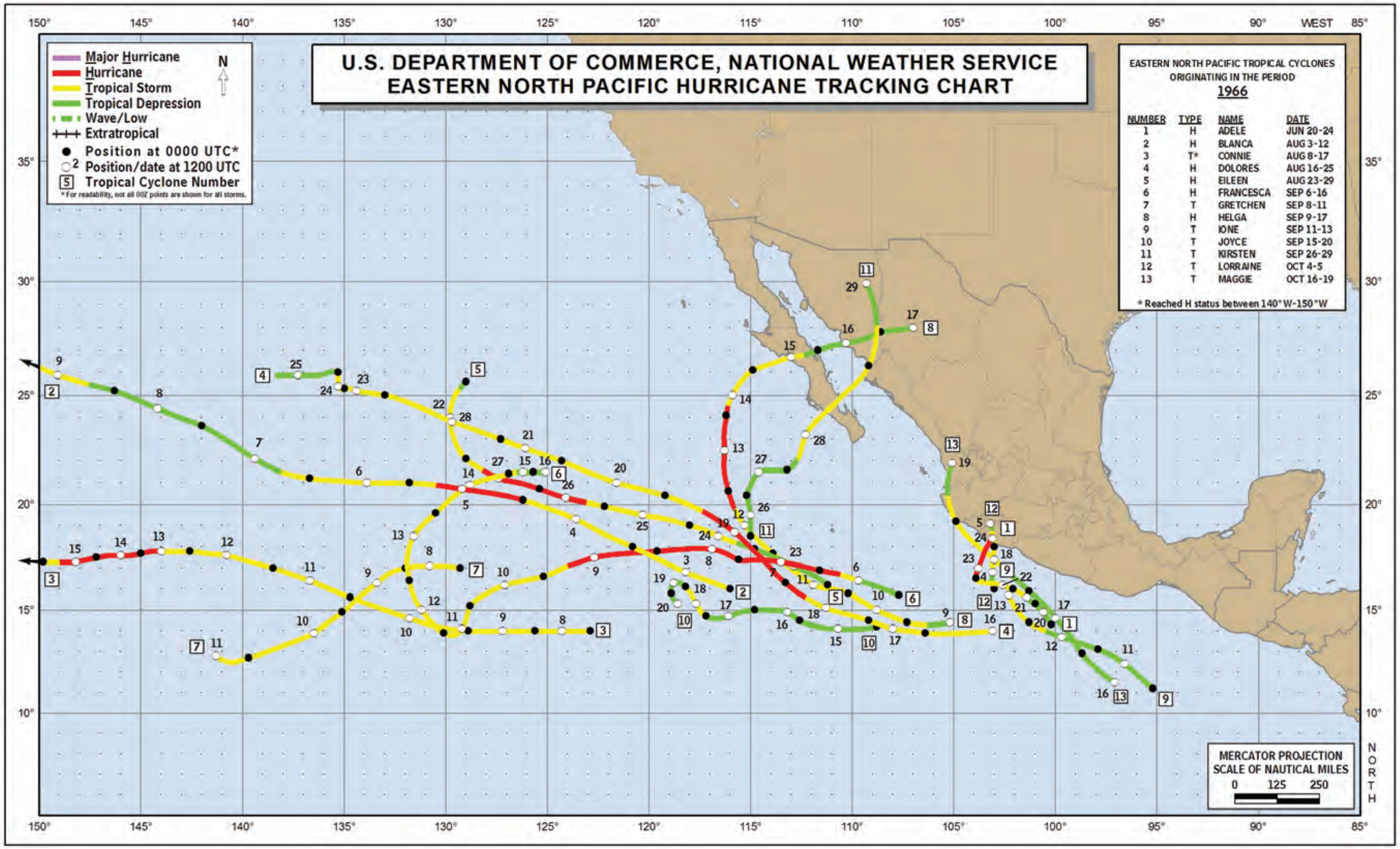

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL STORMS ORIGINATING IN THE PERIOD
1961
NUMBER TYPE NAME DATE
1 H IVA JUN 9-12
2 T JOANNE JUL 10-12
3 T KATHLEEN JUL 14-16
4 T LIZA JUL 15-19
5 T NAOMI AUG 4-5
6 T ORLA SEP 6-11
7 T PAULINE OCT 3-4
8 T REBECCA OCT 3-4
9 T SIMONE NOV 1-3
10 H TARA NOV 10-12
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

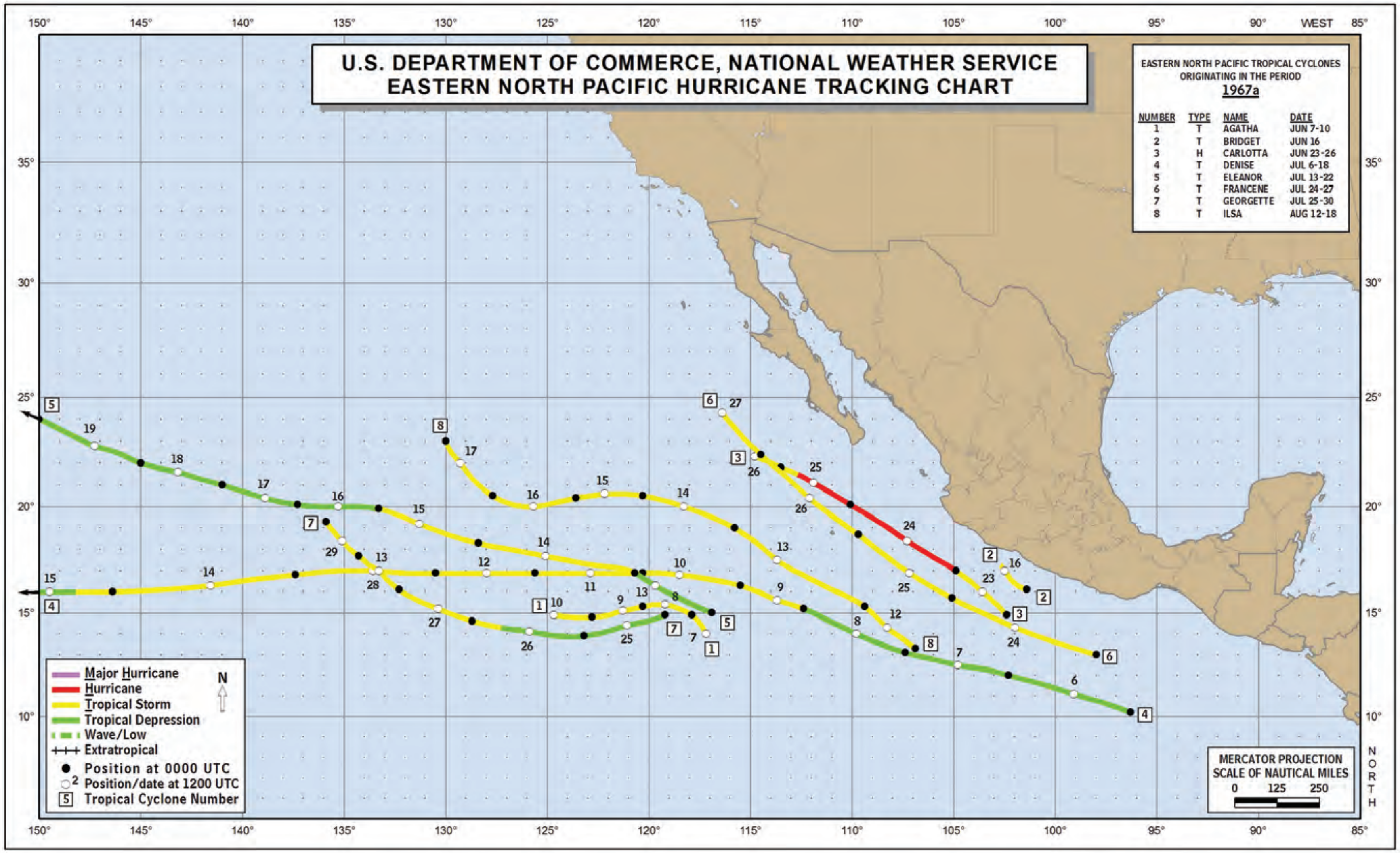

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL STORMS
ORIGINATING IN THE PERIOD
1962
NUMBER TYPE NAME DATE
1 H VALERIE JUN 24-26
2 T WILLA JUL 8-10
3 T AVA AUG 16-20
4 T UNNAMED AUG 20-22
5 T UNNAMED AUG 29-SEP 2
6 T BERNICE SEP 2-6
7 T CLAUDIA SEP 20-24
8 T UNNAMED SEP 26-30
9 H DOREEN OCT 1-5
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

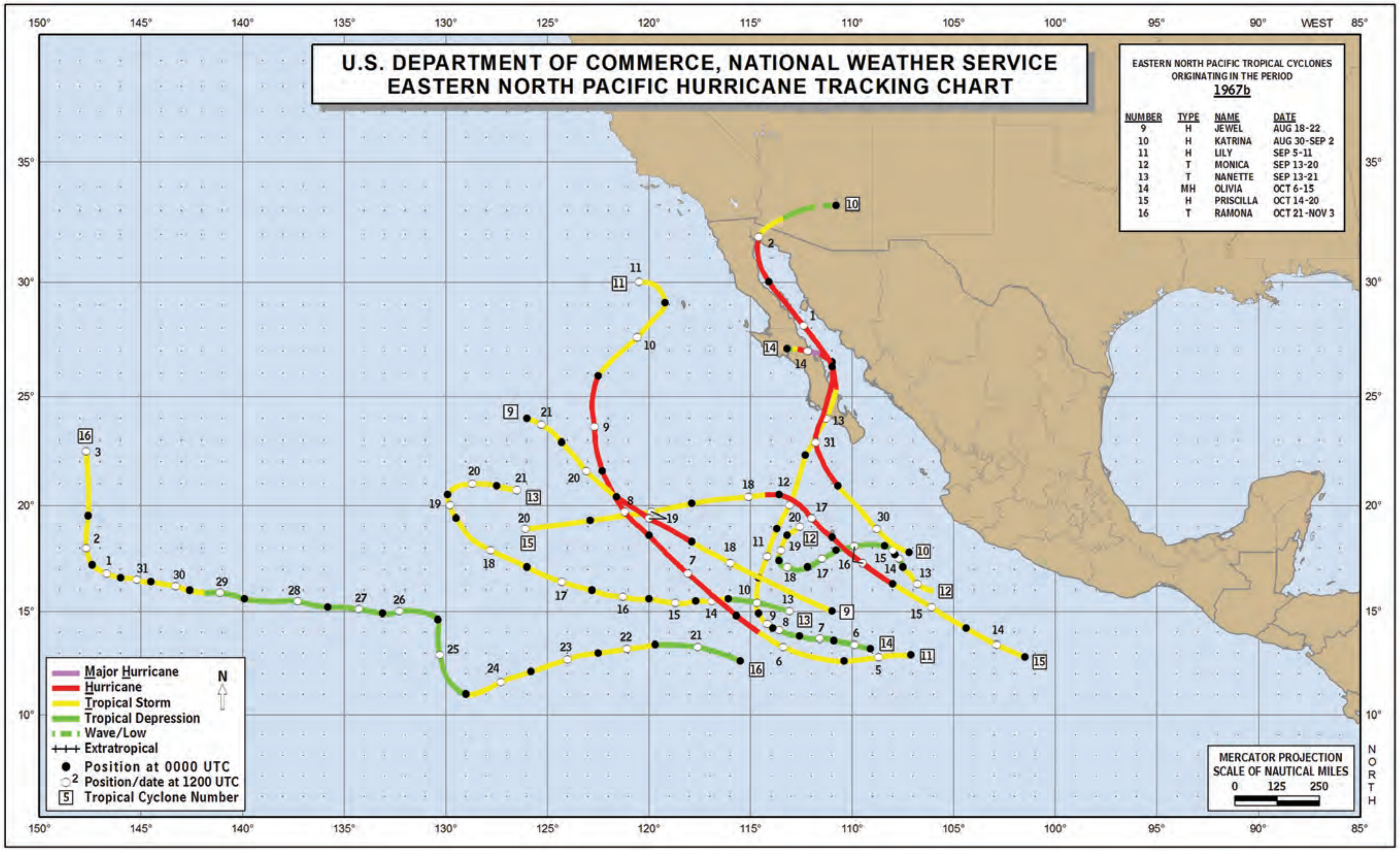

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1963
NUMBER TYPE NAME DATE
1 H EMILY JUN 29-30
2 H FLORENCE JUL 14-17
3 H GLENDA JUL 19-21
4 T JEN-KATH* SEP 9-18
5 T IRAH SEP 12-21
6 T LILLIAN SEP 24-29
7 H MONA OCT 17-19
* This storm was a merged system
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1964
NUMBER TYPE NAME DATE
1 T NATALIE JUL 6-7
2 H ODESSA JUL 15-19
3 T PRUDENCE JUL 20-24
4 T ROSLYN AUG 21-22
5 T TILLIE SEP 7-9
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

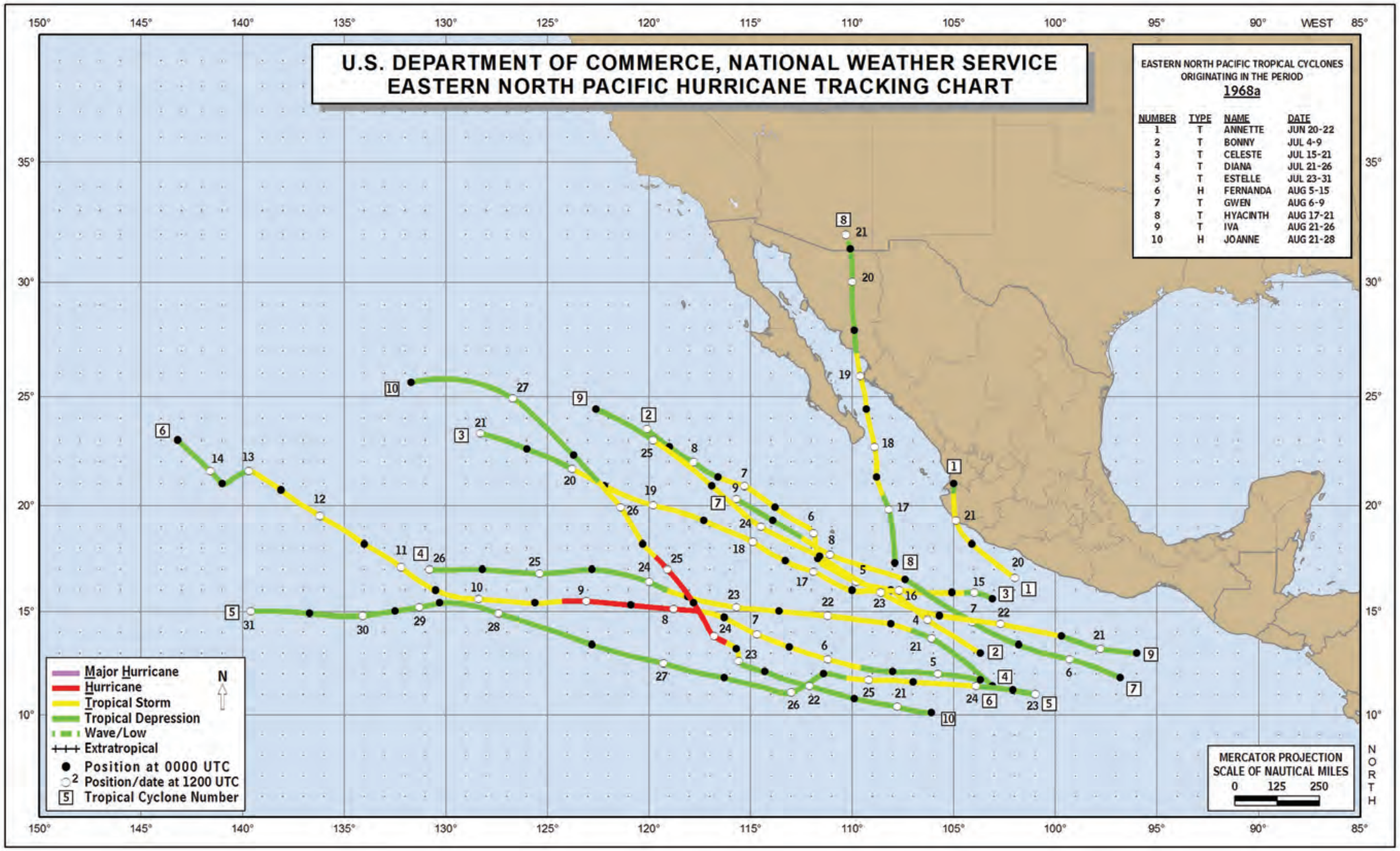

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1965
NUMBER TYPE NAME DATE
1 T VICTORIA JUN 4-7
2 T WALLIE JUN 17-18
3 T AVA JUN 29-JUL 5
4 T BERNICE JUN 30-JUL 8
5 T CLAUDIA AUG 7-11
6 T DOREEN AUG 21-31
7 H EMILY AUG 30-SEP 6
8 T FLORENCE SEP 8-15
9 T GLENDA SEP 13-22
10 T HAZEL SEP 24-27
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

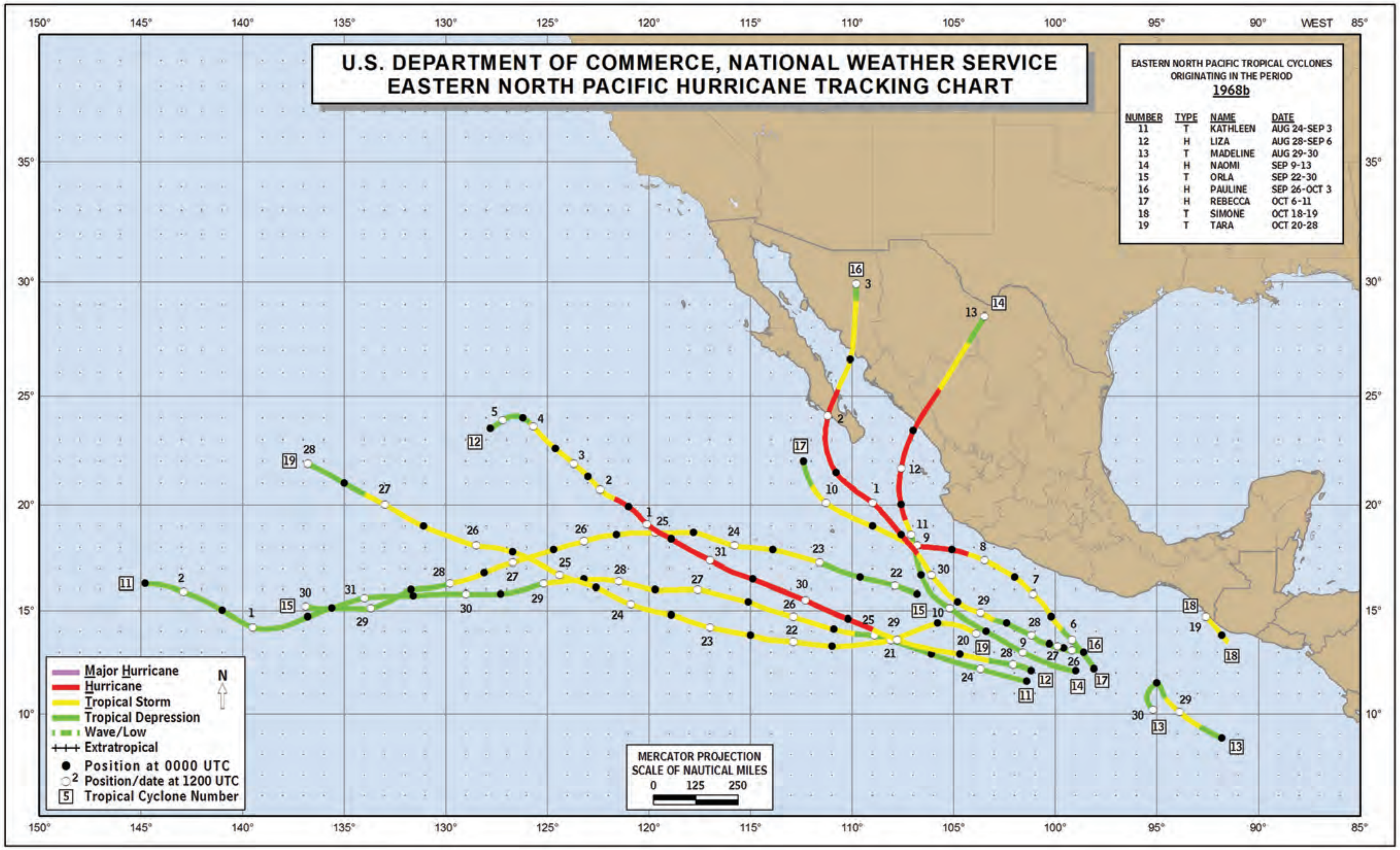

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC*
Position/date at 1200 UTC
Tropical Cyclone Number
* For readability, not all 00Z points are shown for all storms.
N
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1966
NUMBER TYPE NAME DATE
1 H ADELE JUN 20-24
2 H BLANCA AUG 3-12
3 T* CONNIE AUG 8-17
4 H DOLORES AUG 16-25
5 H EILEEN AUG 23-29
6 H FRANCESCA SEP 6-16
7 T GRETCHEN SEP 8-11
8 H HELGA SEP 9-17
9 T IONE SEP 11-13
10 T JOYCE SEP 15-20
11 T KIRSTEN SEP 26-29
12 T LORRAINE OCT 4-5
13 T MAGGIE OCT 16-19
* Reached H status between 140°W-150°W
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° WEST 85°
35° 30° 25° 20° 15° 10°
NORTH

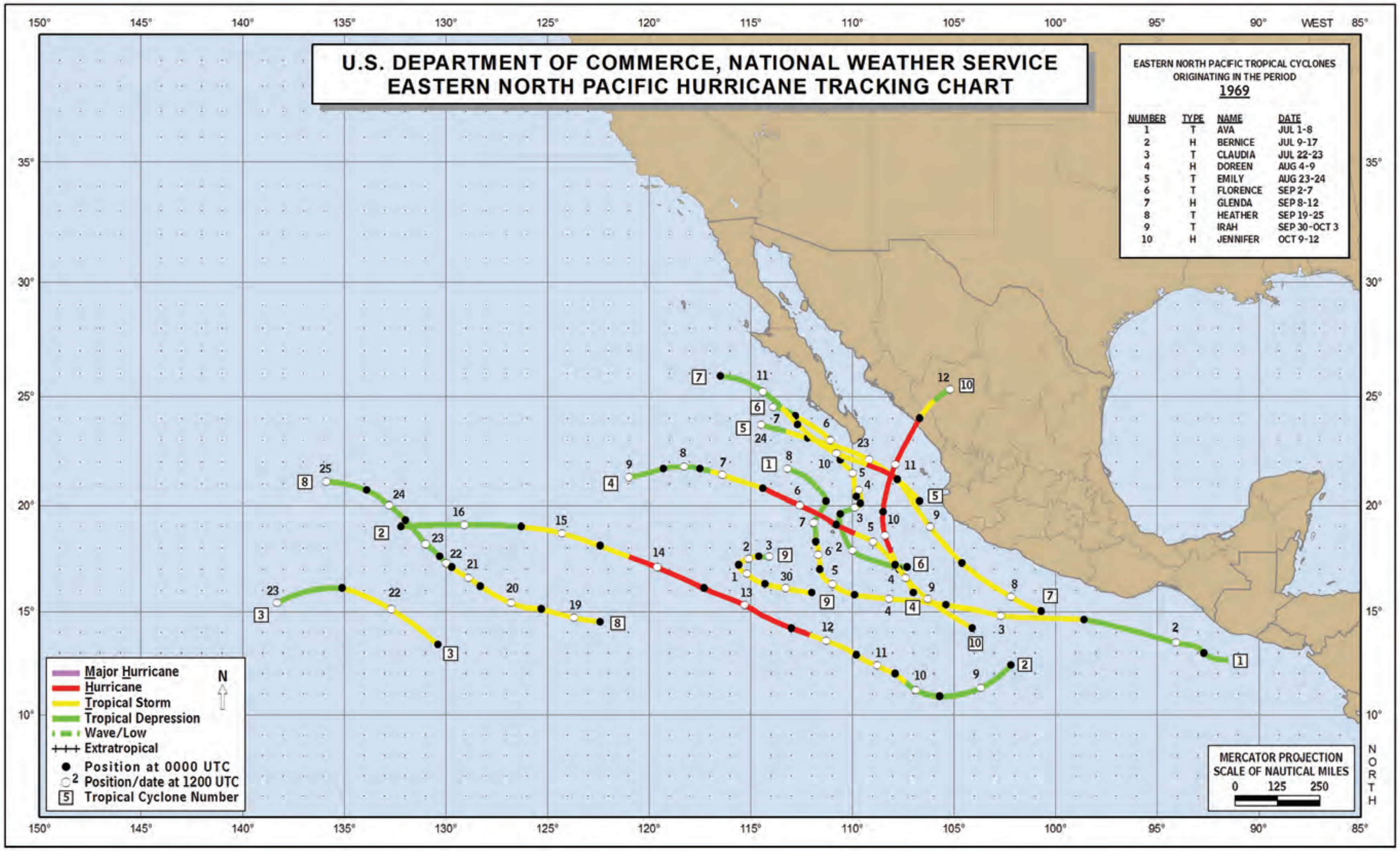

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1967a
NUMBER TYPE NAME DATE
1 T AGATHA JUN 7-10
2 T BRIDGET JUN 16
3 H CARLOTTA JUN 23-26
4 T DENISE JUL 6-18
5 T ELEANOR JUL 13-22
6 T FRANCENE JUL 24-27
7 T GEORGETTE JUL 25-30
8 T ILSA AUG 12-18
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

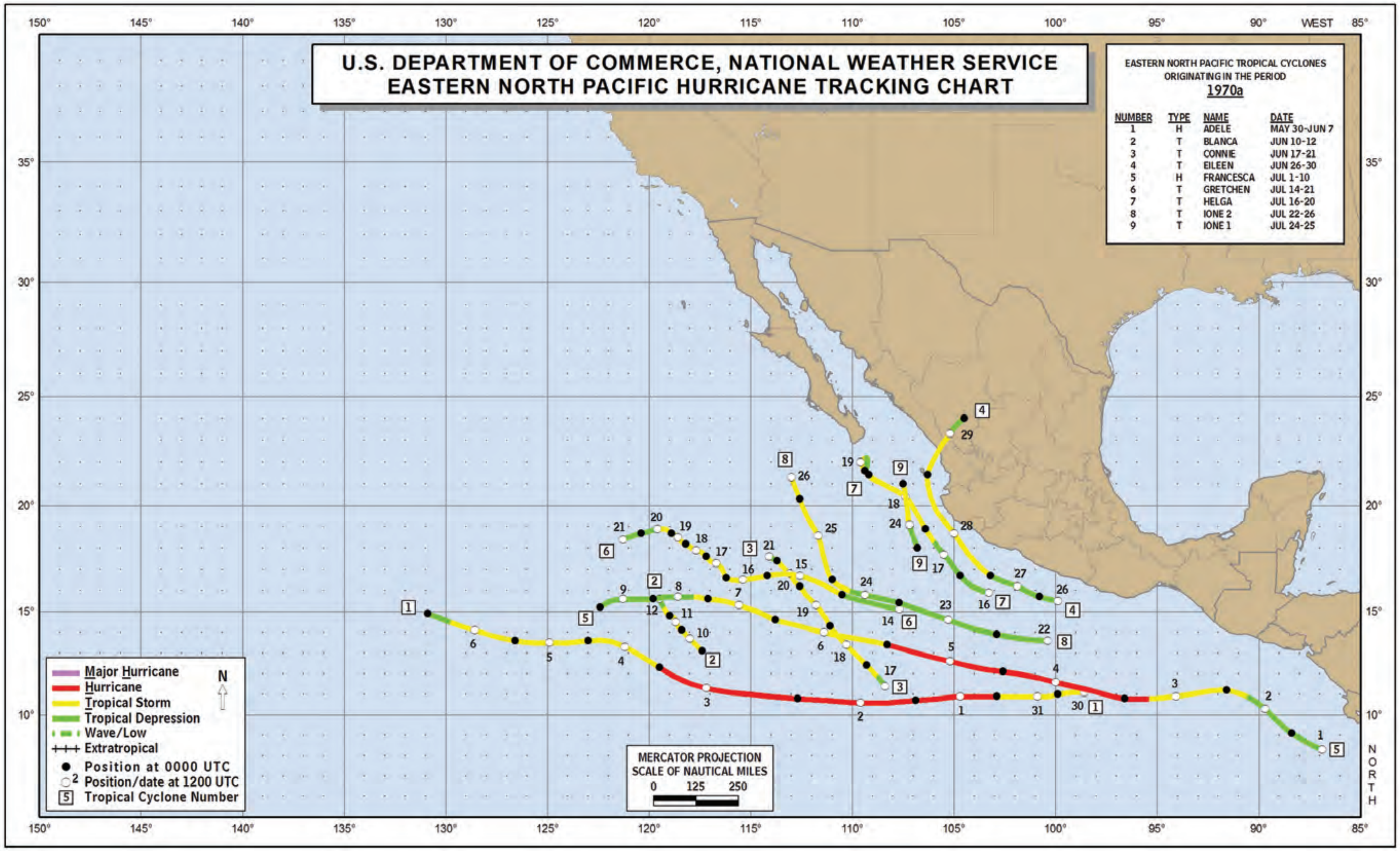


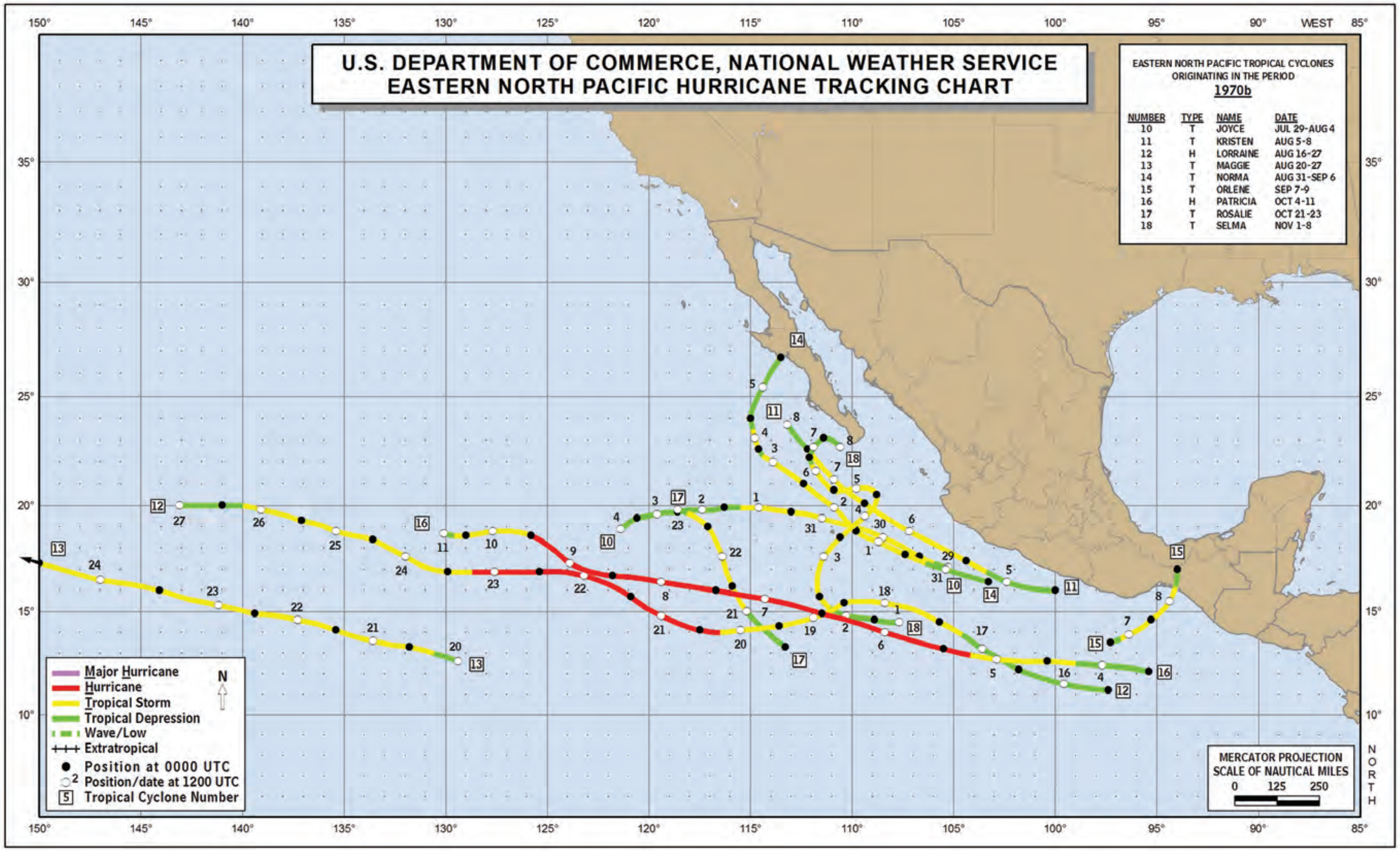
U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1967b
NUMBER TYPE NAME DATE
9 H JEWEL AUG 18-22
10 H KATRINA AUG 30-SEP 2
11 H LILY SEP 5-11
12 T MONICA SEP 13-20
13 T NANETTE SEP 13-21
14 MH OLIVIA OCT 6-15
15 H PRISCILLA OCT 14-20
16 T RAMONA OCT 21-NOV 3
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°

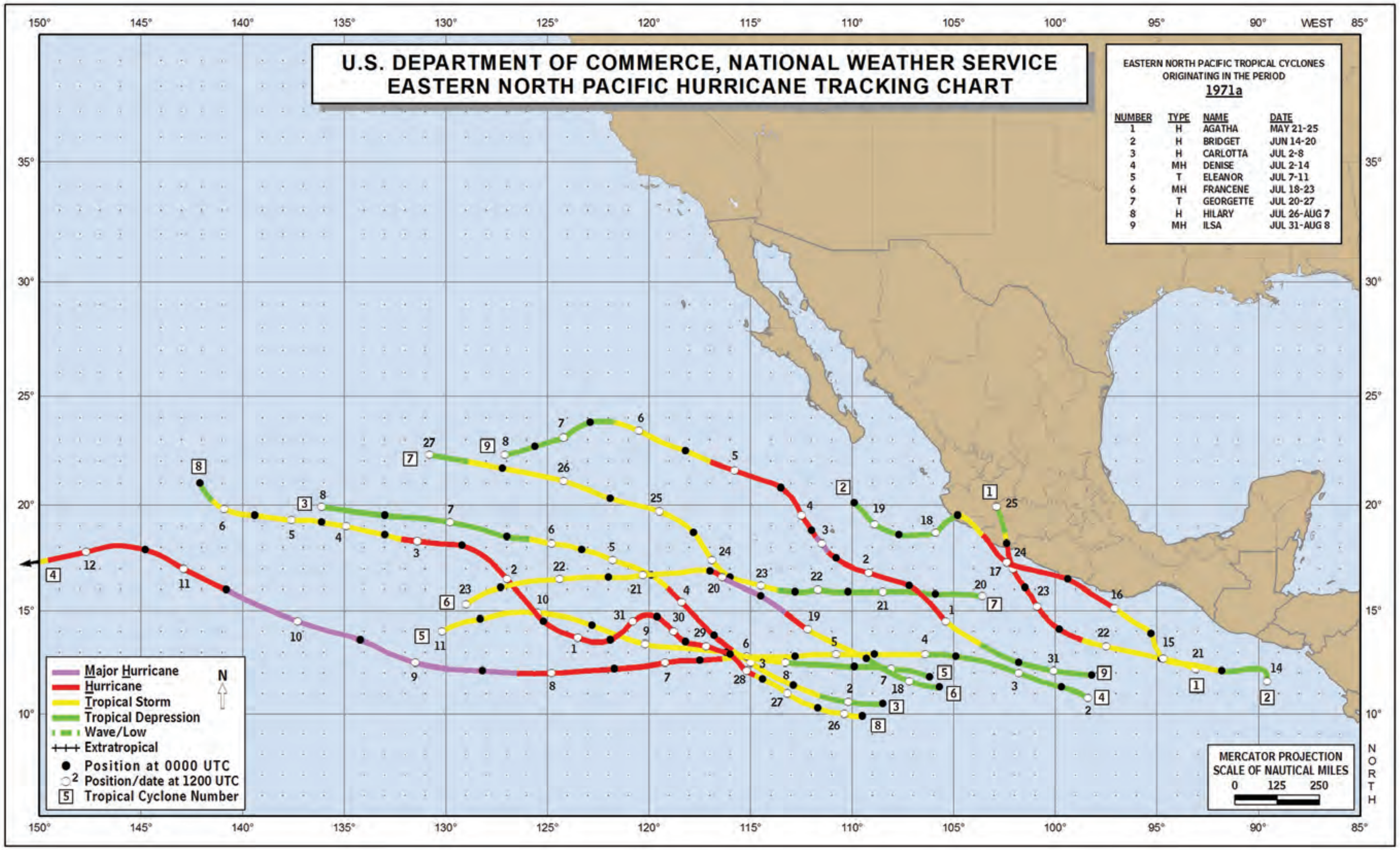

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1968a
NUMBER TYPE NAME DATE
1 T ANNETTE JUN 20-22
2 T BONNY JUL 4-9
3 T CELESTE JUL 15-21
4 T DIANA JUL 21-26
5 T ESTELLE JUL 23-31
6 H FERNANDA AUG 5-15
7 T GWEN AUG 6-9
8 T HYACINTH AUG 17-21
9 T IVA AUG 21-26
10 H JOANNE AUG 21-28
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

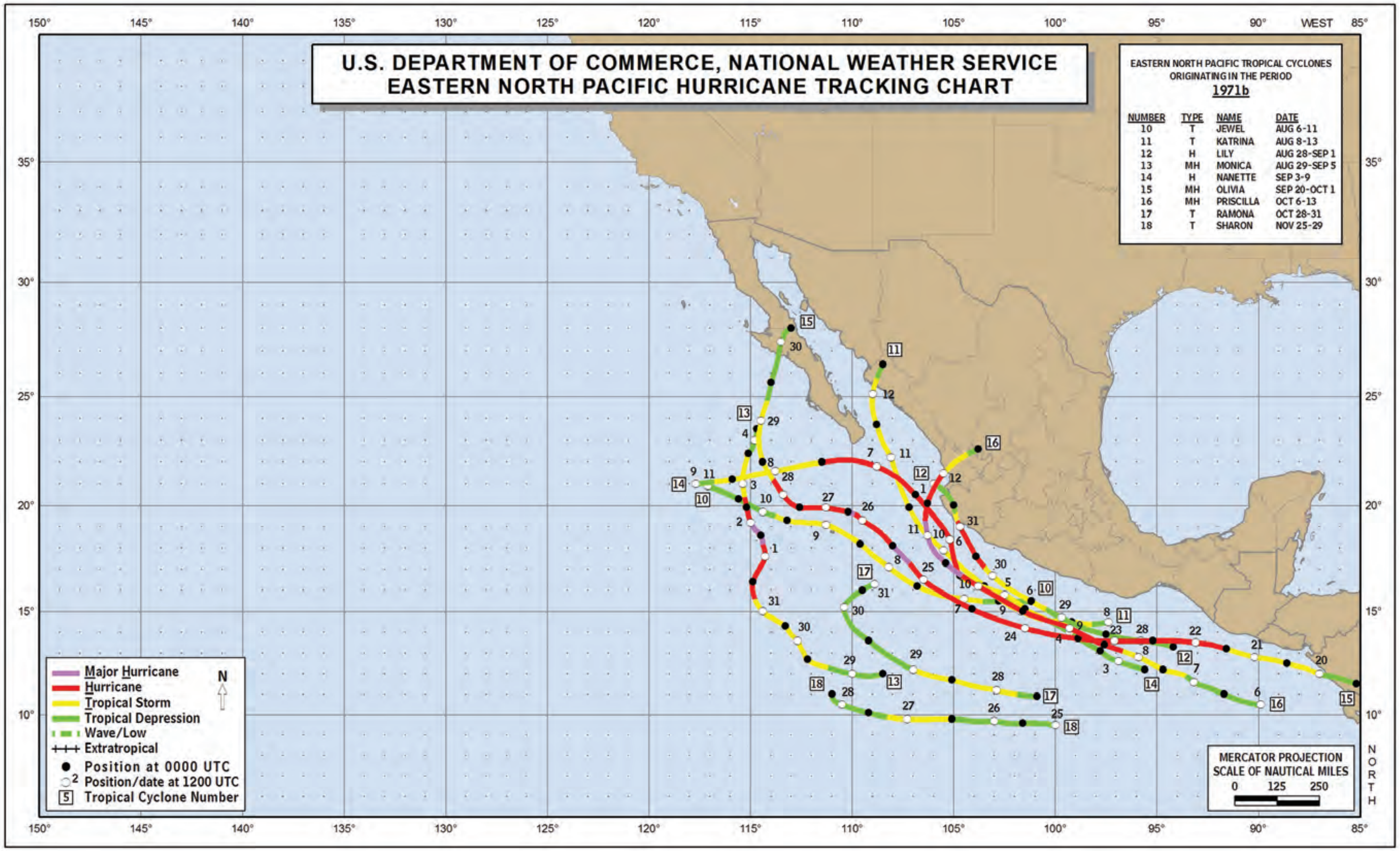

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1968b
NUMBER TYPE NAME DATE
11 T KATHLEEN AUG 24-SEP 3
12 H LIZA AUG 28-SEP 6
13 T MADELINE AUG 29-30
14 H NAOMI SEP 9-13
15 T ORLA SEP 22-30
16 H PAULINE SEP 26-OCT 3
17 H REBECCA OCT 6-11
18 T SIMONE OCT 18-19
19 T TARA OCT 20-28
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1969
NUMBER TYPE NAME DATE
1 T AVA JUL 1-8
2 H BERNICE JUL 9-17
3 T CLAUDIA JUL 22-23
4 H DOREEN AUG 4-9
5 T EMILY AUG 23-24
6 T FLORENCE SEP 2-7
7 H GLENDA SEP 8-12
8 T HEATHER SEP 19-25
9 T IRAH SEP 30-OCT 3
10 H JENNIFER OCT 9-12
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

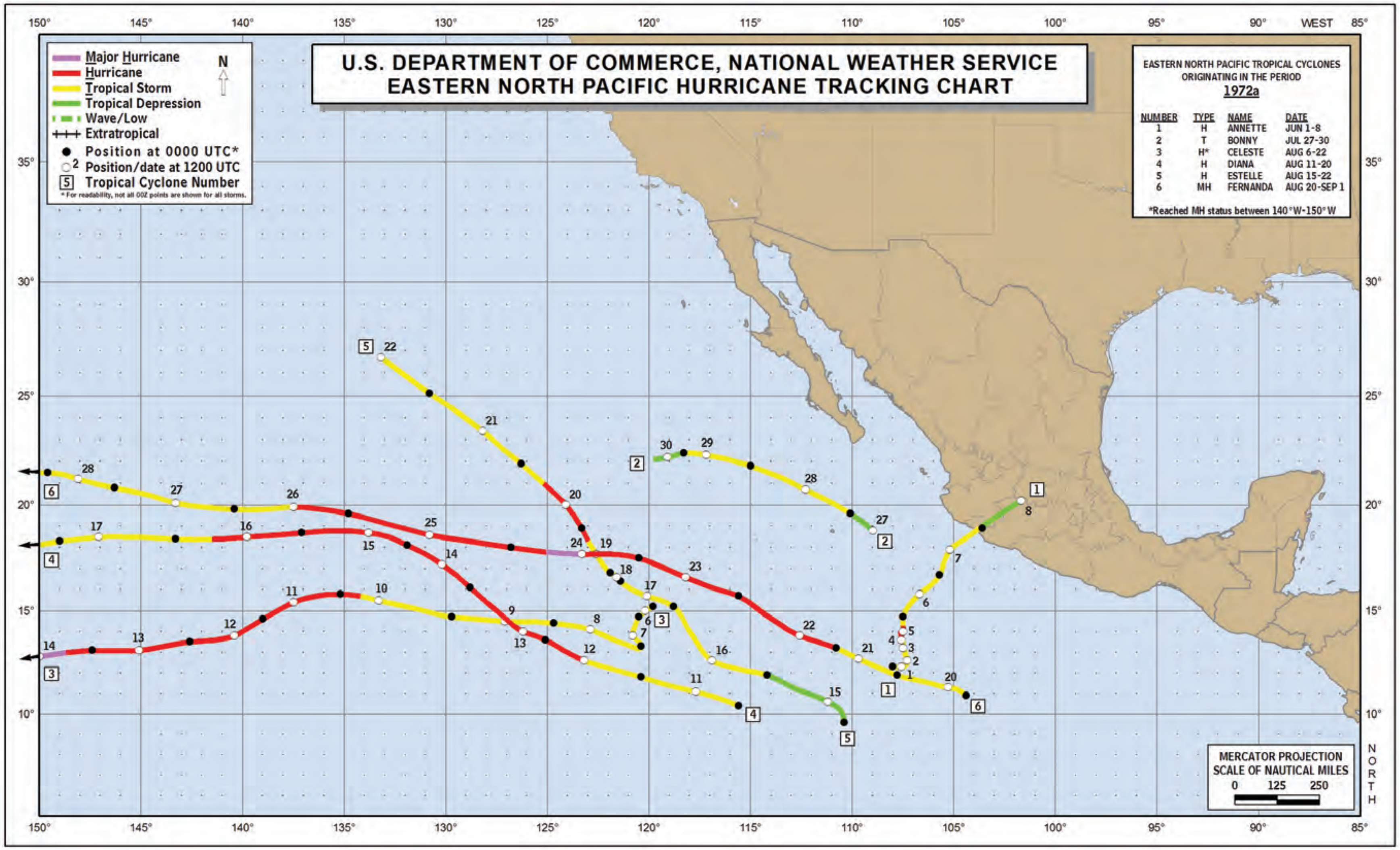

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1970a
NUMBER TYPE NAME DATE
1 H ADELE MAY 30-JUN 7
2 T BLANCA JUN 10-12
3 T CONNIE JUN 17-21
4 T EILEEN JUN 26-30
5 H FRANCESCA JUL 1-10
6 T GRETCHEN JUL 14-21
7 T HELGA JUL 16-20
8 T IONE 2 JUL 22-26
9 T IONE 1 JUL 24-25
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

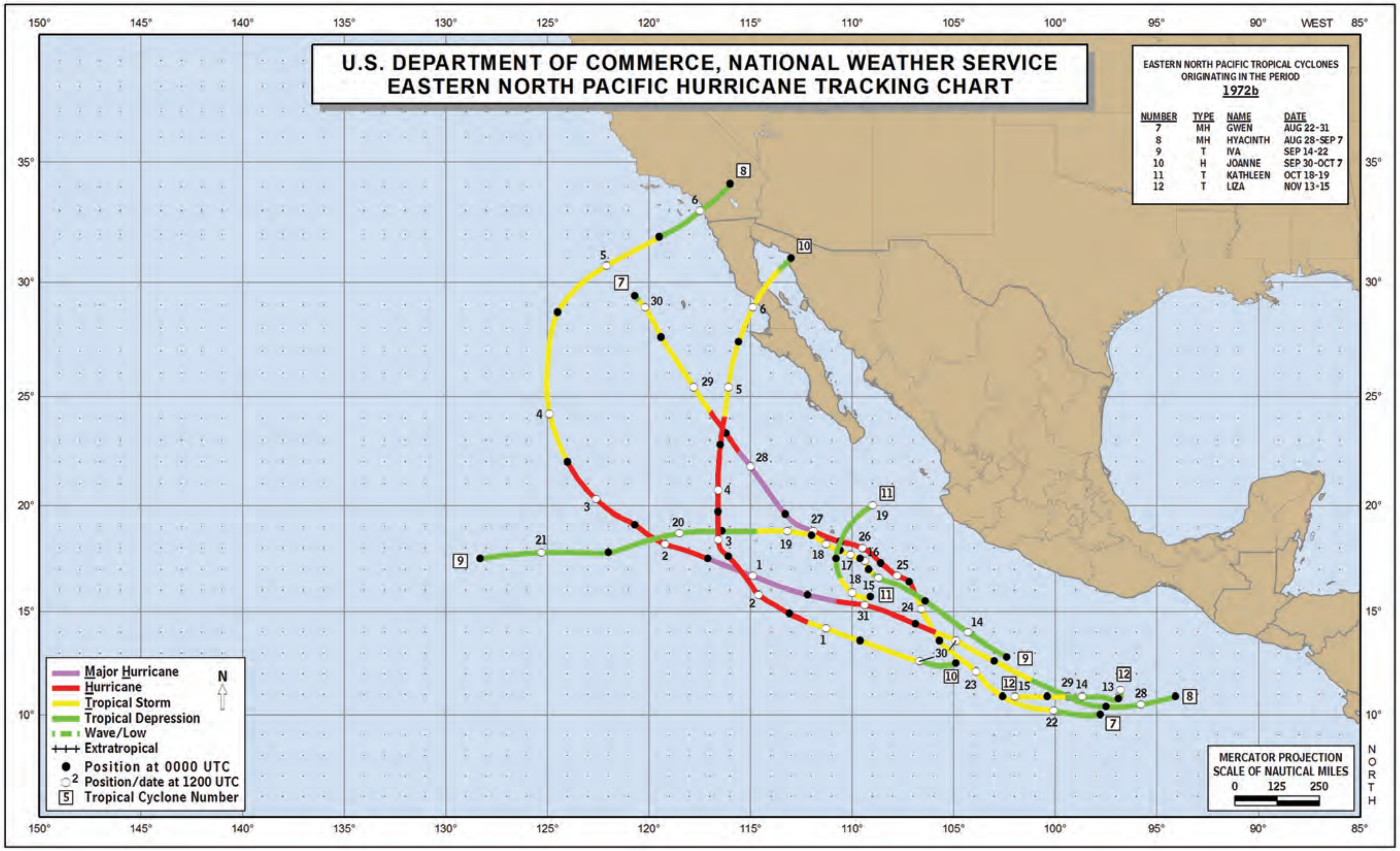

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1970b
NUMBER TYPE NAME DATE
10 T JOYCE JUL 29-AUG 4
11 T KRISTEN AUG 5-8
12 H LORRAINE AUG 16-27
13 T MAGGIE AUG 20-27
14 T NORMA AUG 31-SEP 6
15 T ORLENE SEP 7-9
16 H PATRICIA OCT 4-11
17 T ROSALIE OCT 21-23
18 T SELMA NOV 1-8
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1971a
NUMBER TYPE NAME DATE
1 H AGATHA MAY 21-25
2 H BRIDGET JUN 14-20
3 H CARLOTTA JUL 2-8
4 MH DENISE JUL 2-14
5 T ELEANOR JUL 7-11
6 MH FRANCENE JUL 18-23
7 T GEORGETTE JUL 20-27
8 H HILARY JUL 26-AUG 7
9 MH ILSA JUL 31-AUG 8
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

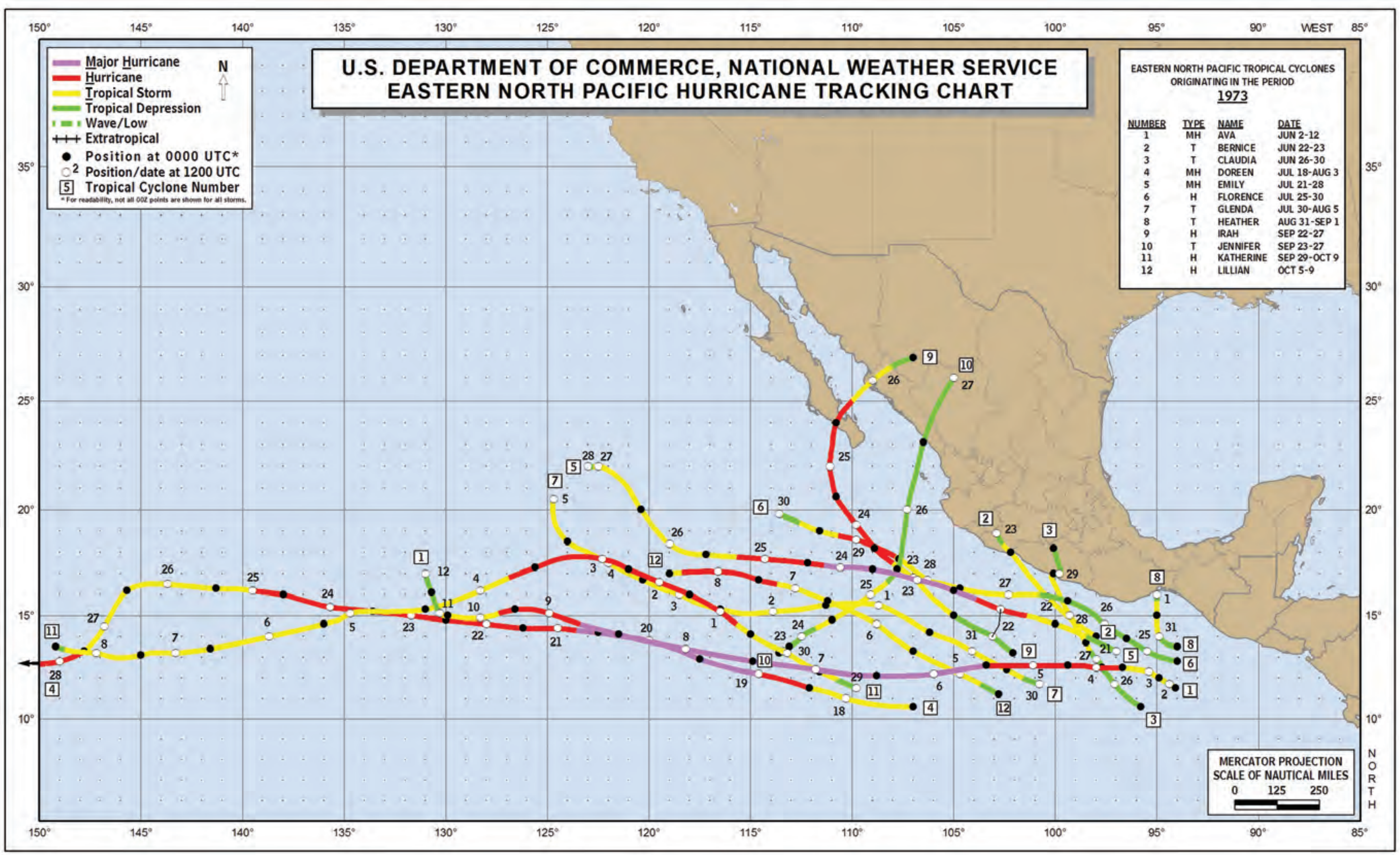


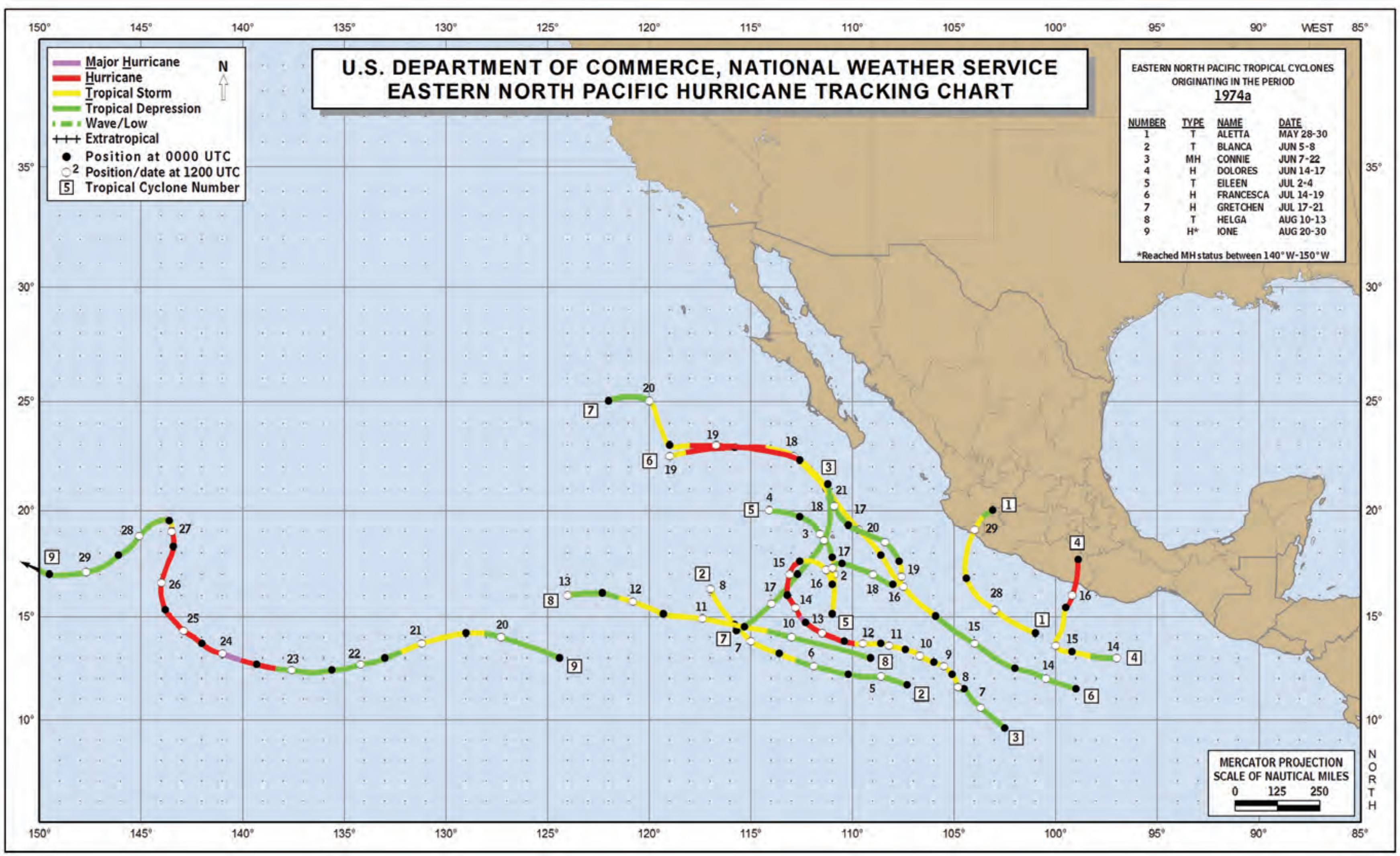
U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1971b
NUMBER TYPE NAME DATE
10 T JEWEL AUG 6-11
11 T KATRINA AUG 8-13
12 H LILY AUG 28-SEP 1
13 MH MONICA AUG 29-SEP 5
14 H NANETTE SEP 3-9
15 MH OLIVIA SEP 20-OCT 1
16 MH PRISCILLA OCT 6-13
17 T RAMONA OCT 28-31
18 T SHARON NOV 25-29
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

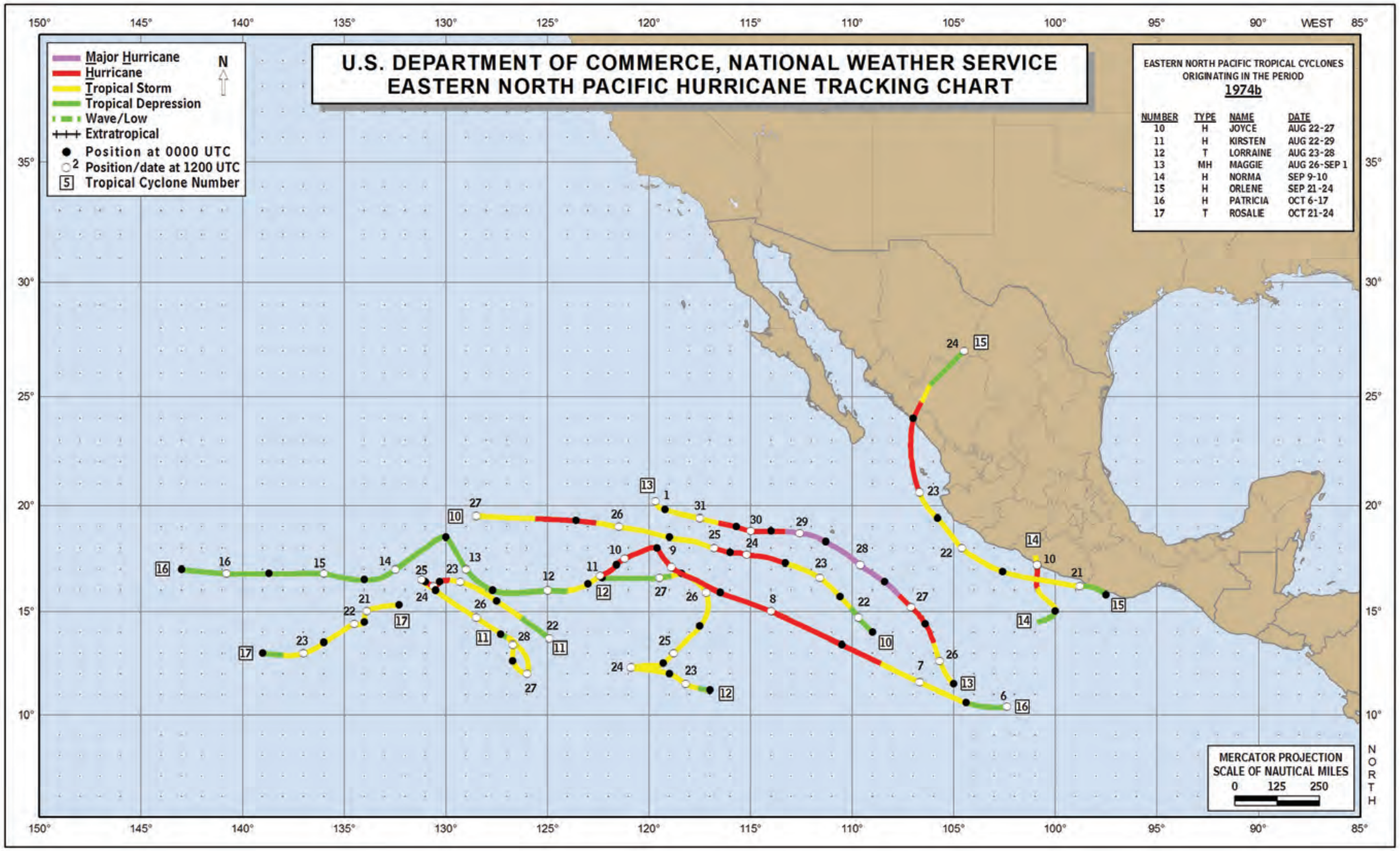

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC*
Position/date at 1200 UTC
Tropical Cyclone Number
* For readability, not all 00Z points are shown for all storms.
N
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1972a
NUMBER TYPE NAME DATE
1 H ANNETTE JUN 1-8
2 T BONNY JUL 27-30
3 H* CELESTE AUG 6-22
4 H DIANA AUG 11-20
5 H ESTELLE AUG 15-22
6 MH FERNANDA AUG 20-SEP 1
*Reached MH status between 140°W-150°W
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

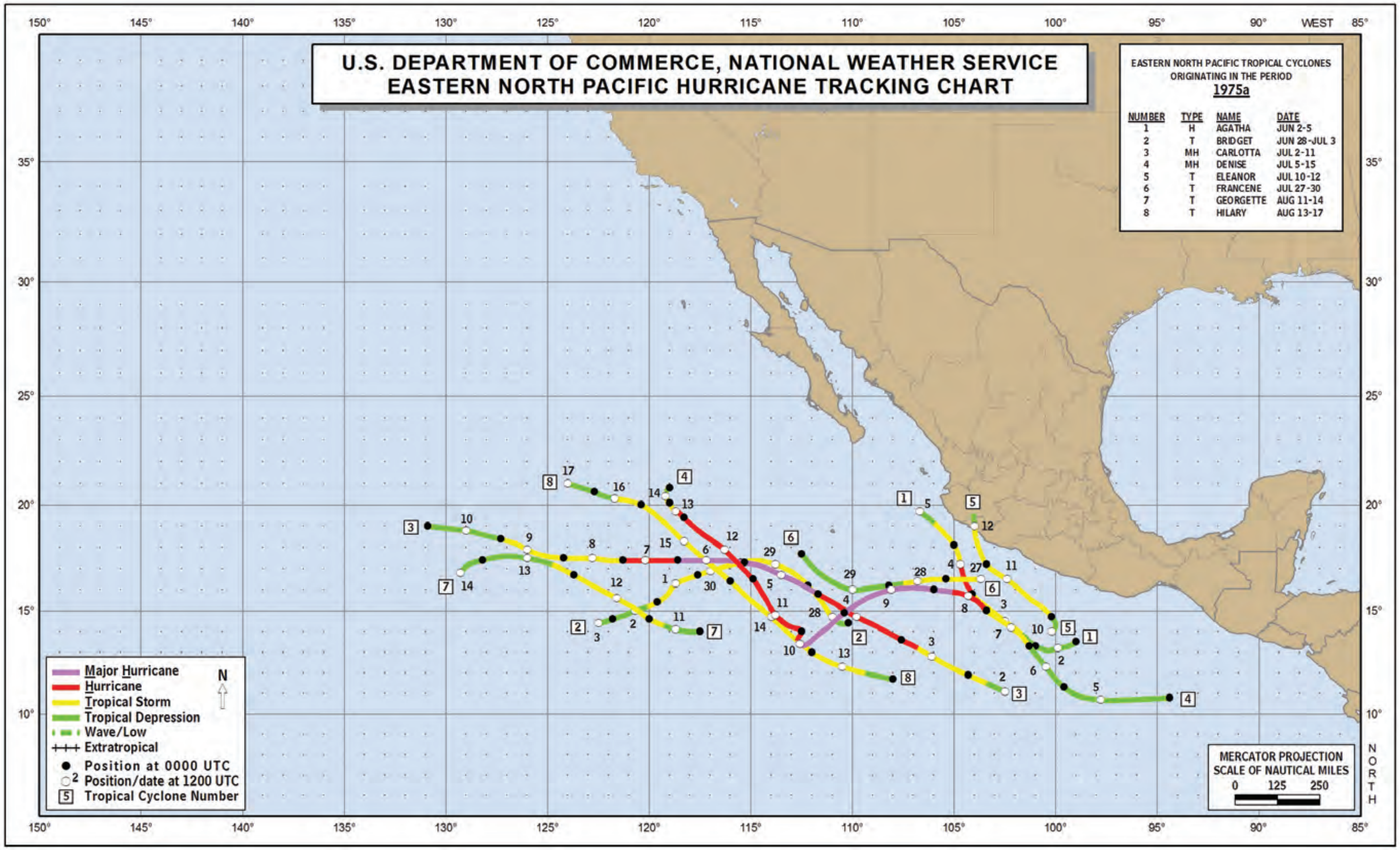


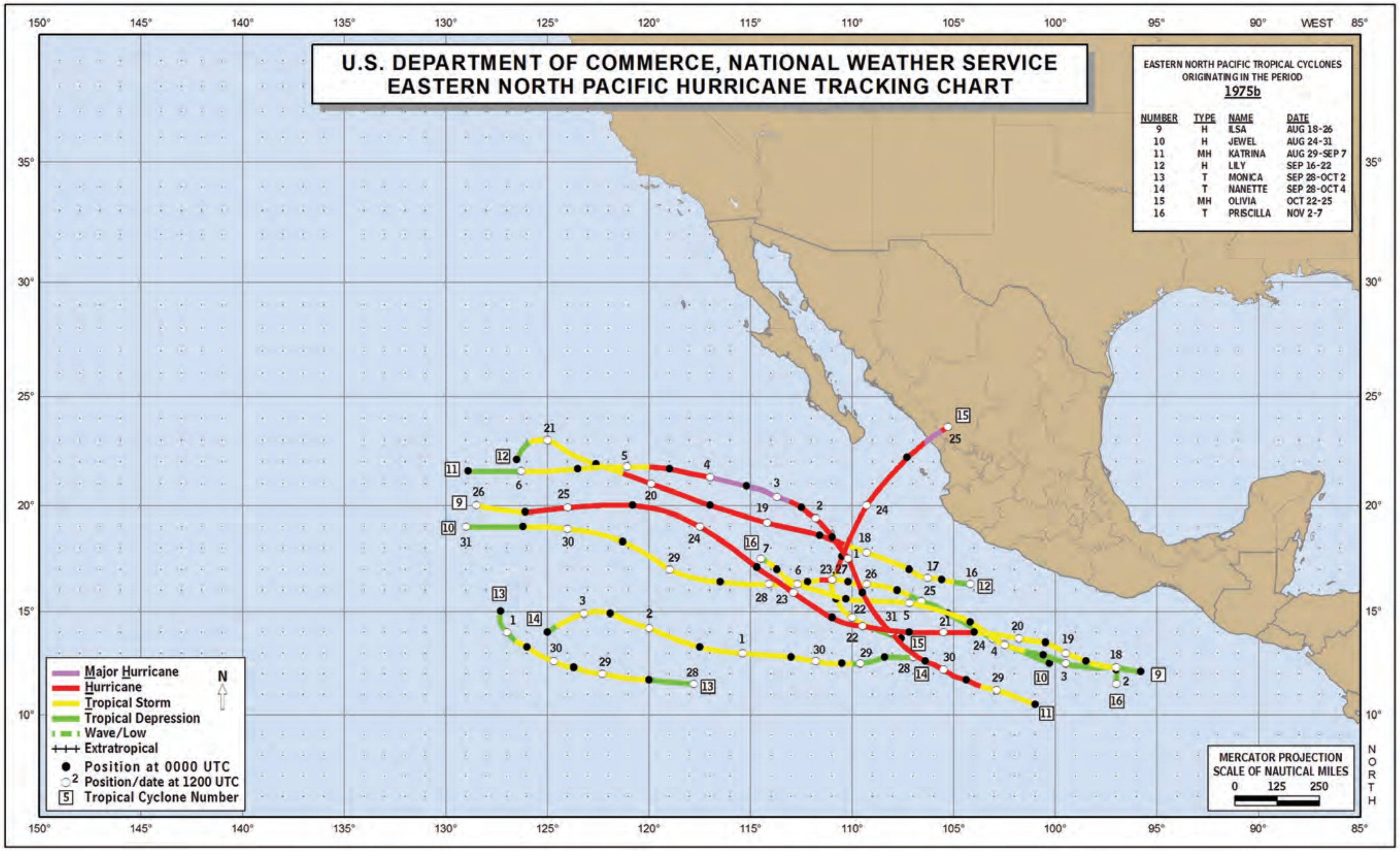
U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1972b
NUMBER TYPE NAME DATE
7 MH GWEN AUG 22-31
8 MH HYACINTH AUG 28-SEP 7
9 T IVA SEP 14-22
10 H JOANNE SEP 30-OCT 7
11 T KATHLEEN OCT 18-19
12 T LIZA NOV 13-15
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

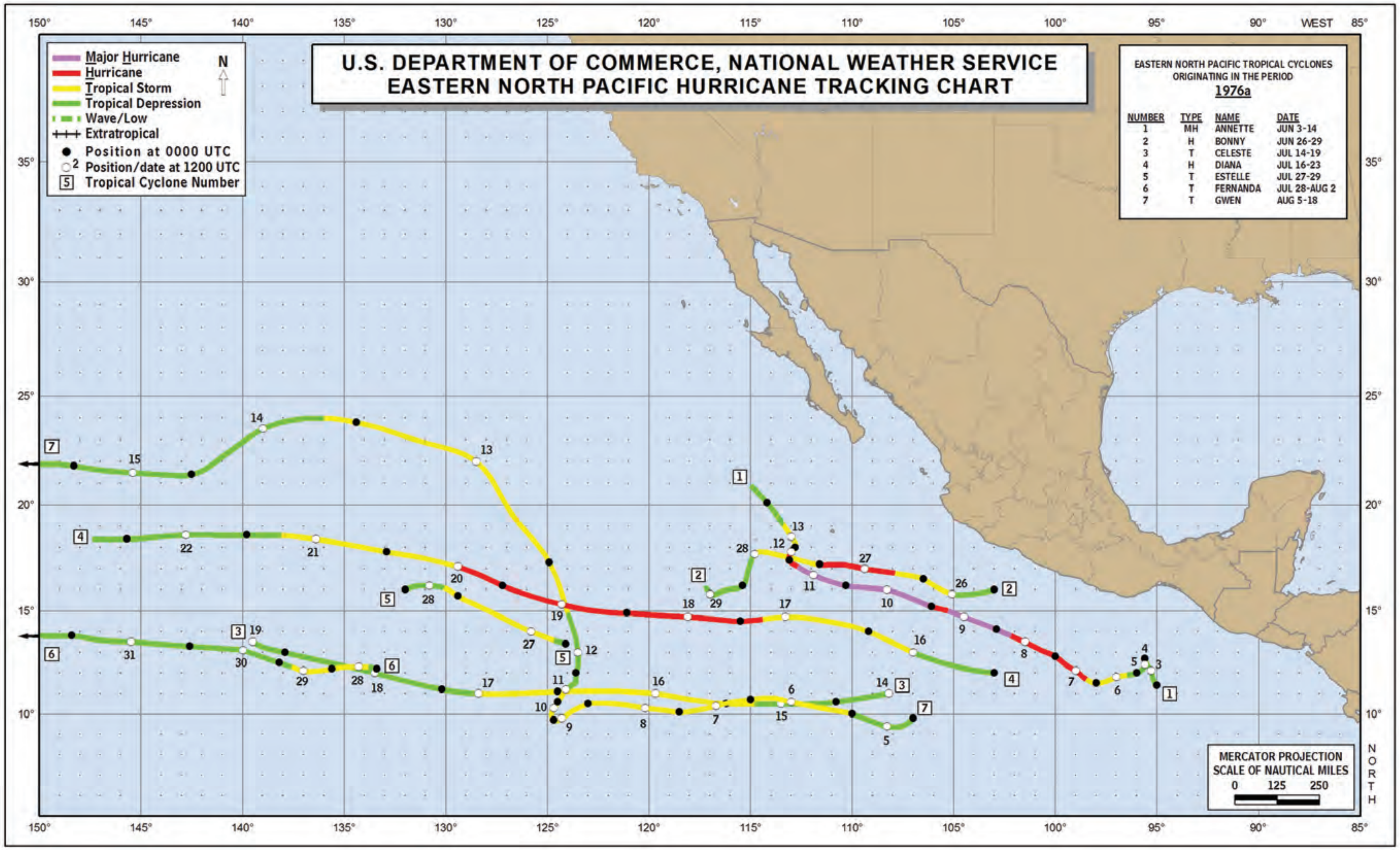

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC*
Position/date at 1200 UTC
Tropical Cyclone Number
* For readability, not all 00Z points are shown for all storms.
N
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1973
NUMBER TYPE NAME DATE
1 MH AVA JUN 2-12
2 T BERNICE JUN 22-23
3 T CLAUDIA JUN 26-30
4 MH DOREEN JUL 18-AUG 3
5 MH EMILY JUL 21-28
6 H FLORENCE JUL 25-30
7 T GLENDA JUL 30-AUG 5
8 T HEATHER AUG 31-SEP 1
9 H IRAH SEP 22-27
10 T JENNIFER SEP 23-27
11 H KATHERINE SEP 29-OCT 9
12 H LILLIAN OCT 5-9
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°

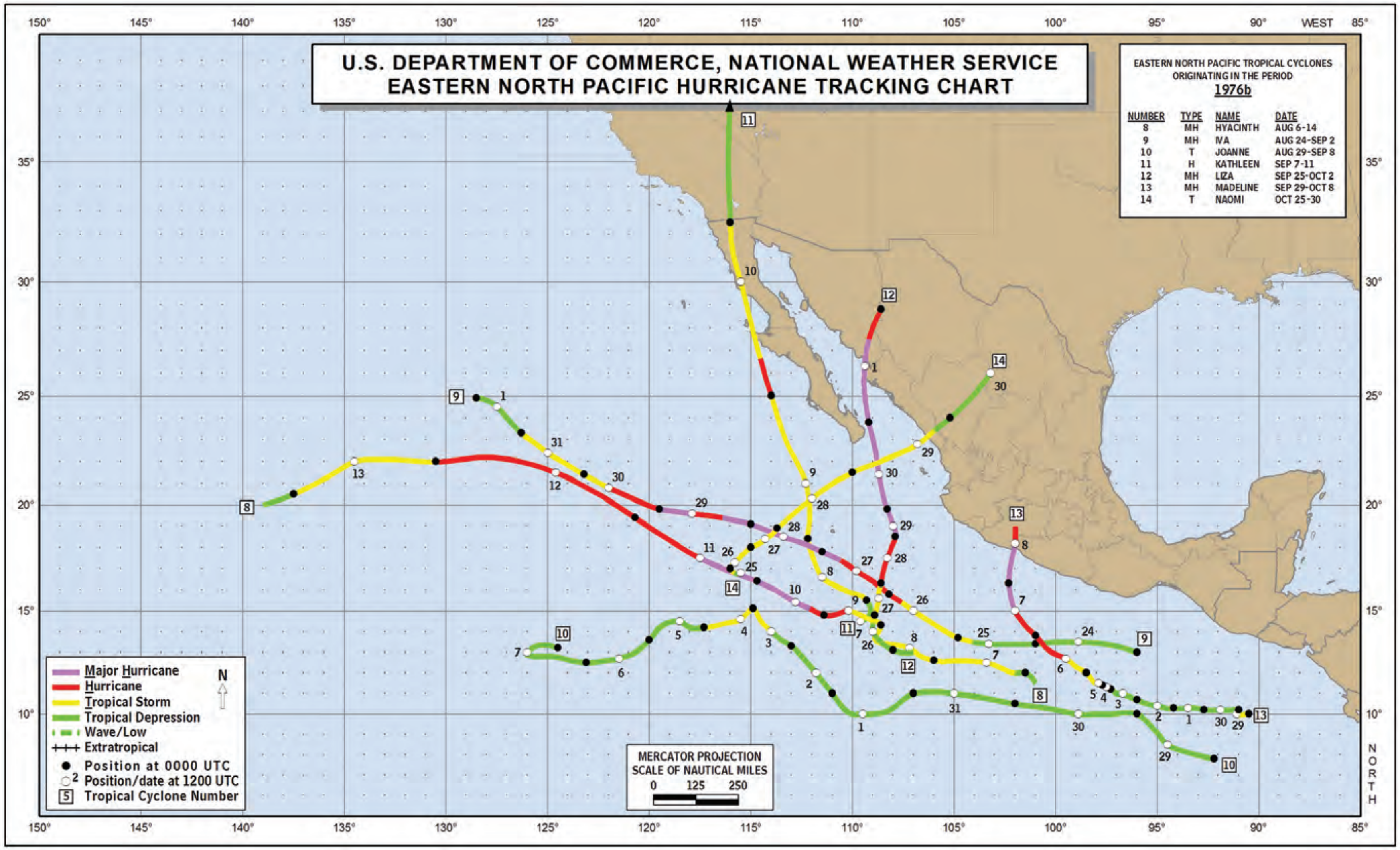

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
2 Position/date at 1200 UTC
5 Tropical Cyclone Number
N
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1974a
NUMBER TYPE NAME DATE
1 T ALETTA MAY 28-30
2 T BLANCA JUN 5-8
3 MH CONNIE JUN 7-22
4 H DOLORES JUN 14-17
5 T EILEEN JUL 2-4
6 H FRANCESCA JUL 14-19
7 H GRETCHEN JUL 17-21
8 T HELGA AUG 10-13
9 H* IONE AUG 20-30
*Reached MH status between 140°W-150°W
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°

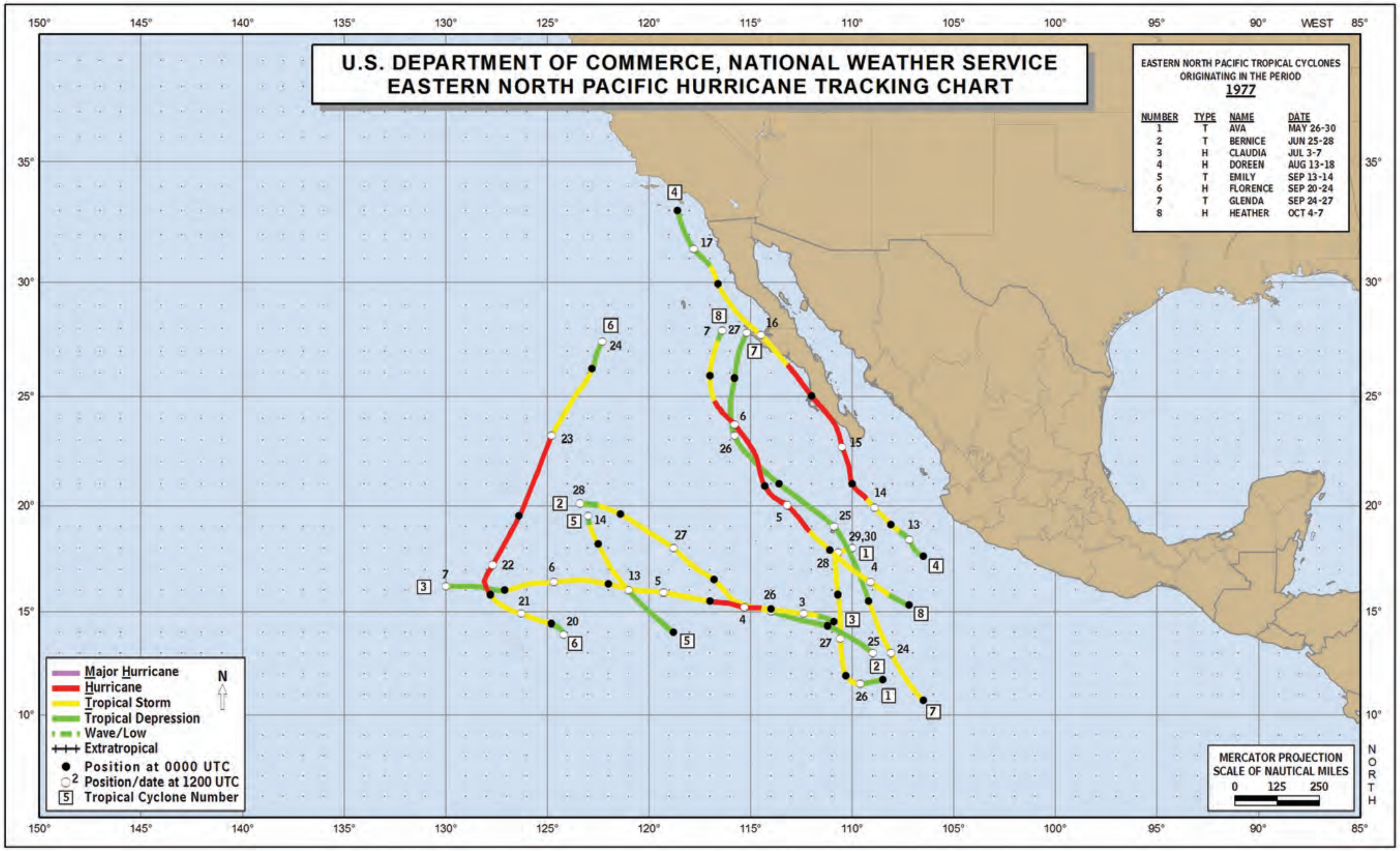

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1974b
NUMBER TYPE NAME DATE
10 H JOYCE AUG 22-27
11 H KIRSTEN AUG 22-29
12 T LORRAINE AUG 23-28
13 MH MAGGIE AUG 26-SEP 1
14 H NORMA SEP 9-10
15 H ORLENE SEP 21-24
16 H PATRICIA OCT 6-17
17 T ROSALIE OCT 21-24
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

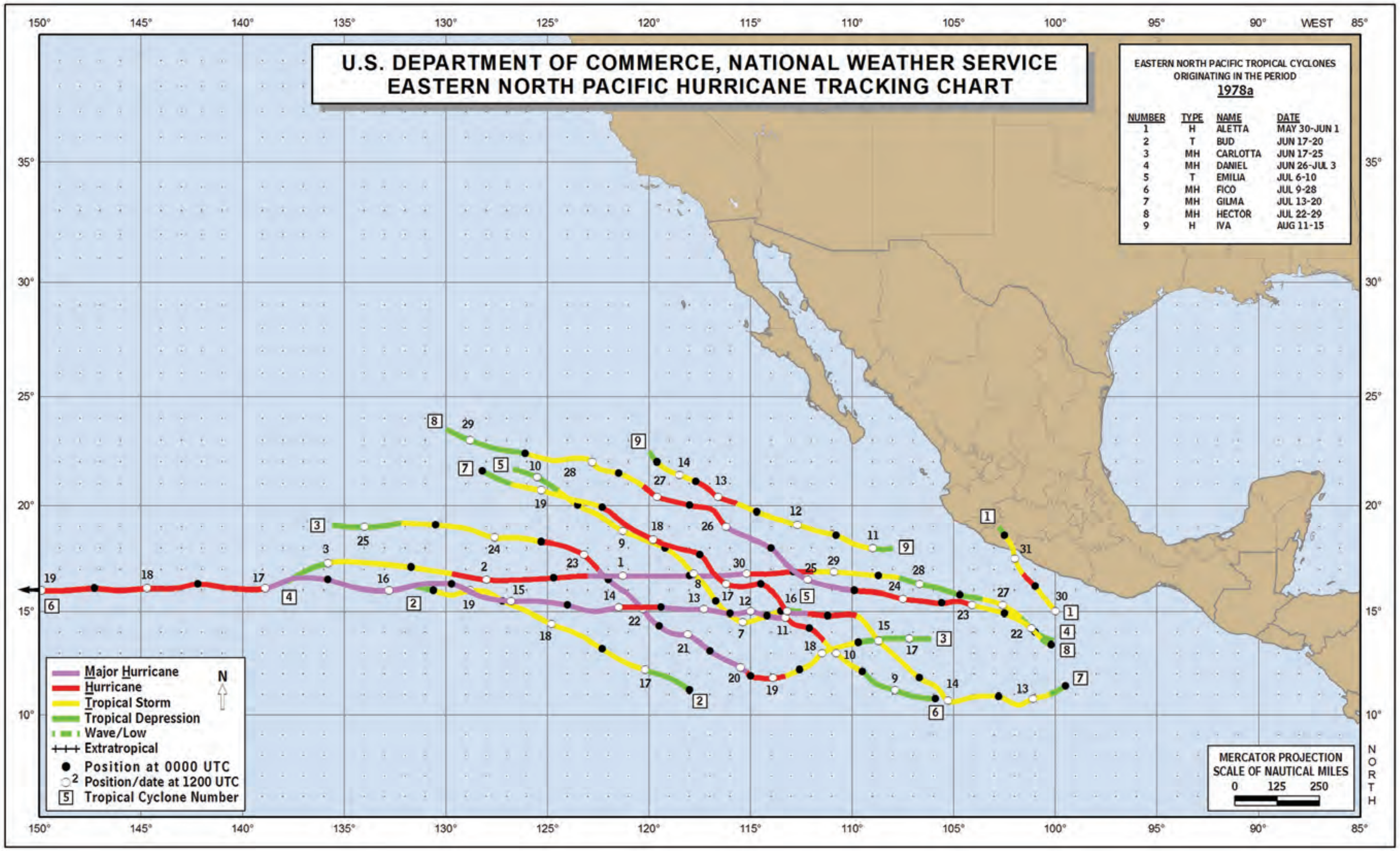

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1975a
NUMBER TYPE NAME DATE
1 H AGATHA JUN 2-5
2 T BRIDGET JUN 28-JUL 3
3 MH CARLOTTA JUL 2-11
4 MH DENISE JUL 5-15
5 T ELEANOR JUL 10-12
6 T FRANCENE JUL 27-30
7 T GEORGETTE AUG 11-14
8 T HILARY AUG 13-17
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

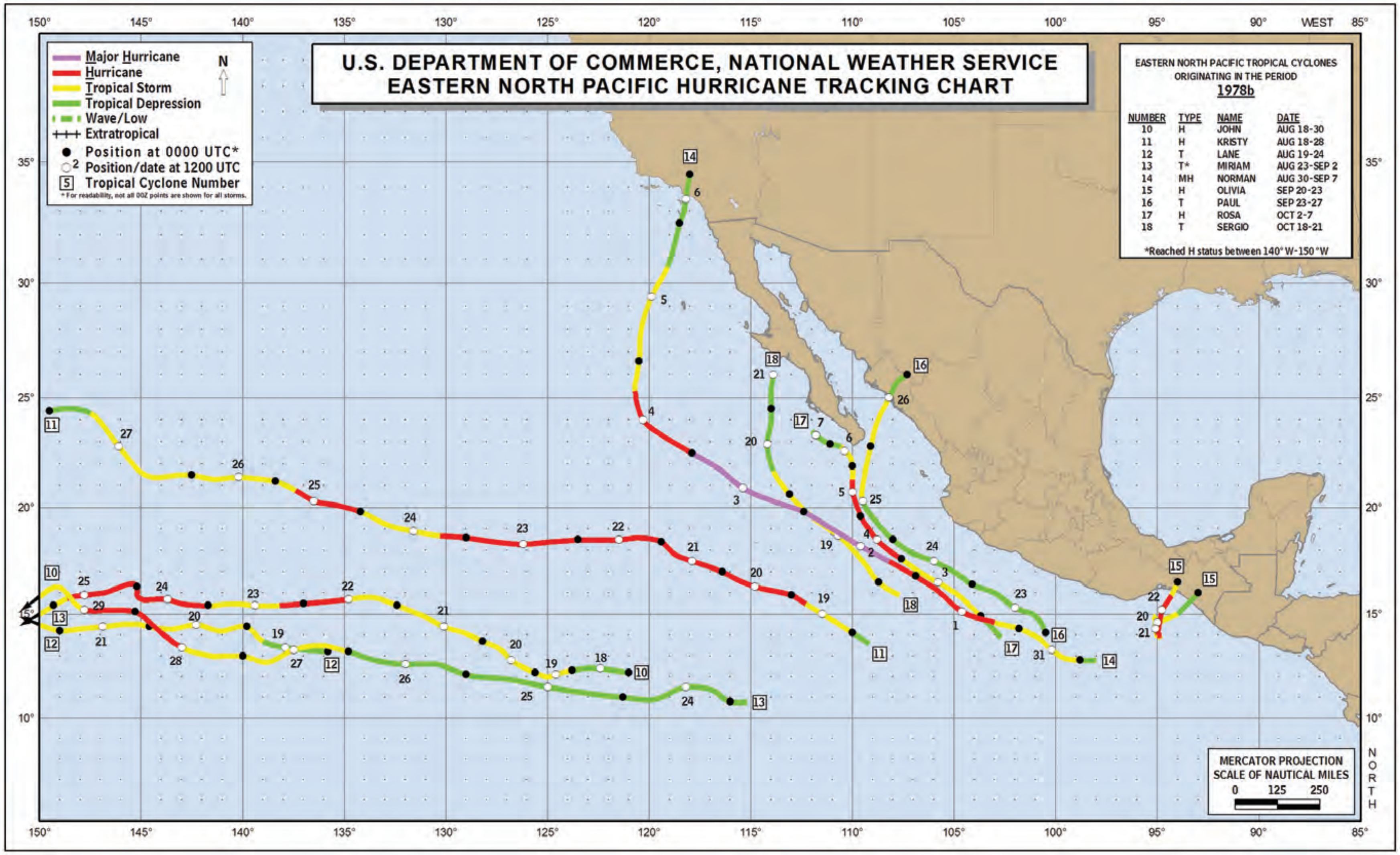

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1975b
NUMBER TYPE NAME DATE
9 H ILSA AUG 18-26
10 H JEWEL AUG 24-31
11 MH KATRINA AUG 29-SEP 7
12 H LILY SEP 16-22
13 T MONICA SEP 28-OCT 2
14 T NANETTE SEP 28-OCT 4
15 MH OLIVIA OCT 22-25
16 T PRISCILLA NOV 2-7
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

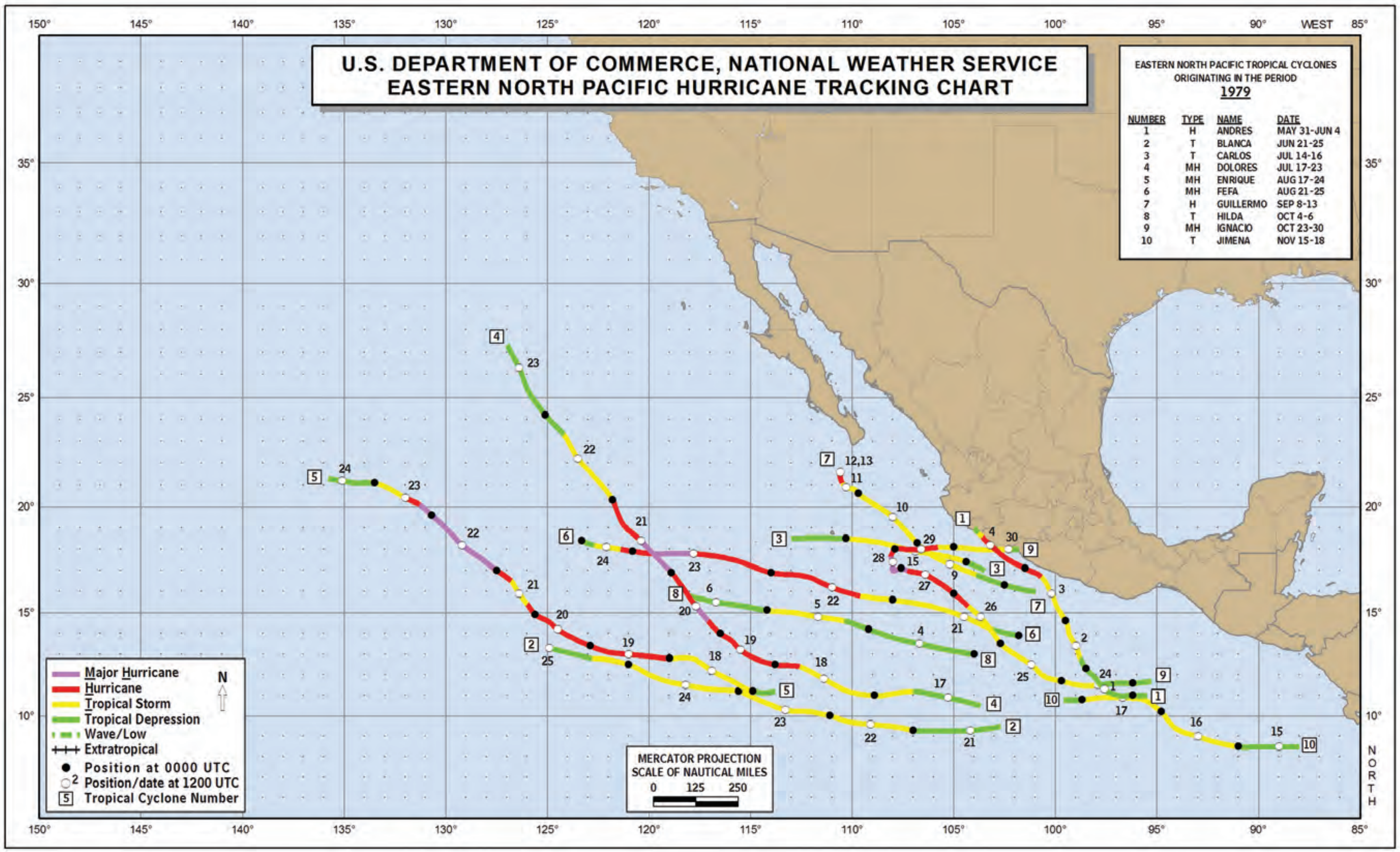

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1976a
NUMBER TYPE NAME DATE
1 MH ANNETTE JUN 3-14
2 H BONNY JUN 26-29
3 T CELESTE JUL 14-19
4 H DIANA JUL 16-23
5 T ESTELLE JUL 27-29
6 T FERNANDA JUL 28-AUG 2
7 T GWEN AUG 5-18
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1976b
NUMBER TYPE NAME DATE
8 MH HYACINTH AUG 6-14
9 MH IVA AUG 24-SEP 2
10 T JOANNE AUG 29-SEP 8
11 H KATHLEEN SEP 7-11
12 MH LIZA SEP 25-OCT 2
13 MH MADELINE SEP 29-OCT 8
14 T NAOMI OCT 25-30
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

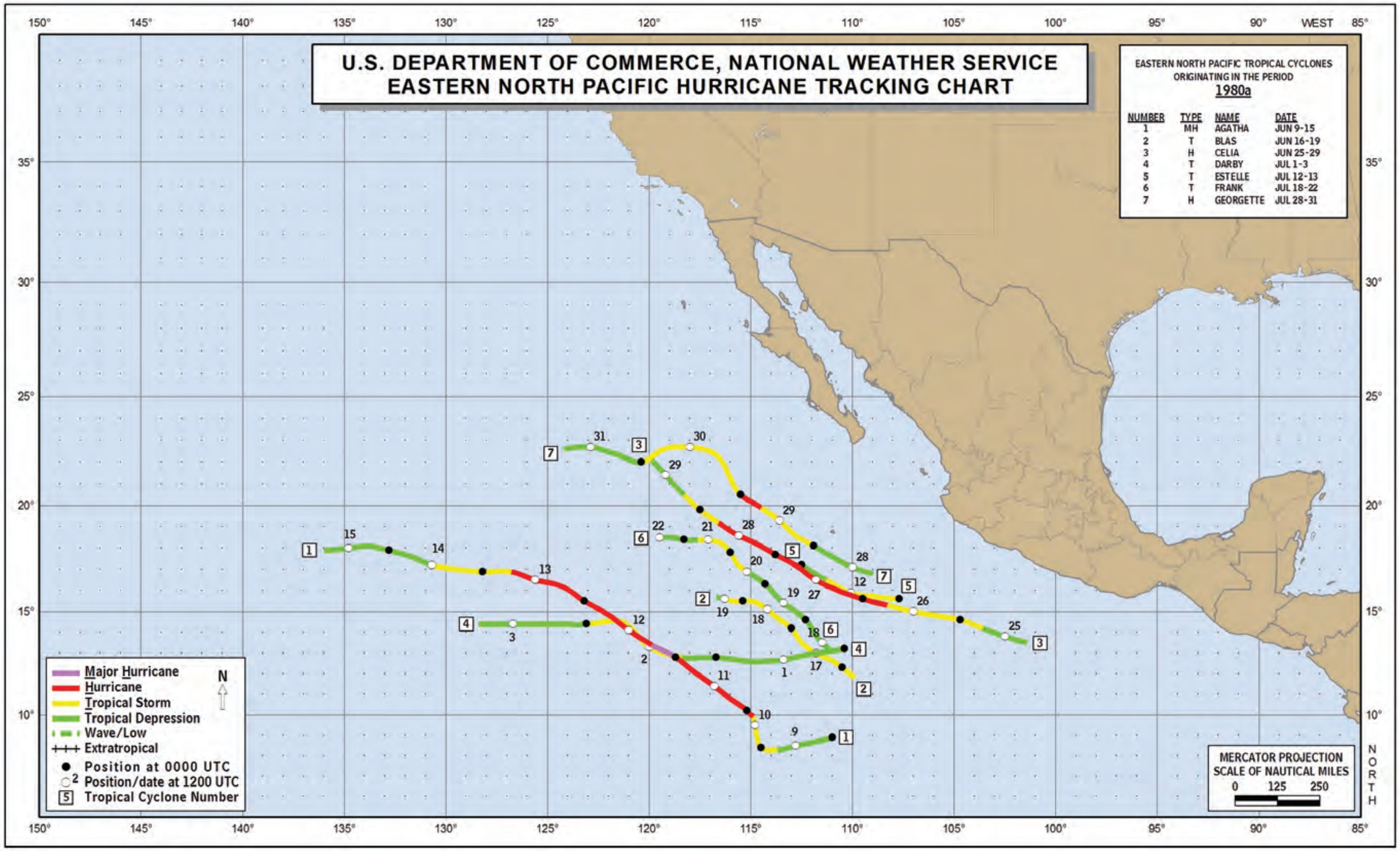

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1977
NUMBER TYPE NAME DATE
1 T AVA MAY 26-30
2 T BERNICE JUN 25-28
3 H CLAUDIA JUL 3-7
4 H DOREEN AUG 13-18
5 T EMILY SEP 13-14
6 H FLORENCE SEP 20-24
7 T GLENDA SEP 24-27
8 H HEATHER OCT 4-7
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

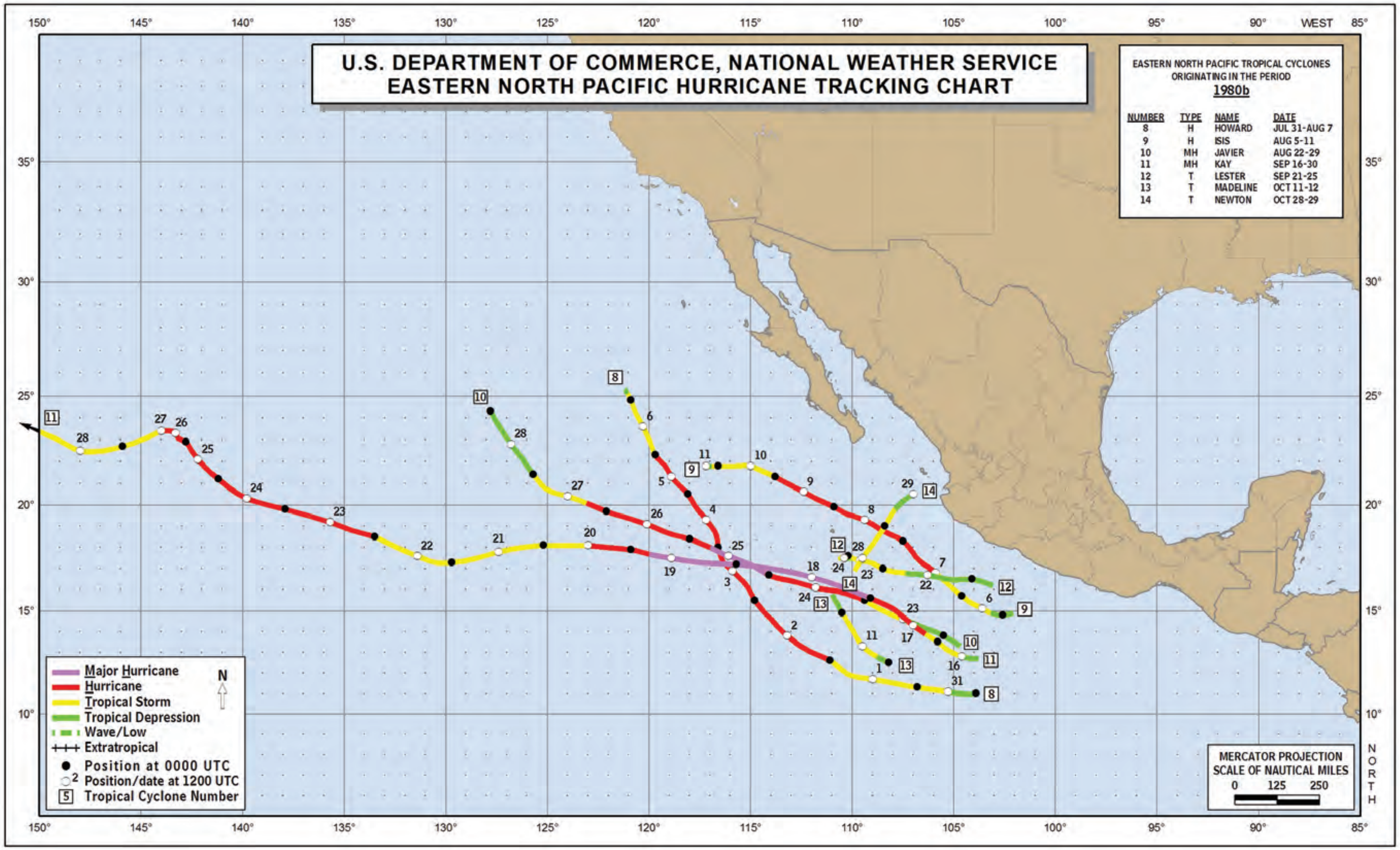

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1978a
NUMBER TYPE NAME DATE
1 H ALETTA MAY 30-JUN 1
2 T BUD JUN 17-20
3 MH CARLOTTA JUN 17-25
4 MH DANIEL JUN 26-JUL 3
5 T EMILIA JUL 6-10
6 MH FICO JUL 9-28
7 MH GILMA JUL 13-20
8 MH HECTOR JUL 22-29
9 H IVA AUG 11-15
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

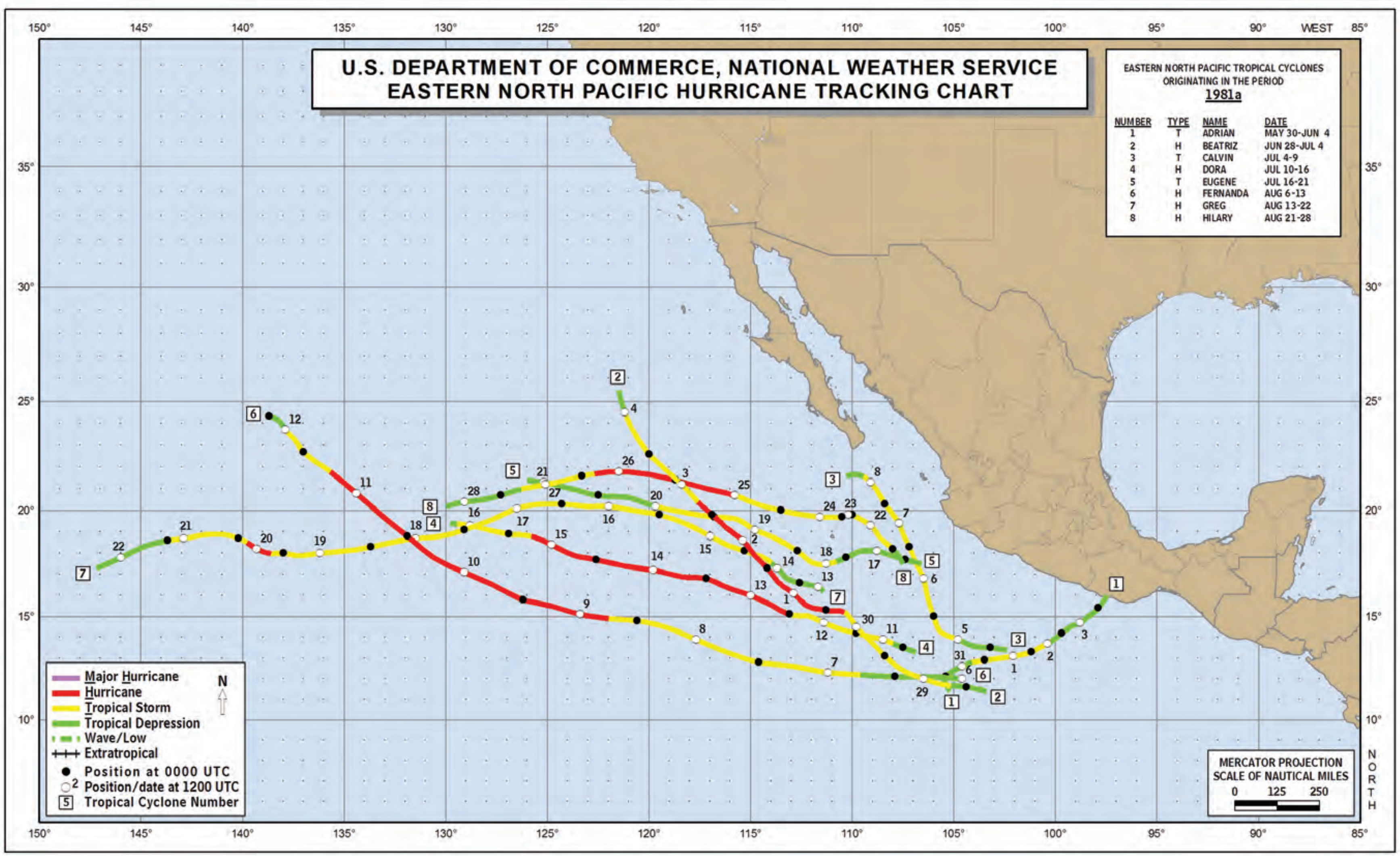

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC*
Position/date at 1200 UTC
Tropical Cyclone Number
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1978b
NUMBER TYPE NAME DATE
10 H JOHN AUG 18-30
11 H KRISTY AUG 18-28
12 T LANE AUG 19-24
13 T* MIRIAM AUG 23-SEP 2
14 MH NORMAN AUG 30-SEP 7
15 H OLIVIA SEP 20-23
16 T PAUL SEP 23-27
17 H ROSA OCT 2-7
18 T SERGIO OCT 18-21
*Reached H status between 140° W-150 °W
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH



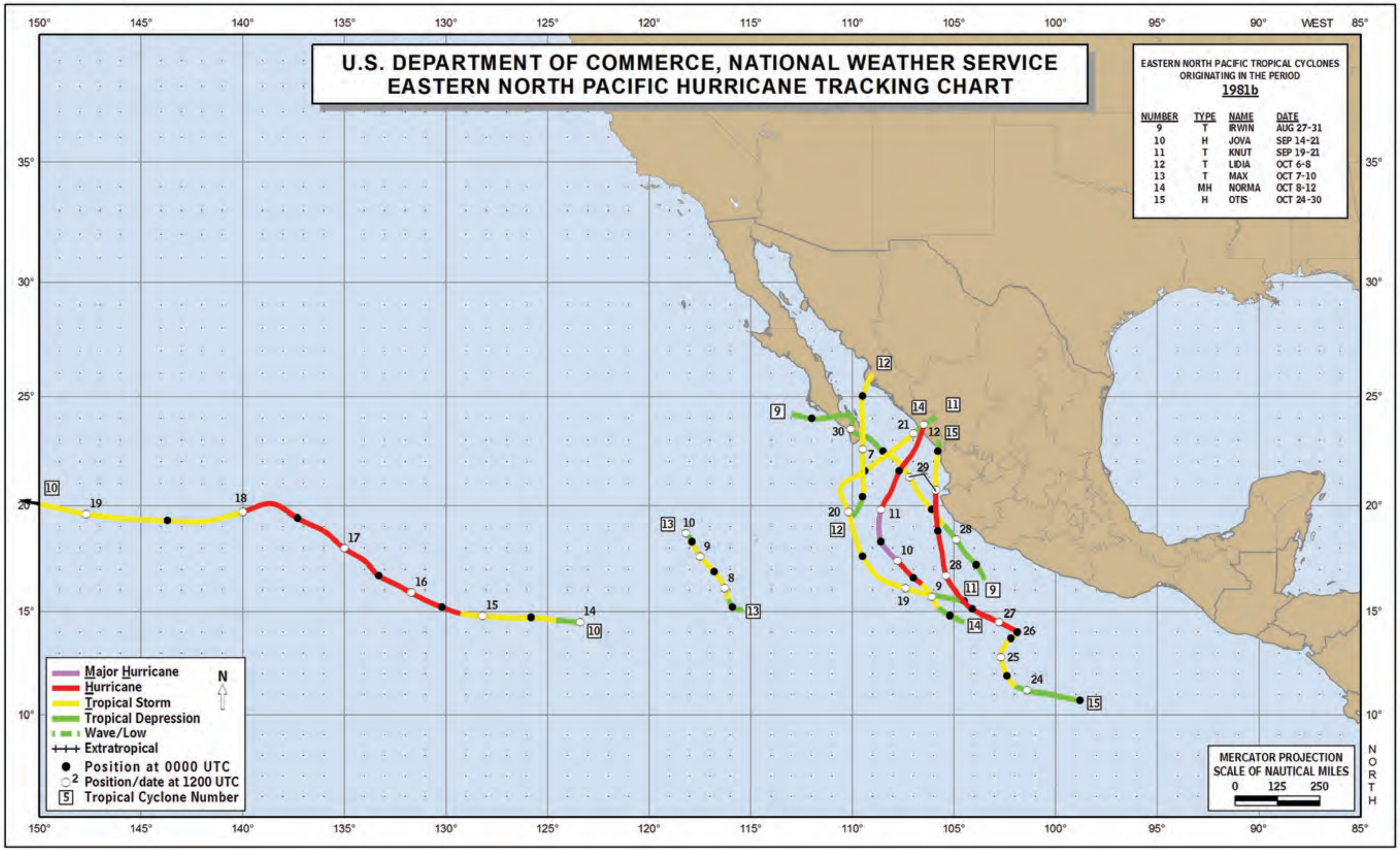
U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1979
NUMBER TYPE NAME DATE
1 H ANDRES MAY 31-JUN 4
2 T BLANCA JUN 21-25
3 T CARLOS JUL 14-16
4 MH DOLORES JUL 17-23
5 MH ENRIQUE AUG 17-24
6 MH FEFA AUG 21-25
7 H GUILLERMO SEP 8-13
8 T HILDA OCT 4-6
9 MH IGNACIO OCT 23-30
10 T JIMENA NOV 15-18
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

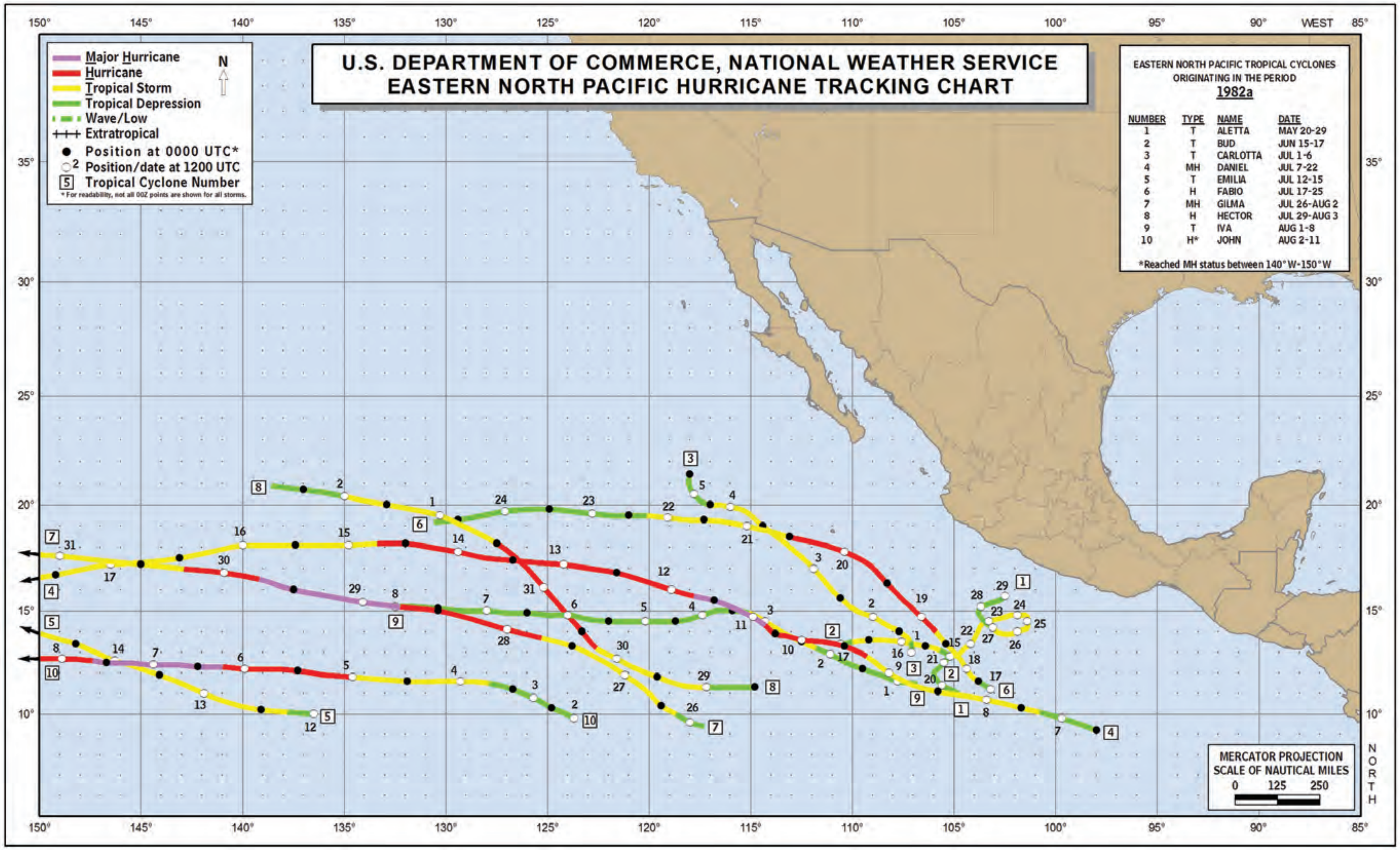

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1980a
NUMBER TYPE NAME DATE
1 MH AGATHA JUN 9-15
2 T BLAS JUN 16-19
3 H CELIA JUN 25-29
4 T DARBY JUL 1-3
5 T ESTELLE JUL 12-13
6 T FRANK JUL 18-22
7 H GEORGETTE JUL 28-31
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

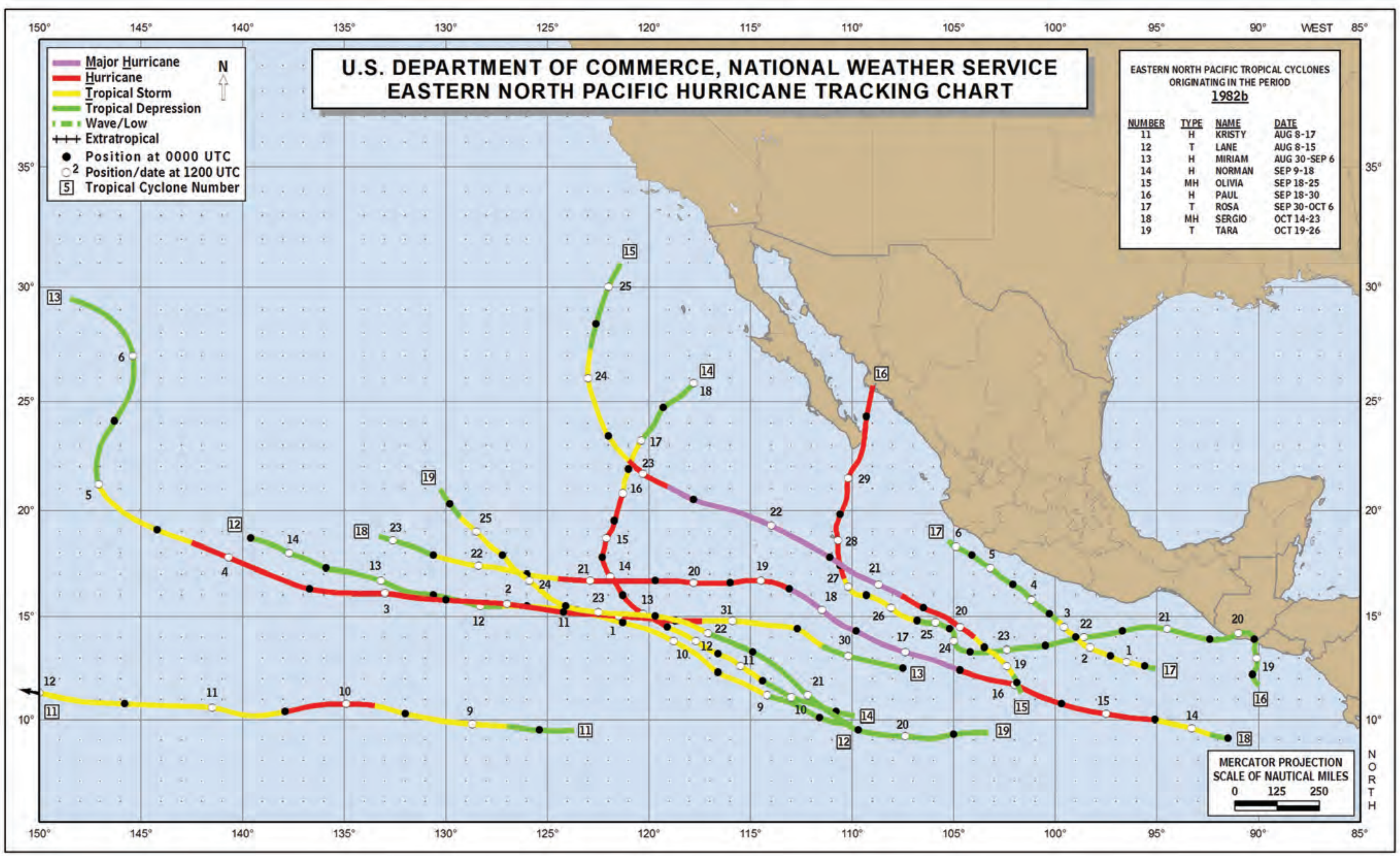

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1980b
NUMBER TYPE NAME DATE
8 H HOWARD JUL 31-AUG 7
9 H ISIS AUG 5-11
10 MH JAVIER AUG 22-29
11 MH KAY SEP 16-30
12 T LESTER SEP 21-25
13 T MADELINE OCT 11-12
14 T NEWTON OCT 28-29
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

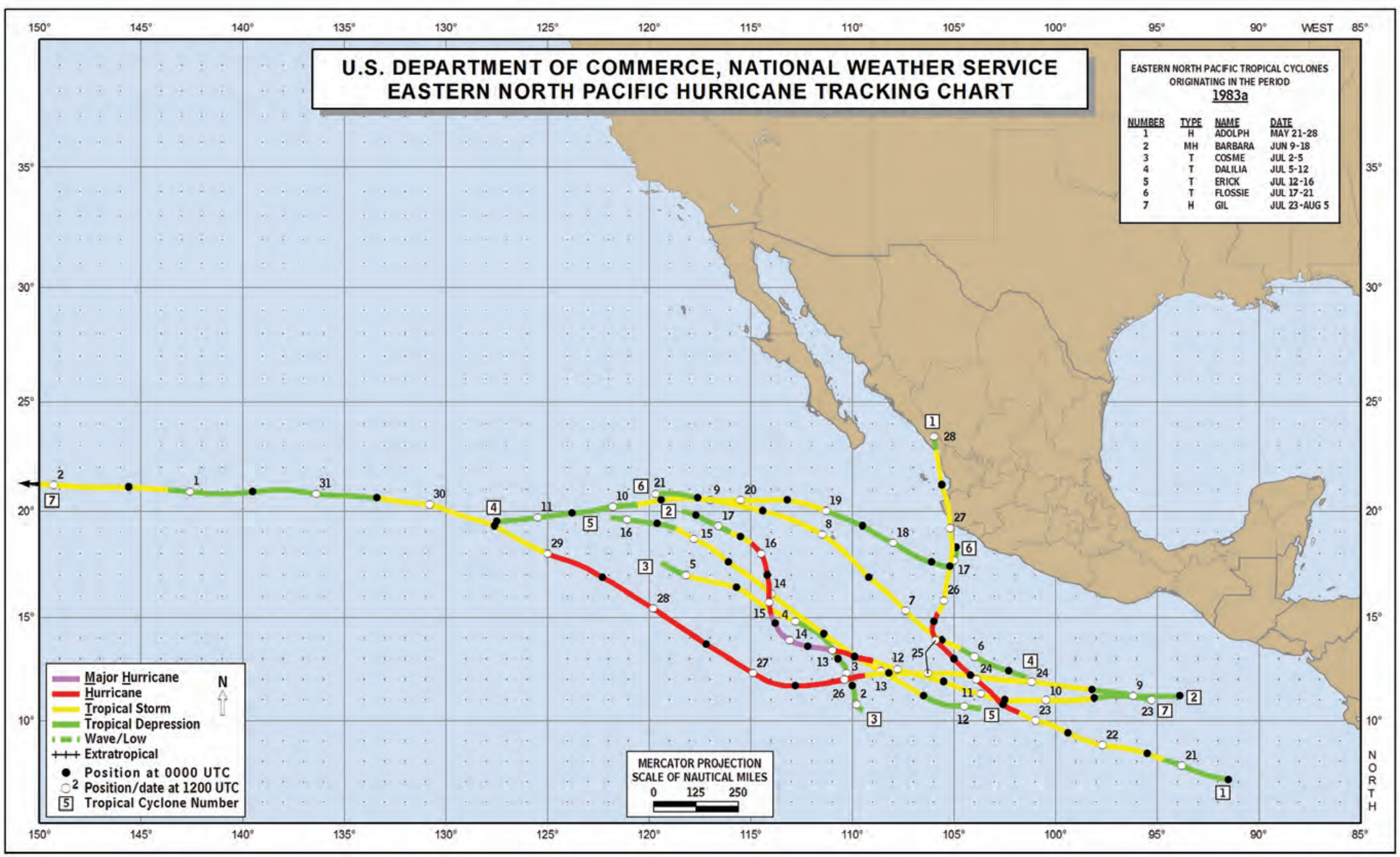


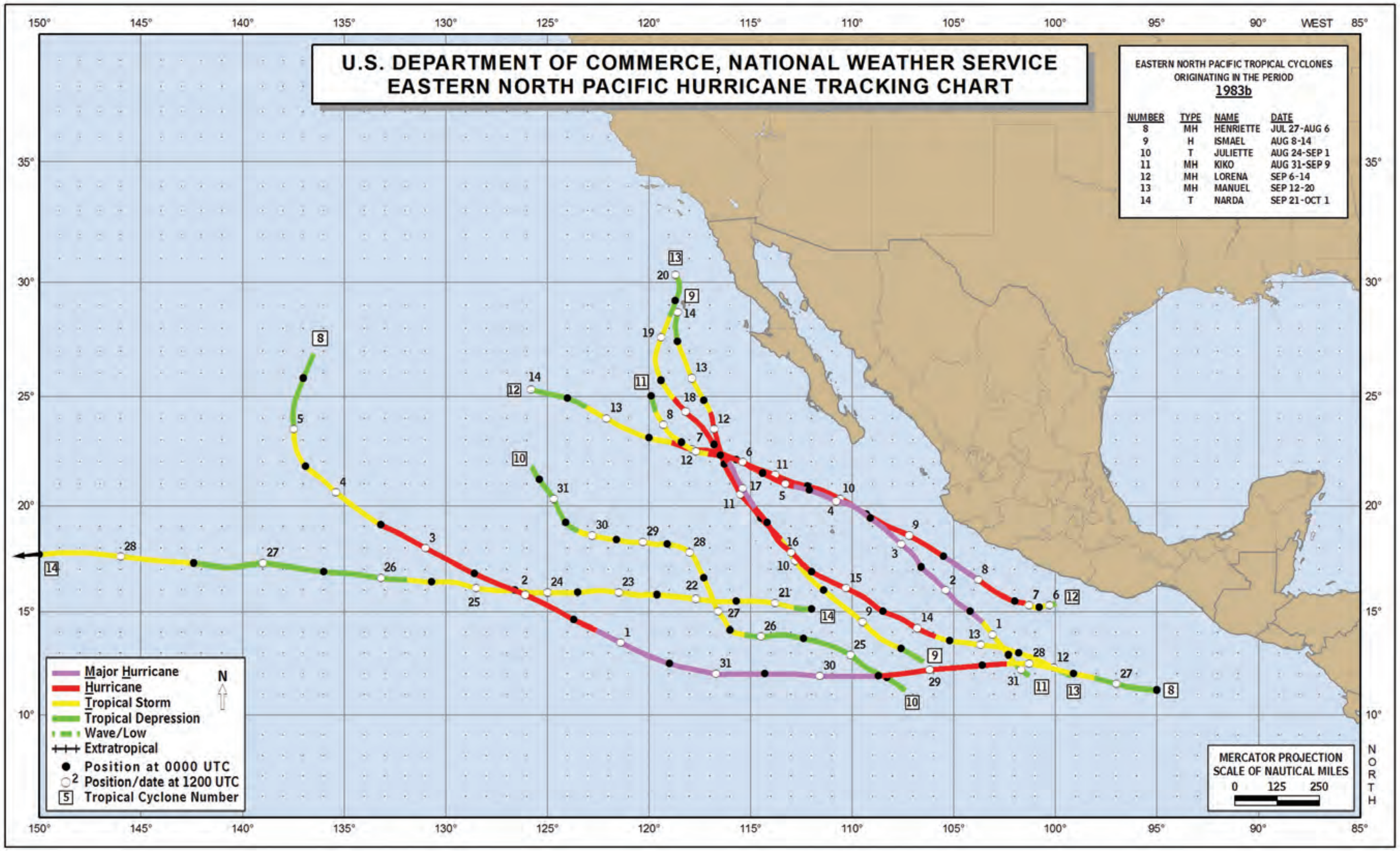
U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1981a
NUMBER TYPE NAME DATE
1 T ADRIAN MAY 30-JUN 4
2 H BEATRIZ JUN 28-JUL 4
3 T CALVIN JUL 4-9
4 H DORA JUL 10-16
5 T EUGENE JUL 16-21
6 H FERNANDA AUG 6-13
7 H GREG AUG 13-22
8 H HILARY AUG 21-28
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

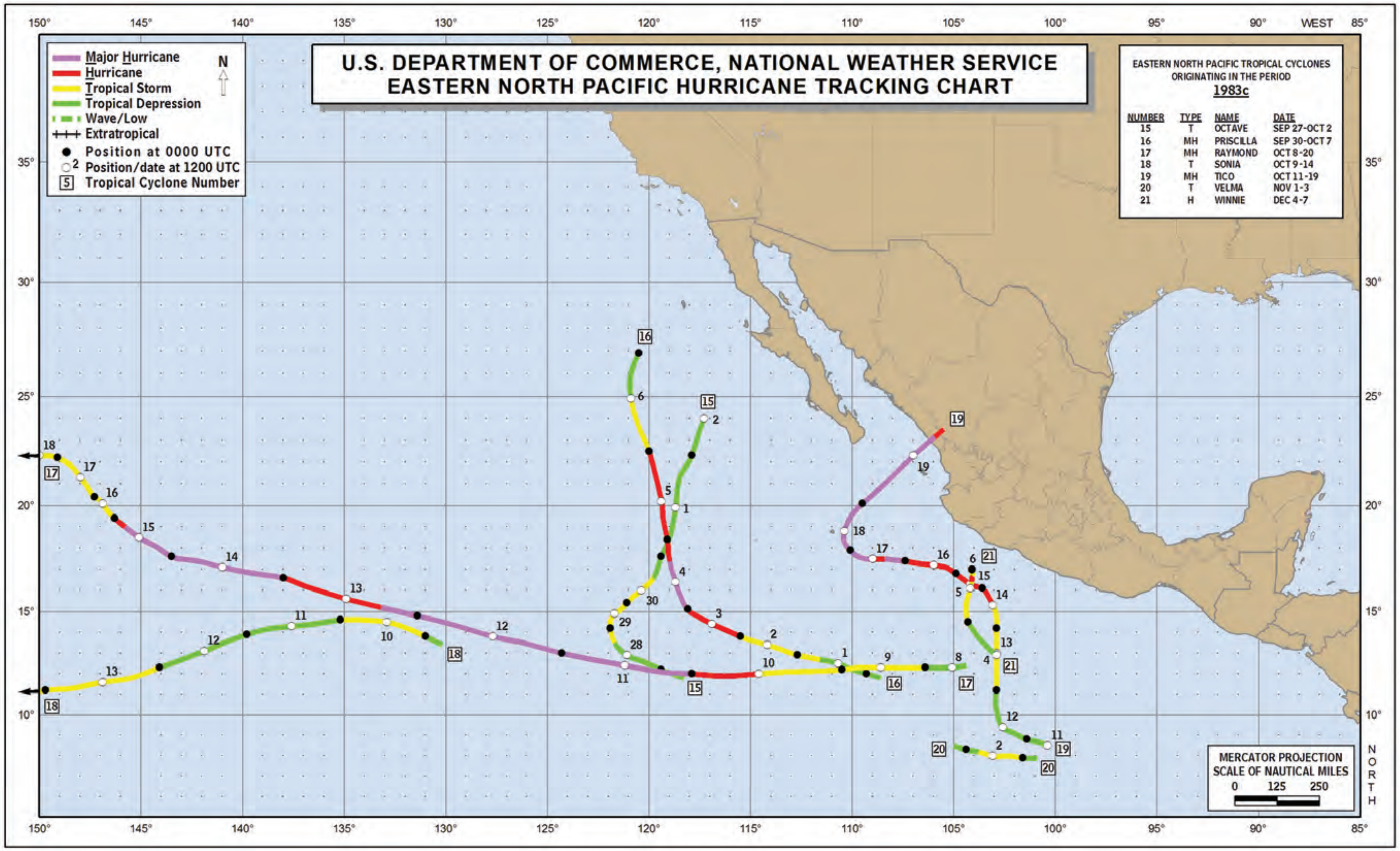

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1981b
NUMBER TYPE NAME DATE
9 T IRWIN AUG 27-31
10 H JOVA SEP 14-21
11 T KNUT SEP 19-21
12 T LIDIA OCT 6-8
13 T MAX OCT 7-10
14 MH NORMA OCT 8-12
15 H OTIS OCT 24-30
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

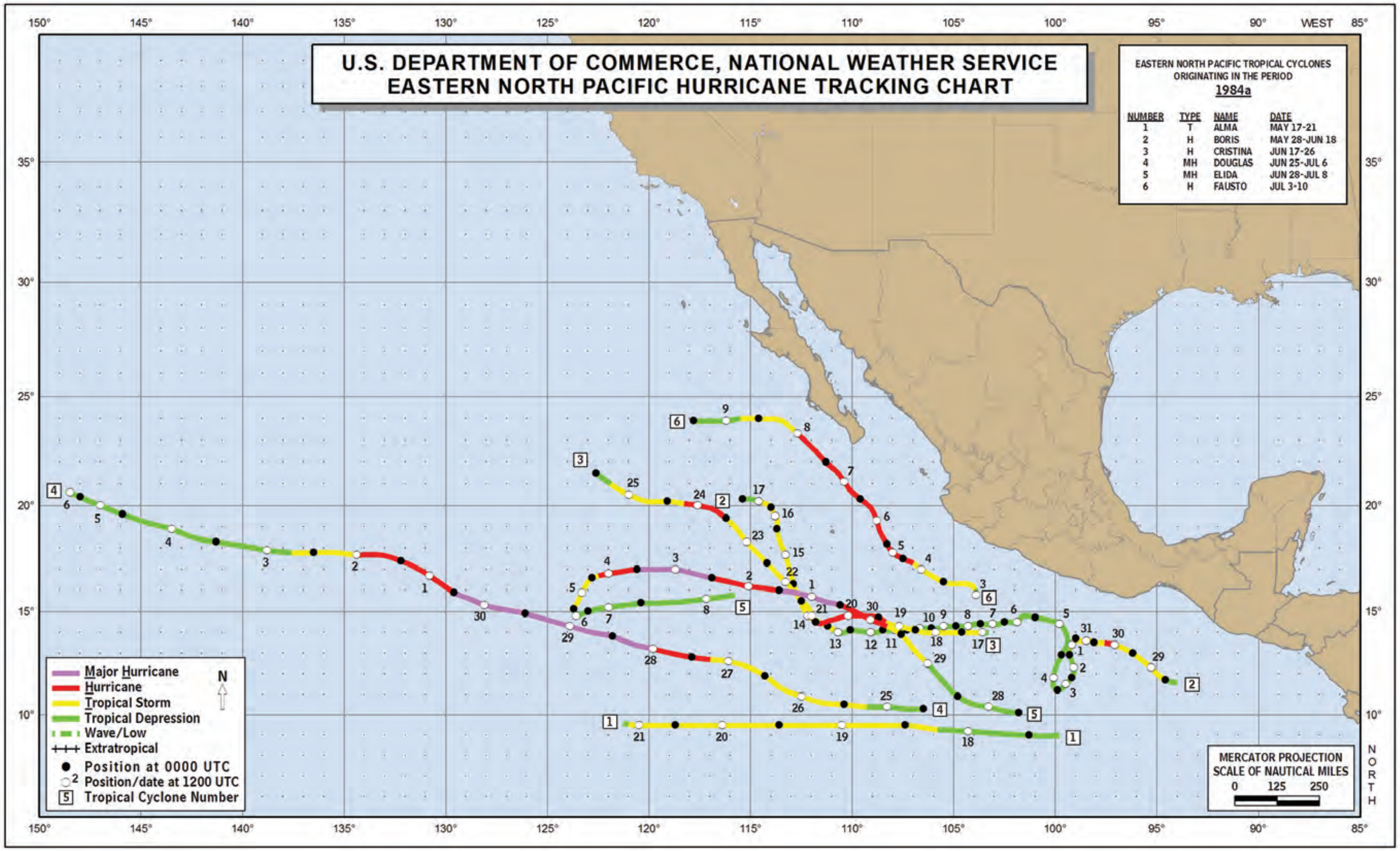

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC*
Position/date at 1200 UTC
Tropical Cyclone Number
* For readability, not all 00Z points are shown for all storms.
N
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1982a
NUMBER TYPE NAME DATE
1 T ALETTA MAY 20-29
2 T BUD JUN 15-17
3 T CARLOTTA JUL 1-6
4 MH DANIEL JUL 7-22
5 T EMILIA JUL 12-15
6 H FABIO JUL 17-25
7 MH GILMA JUL 26-AUG 2
8 H HECTOR JUL 29-AUG 3
9 T IVA AUG 1-8
10 H* JOHN AUG 2-11
*Reached MH status between 140°W-150°W
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°

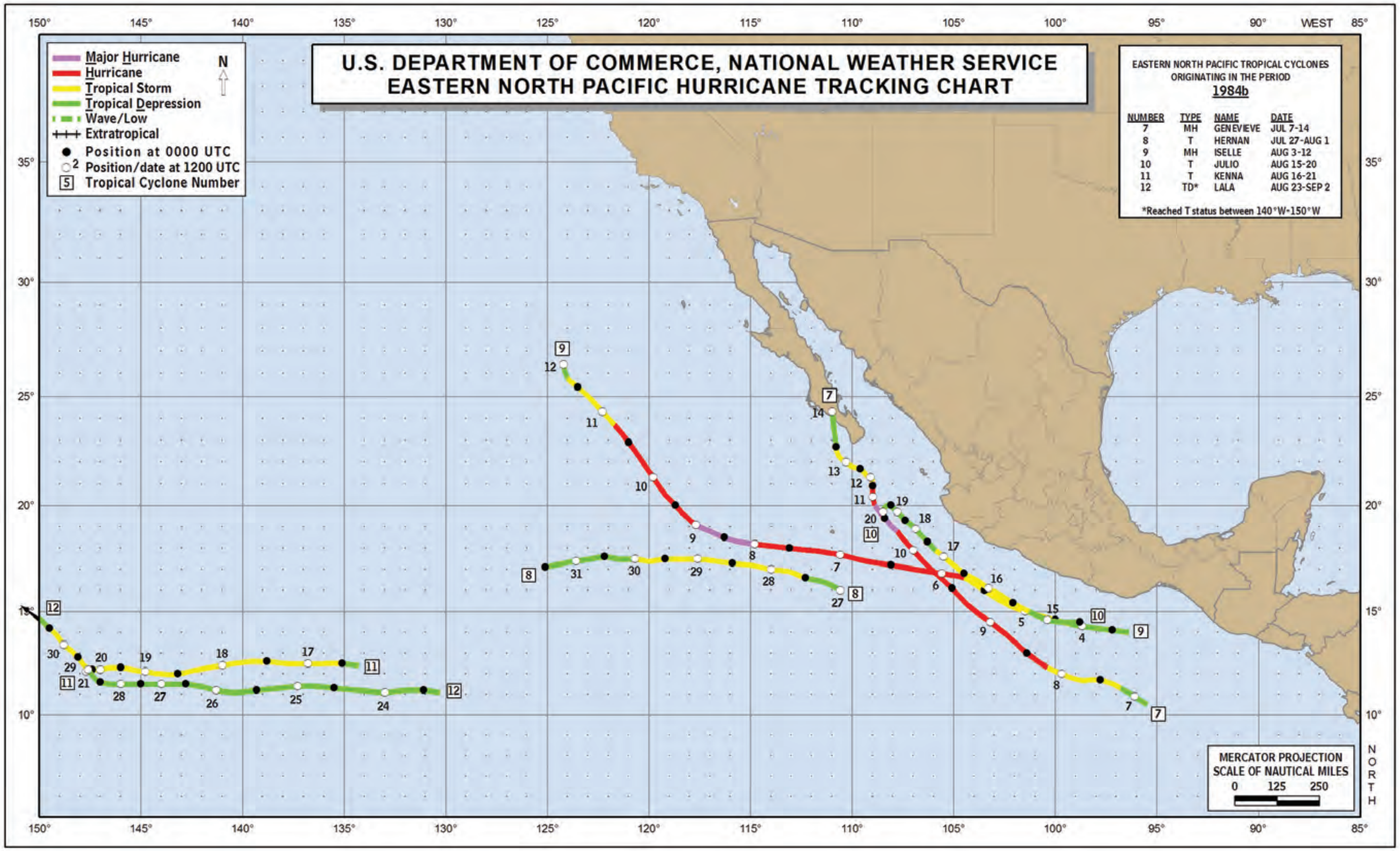

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1982b
NUMBER TYPE NAME DATE
11 H KRISTY AUG 8-17
12 T LANE AUG 8-15
13 H MIRIAM AUG 30-SEP 6
14 H NORMAN SEP 9-18
15 MH OLIVIA SEP 18-25
16 H PAUL SEP 18-30
17 T ROSA SEP 30-OCT 6
18 MH SERGIO OCT 14-23
19 T TARA OCT 19-26
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1983a
NUMBER TYPE NAME DATE
1 H ADOLPH MAY 21-28
2 MH BARBARA JUN 9-18
3 T COSME JUL 2-5
4 T DALILIA JUL 5-12
5 T ERICK JUL 12-16
6 T FLOSSIE JUL 17-21
7 H GIL JUL 23-AUG 5
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

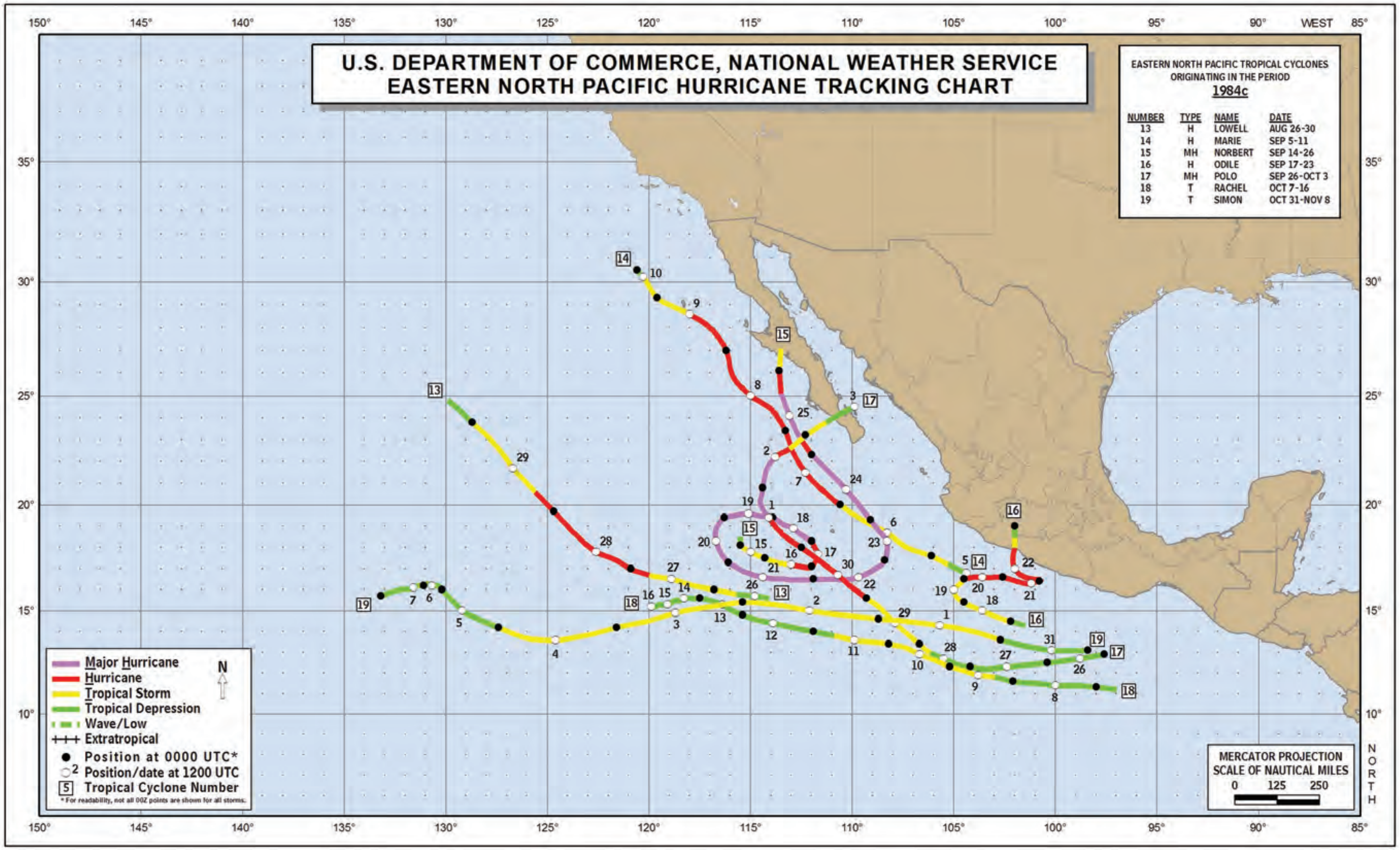

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1983b
NUMBER TYPE NAME DATE
8 MH HENRIETTE JUL 27-AUG 6
9 H ISMAEL AUG 8-14
10 T JULIETTE AUG 24-SEP 1
11 MH KIKO AUG 31-SEP 9
12 MH LORENA SEP 6-14
13 MH MANUEL SEP 12-20
14 T NARDA SEP 21-OCT 1
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

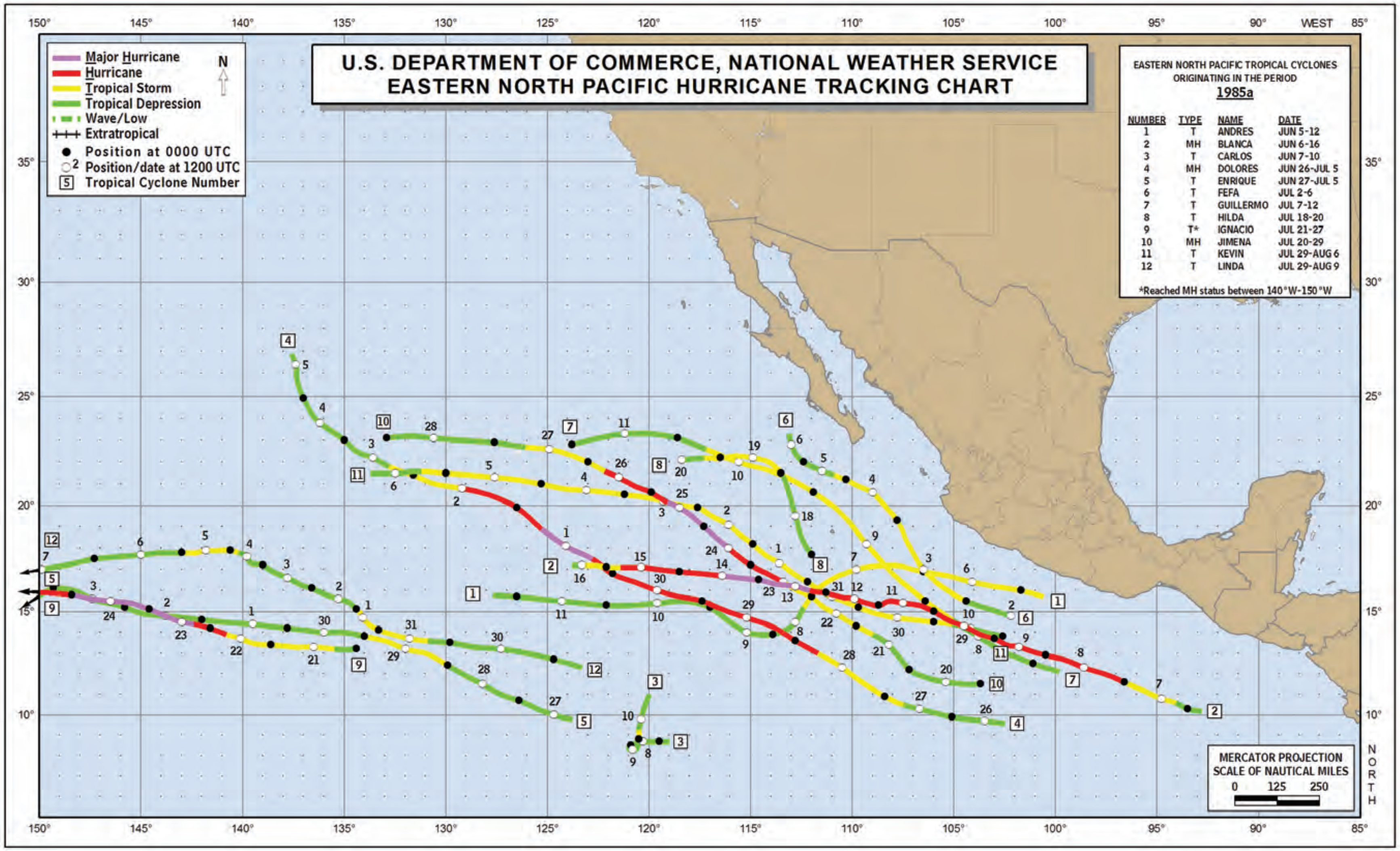

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1983c
NUMBER TYPE NAME DATE
15 T OCTAVE SEP 27-OCT 2
16 MH PRISCILLA SEP 30-OCT 7
17 MH RAYMOND OCT 8-20
18 T SONIA OCT 9-14
19 MH TICO OCT 11-19
20 T VELMA NOV 1-3
21 H WINNIE DEC 4-7
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

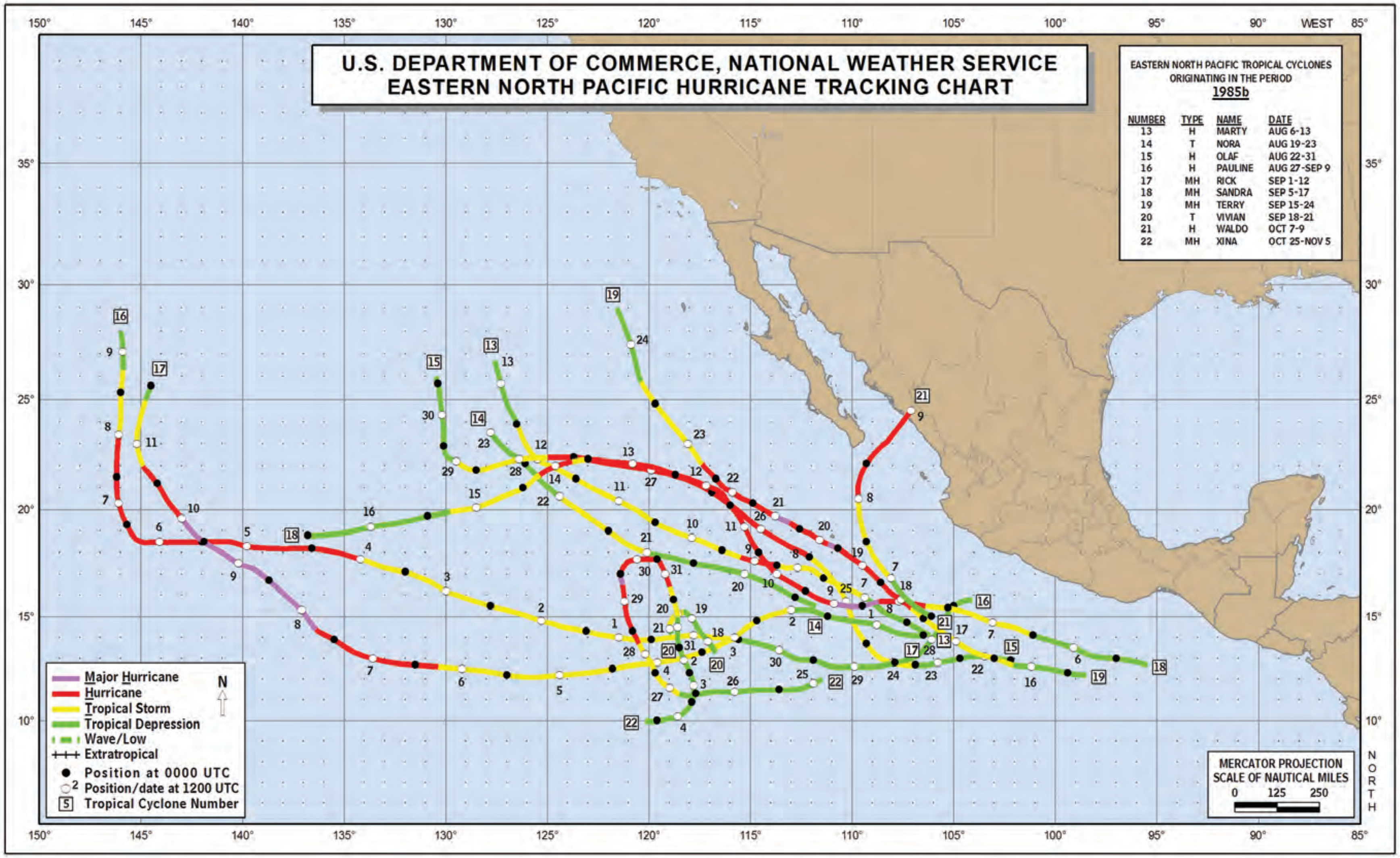

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1984a
NUMBER TYPE NAME DATE
1 T ALMA MAY 17-21
2 H BORIS MAY 28-JUN 18
3 H CRISTINA JUN 17-26
4 MH DOUGLAS JUN 25-JUL 6
5 MH ELIDA JUN 28-JUL 8
6 H FAUSTO JUL 3-10
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

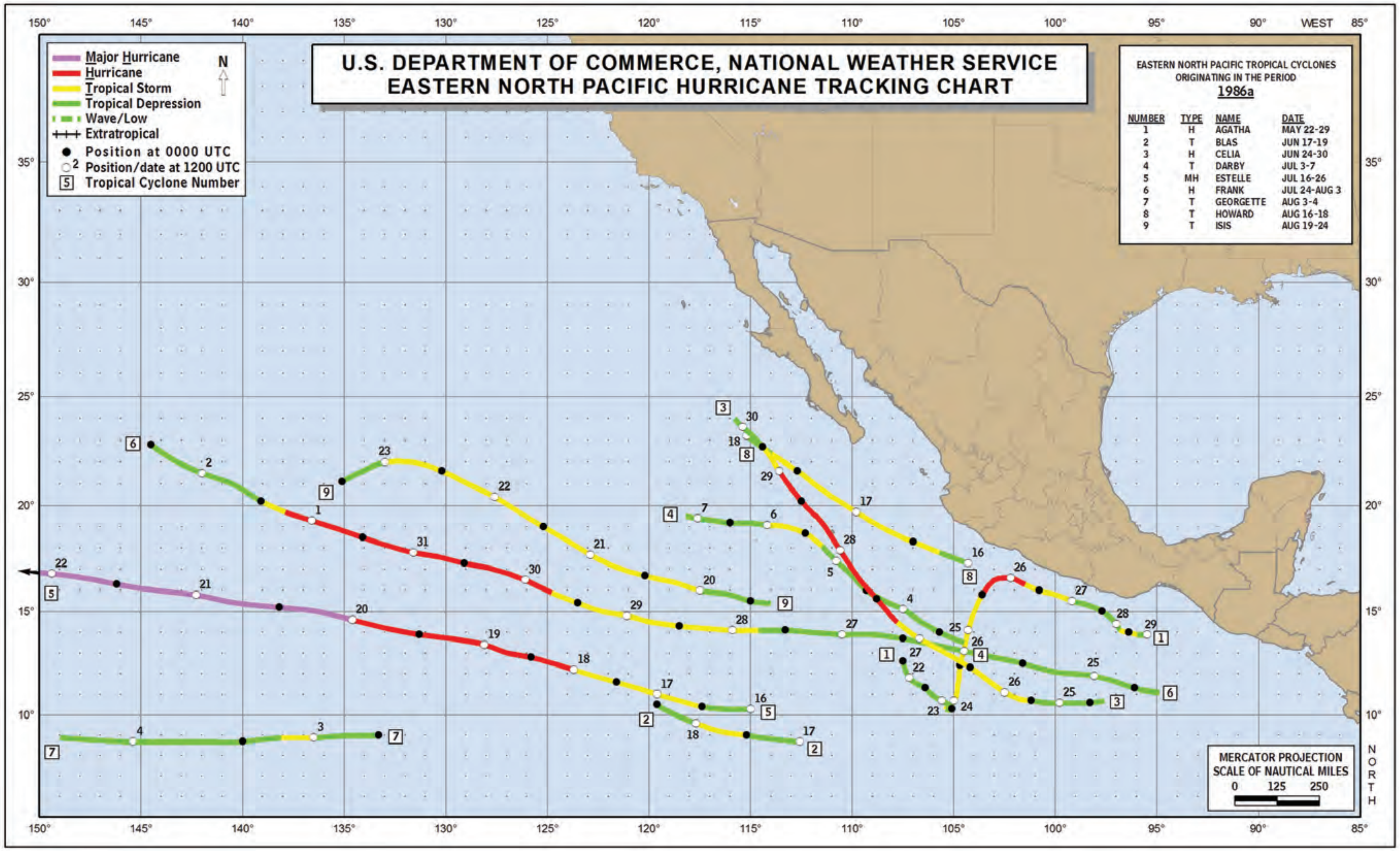


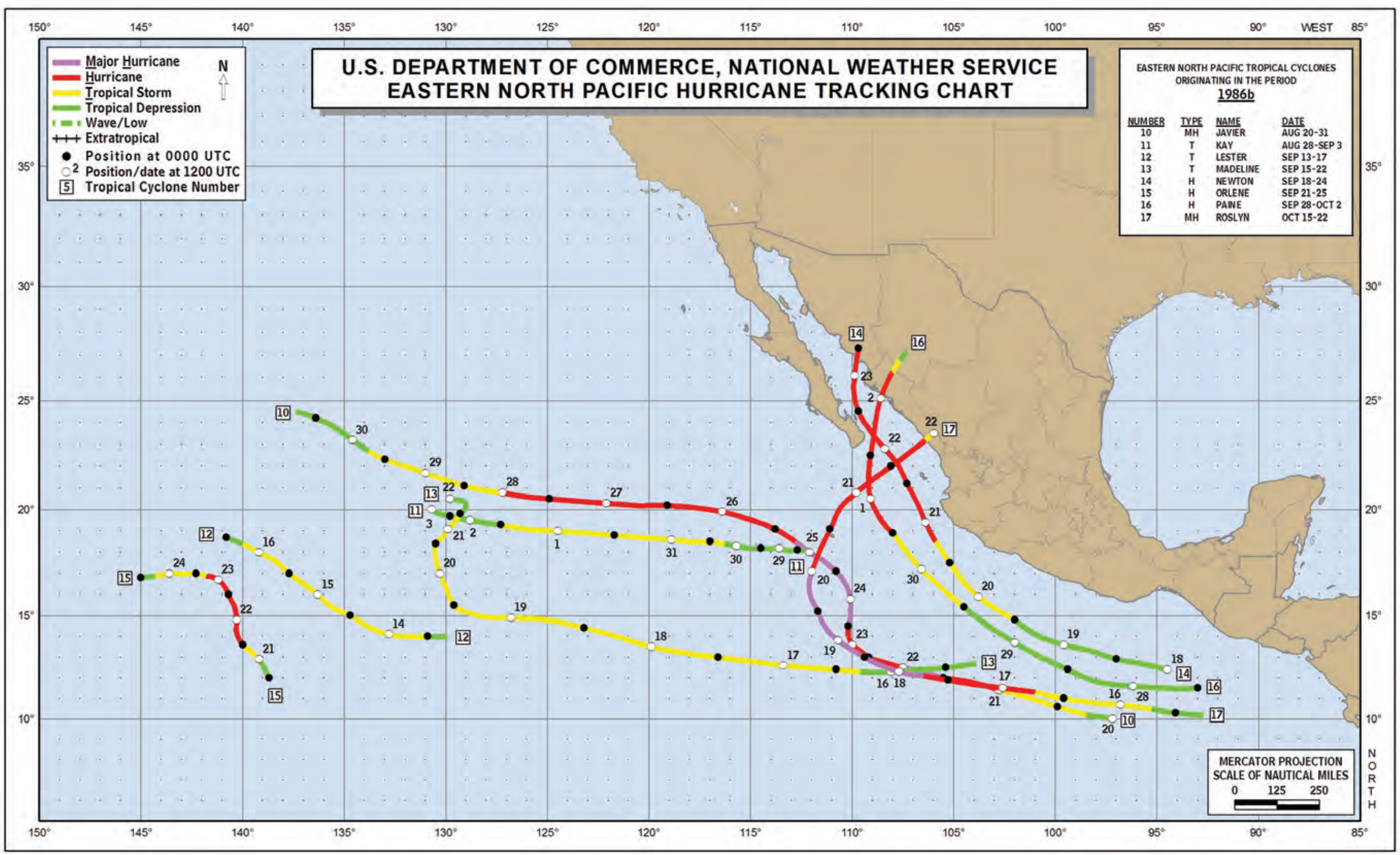
U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
5 Tropical Cyclone Number
N
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1984b
NUMBER TYPE NAME DATE
7 MH GENEVIEVE JUL 7-14
8 T HERNAN JUL 27-AUG 1
9 MH ISELLE AUG 3-12
10 T JULIO AUG 15-20
11 T KENNA AUG 16-21
12 TD* LALA AUG 23-SEP 2
*Reached T status between 140°W-150°W
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°

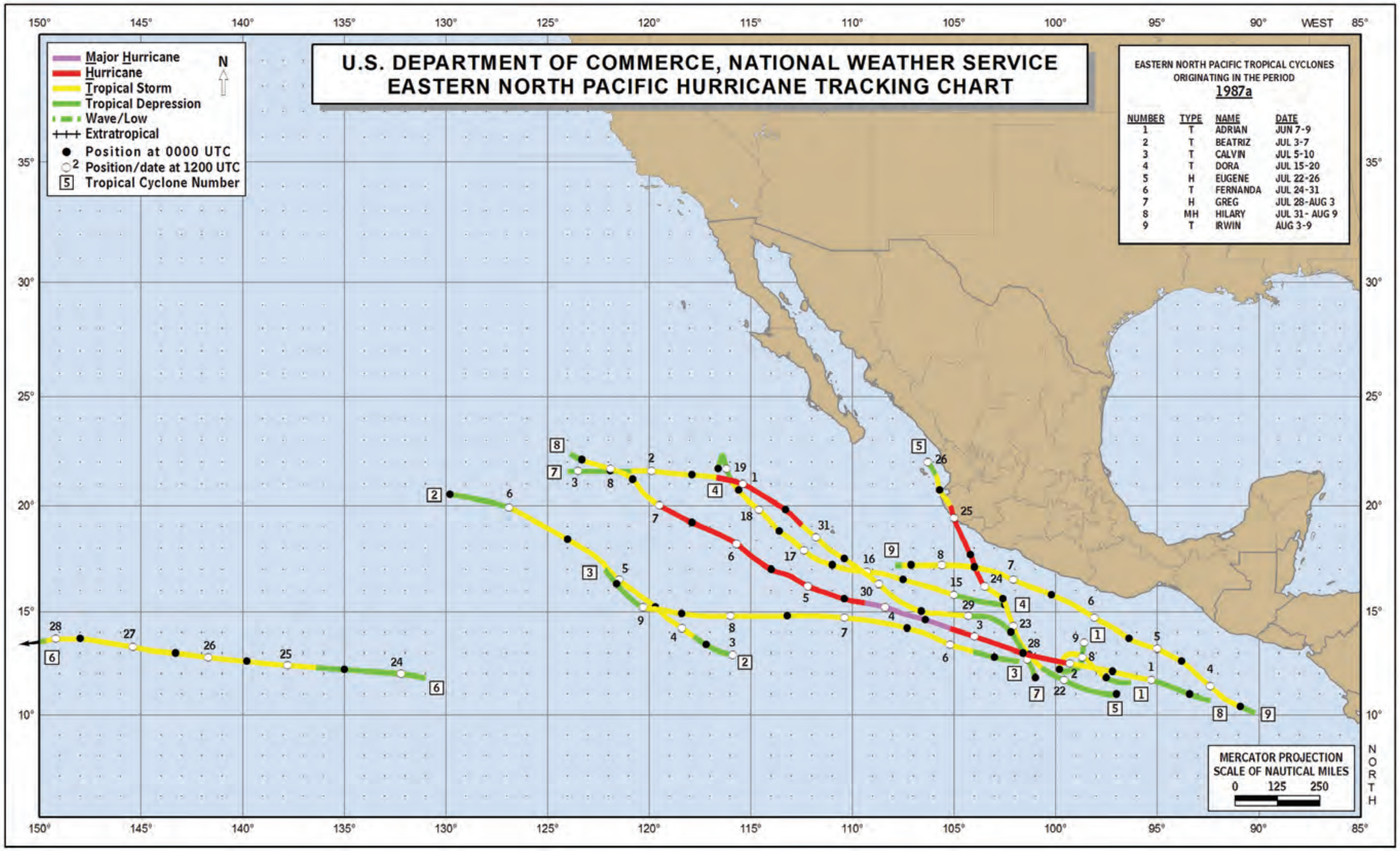

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1984c
NUMBER TYPE NAME DATE
13 H LOWELL AUG 26-30
14 H MARIE SEP 5-11
15 MH NORBERT SEP 14-26
16 H ODILE SEP 17-23
17 MH POLO SEP 26-OCT 3
18 T RACHEL OCT 7-16
19 T SIMON OCT 31-NOV 8
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC*
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

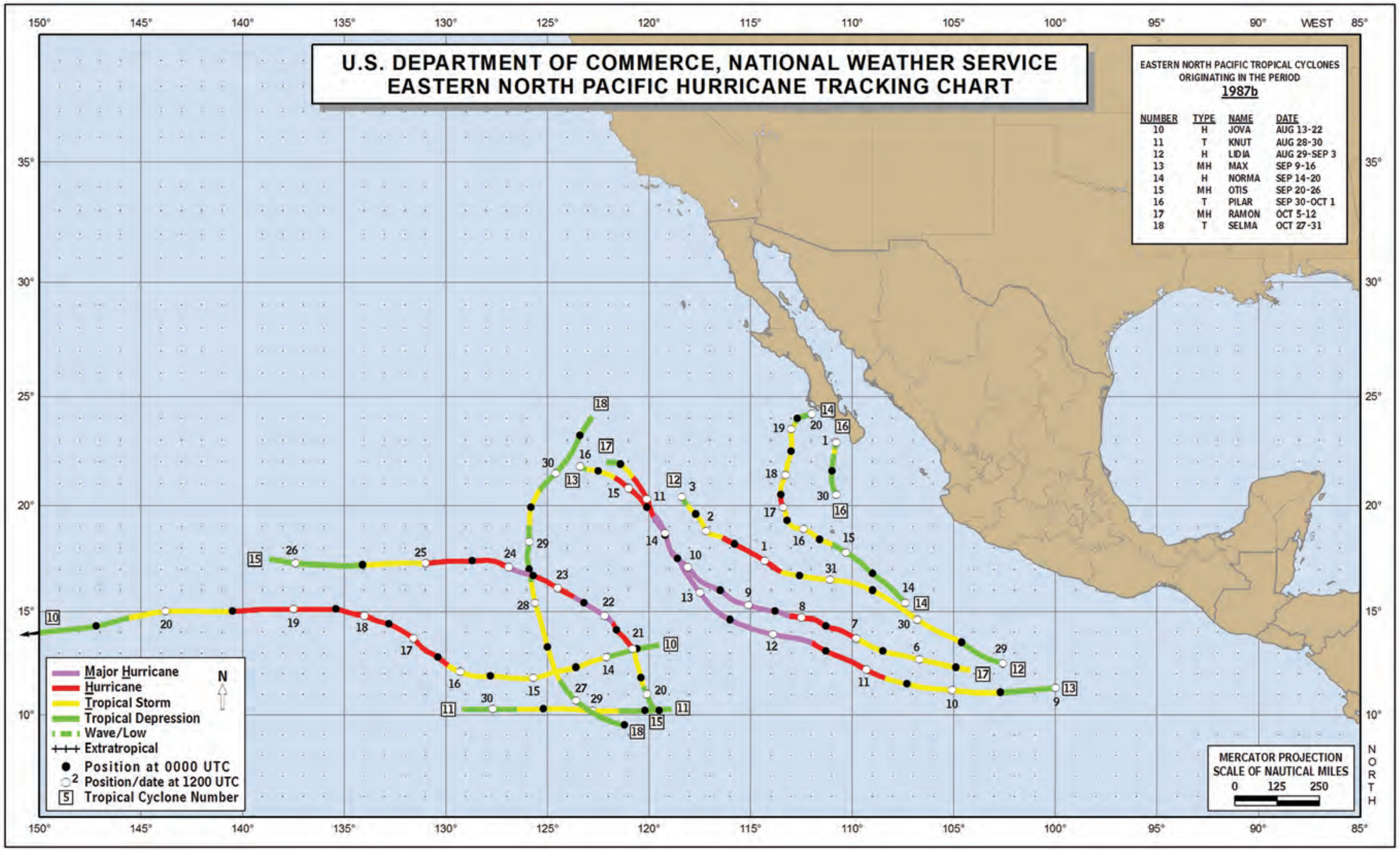

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1985a
NUMBER TYPE NAME DATE
1 T ANDRES JUN 5-12
2 MH BLANCA JUN 6-16
3 T CARLOS JUN 7-10
4 MH DOLORES JUN 26-JUL 5
5 T ENRIQUE JUN 27-JUL 5
6 T FEFA JUL 2-6
7 T GUILLERMO JUL 7-12
8 T HILDA JUL 18-20
9 T* IGNACIO JUL 21-27
10 MH JIMENA JUL 20-29
11 T KEVIN JUL 29-AUG 6
12 T LINDA JUL 29-AUG 9
*Reached MH status between 140°W-150°W
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

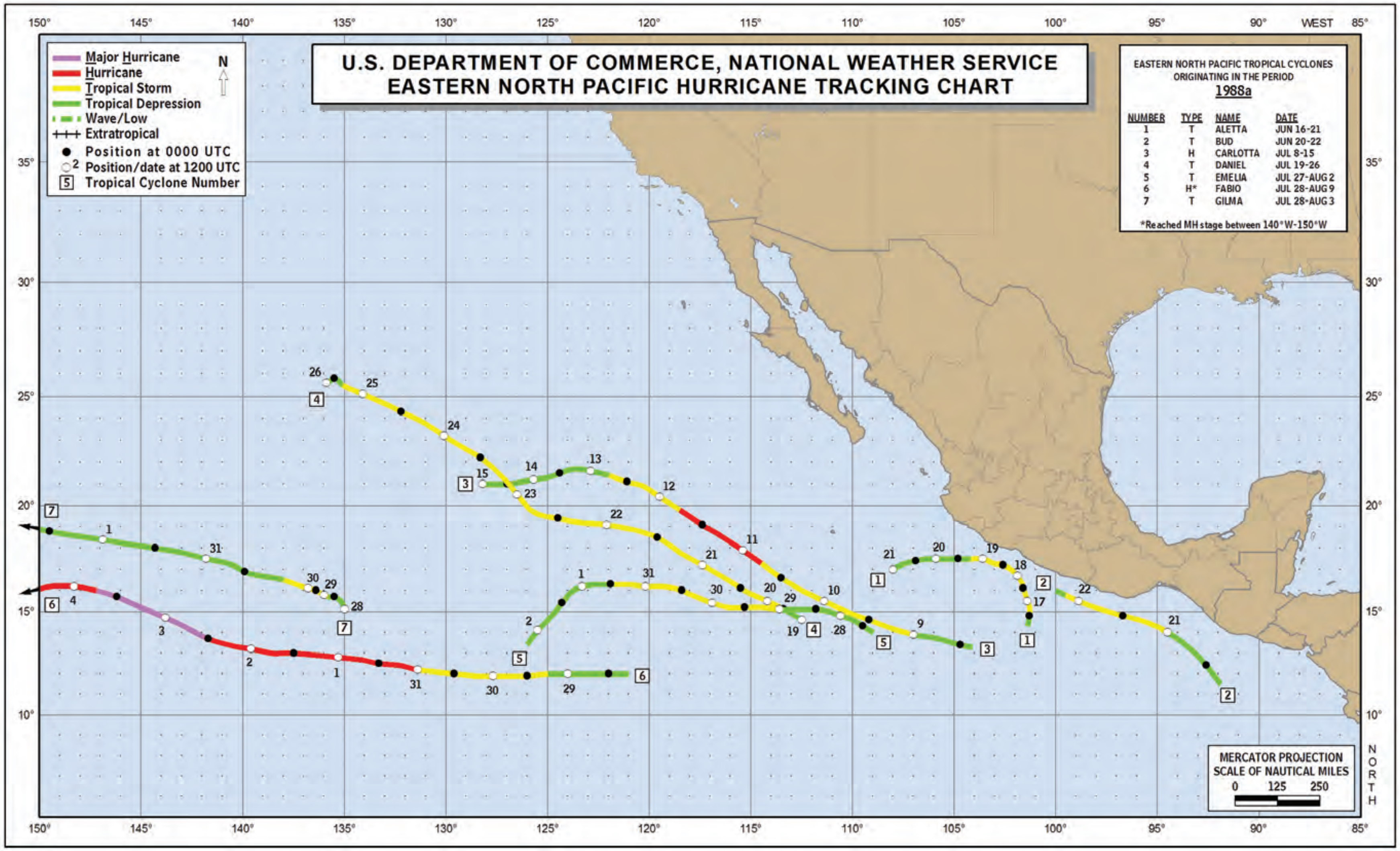

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1985b
NUMBER TYPE NAME DATE
13 H MARTY AUG 6-13
14 T NORA AUG 19-23
15 H OLAF AUG 22-31
16 H PAULINE AUG 27-SEP 9
17 MH RICK SEP 1-12
18 MH SANDRA SEP 5-17
19 MH TERRY SEP 15-24
20 T VIVIAN SEP 18-21
21 H WALDO OCT 7-9
22 MH XINA OCT 25-NOV 5
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

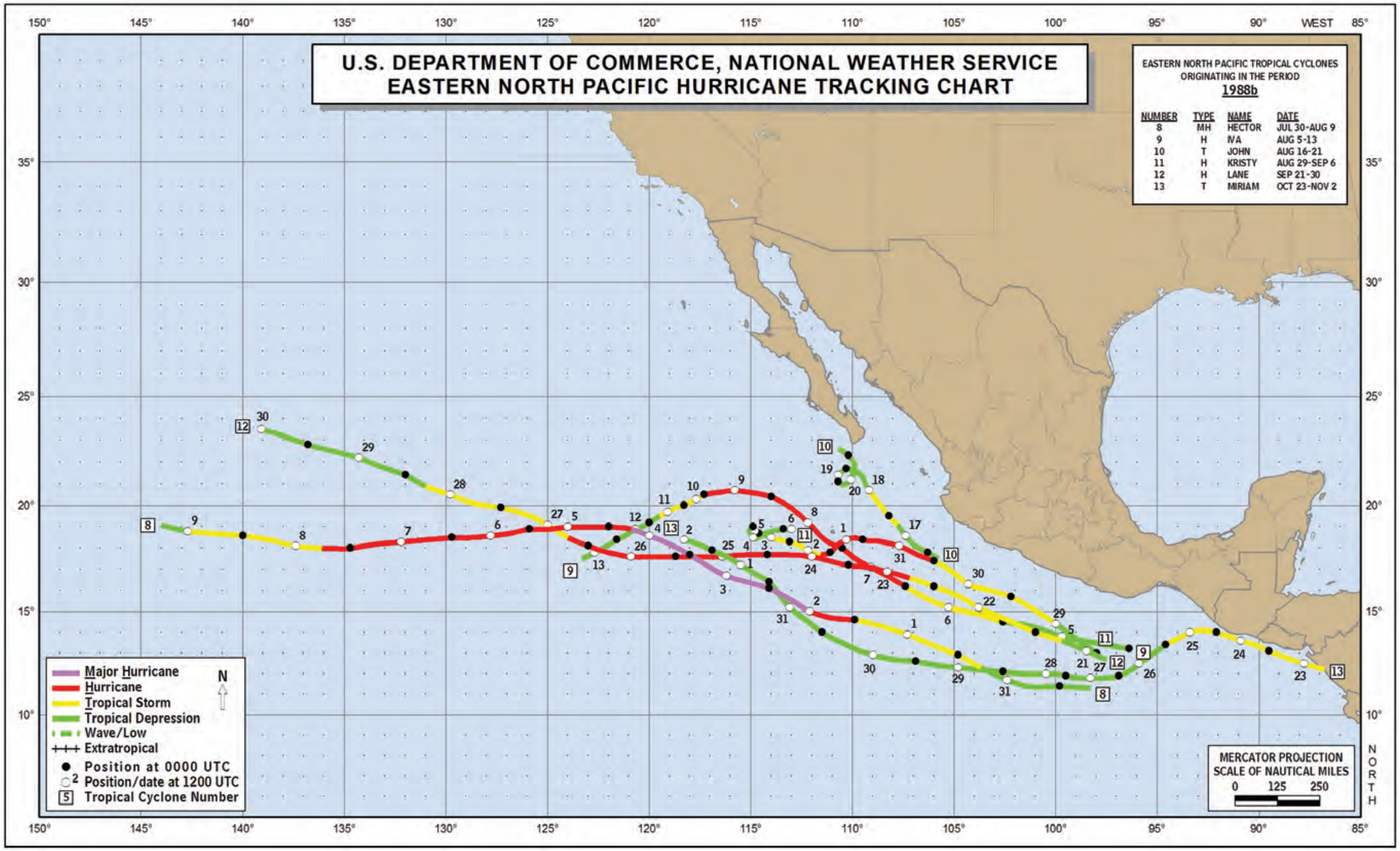

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1986a
NUMBER TYPE NAME DATE
1 H AGATHA MAY 22-29
2 T BLAS JUN 17-19
3 H CELIA JUN 24-30
4 T DARBY JUL 3-7
5 MH ESTELLE JUL 16-26
6 H FRANK JUL 24-AUG 3
7 T GEORGETTE AUG 3-4
8 T HOWARD AUG 16-18
9 T ISIS AUG 19-24
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

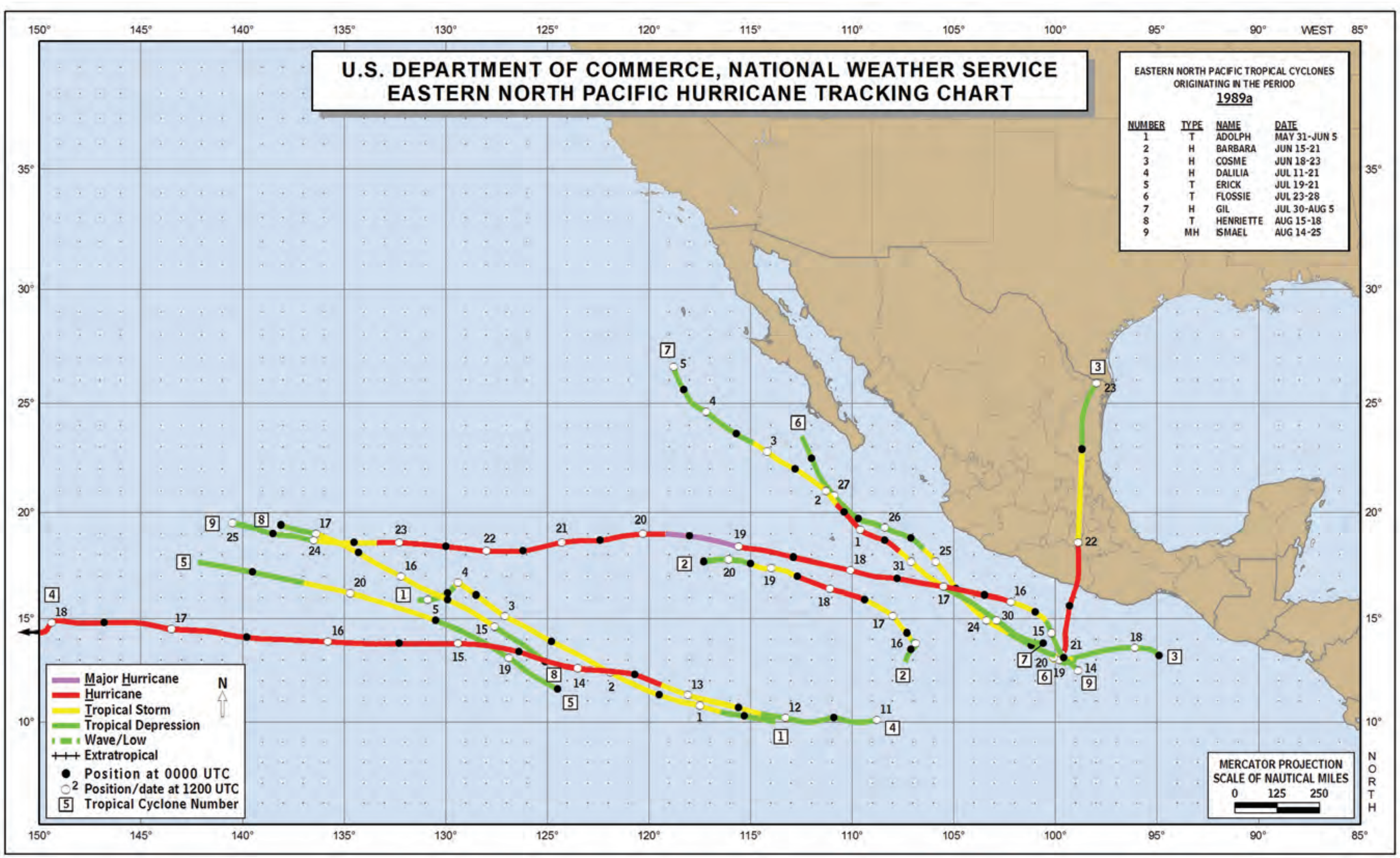

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1986b
NUMBER TYPE NAME DATE
10 MH JAVIER AUG 20-31
11 T KAY AUG 28-SEP 3
12 T LESTER SEP 13-17
13 T MADELINE SEP 15-22
14 H NEWTON SEP 18-24
15 H ORLENE SEP 21-25
16 H PAINE SEP 28-OCT 2
17 MH ROSLYN OCT 15-22
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

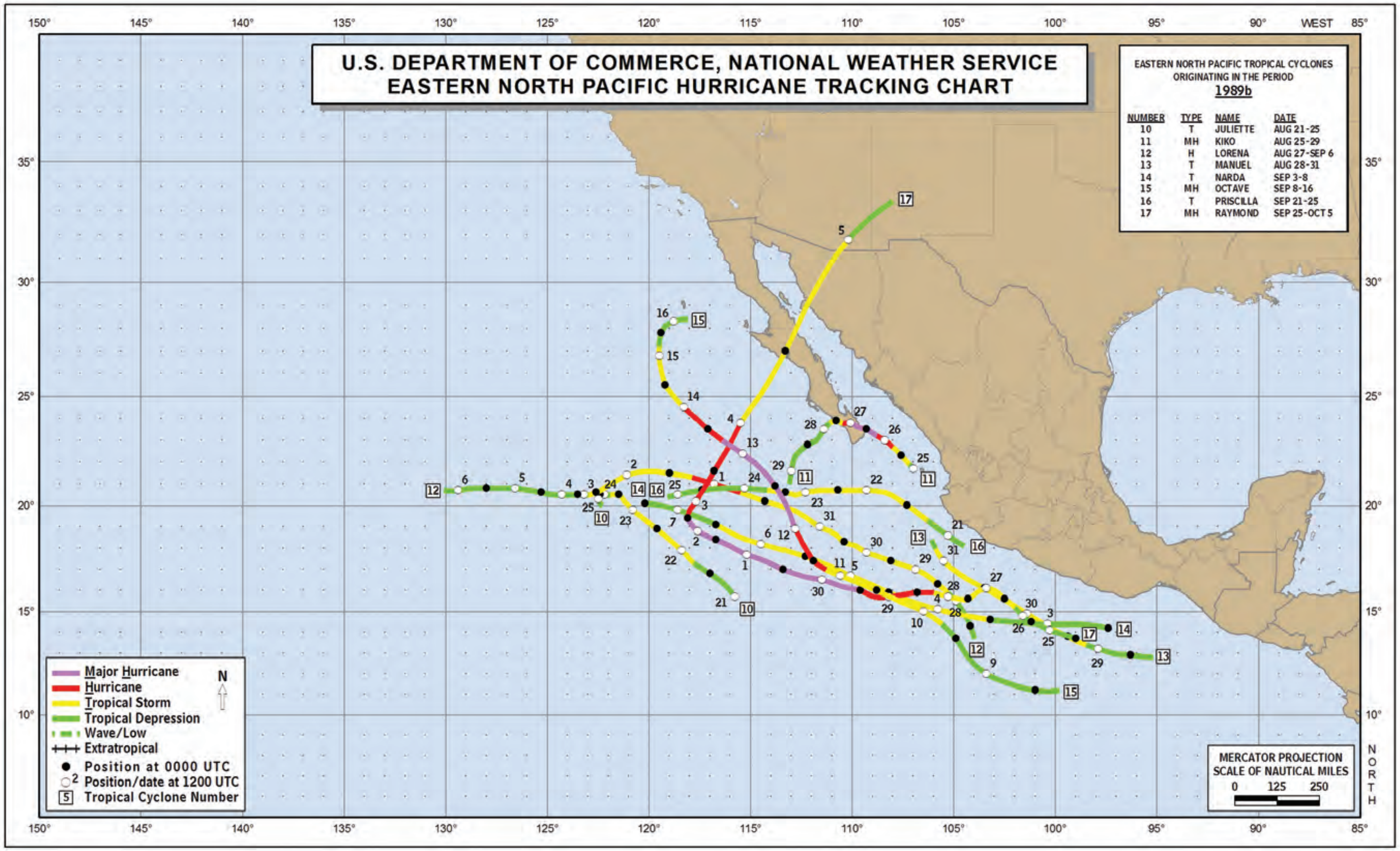

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1987a
NUMBER TYPE NAME DATE
1 T ADRIAN JUN 7-9
2 T BEATRIZ JUL 3-7
3 T CALVIN JUL 5-10
4 T DORA JUL 15-20
5 H EUGENE JUL 22-26
6 T FERNANDA JUL 24-31
7 H GREG JUL 28-AUG 3
8 MH HILARY JUL 31- AUG 9
9 T IRWIN AUG 3-9
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

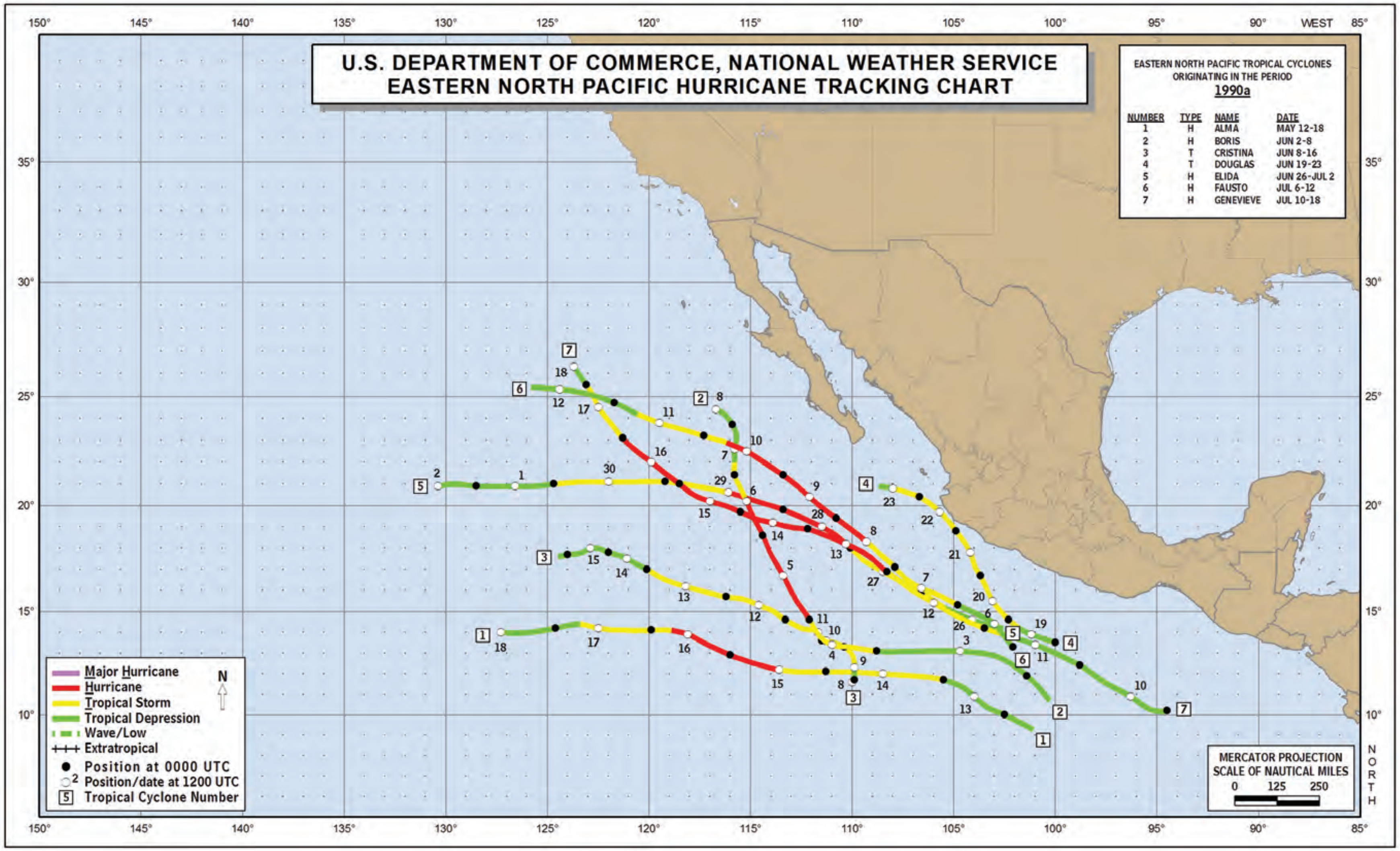

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1987b
NUMBER TYPE NAME DATE
10 H JOVA AUG 13-22
11 T KNUT AUG 28-30
12 H LIDIA AUG 29-SEP 3
13 MH MAX SEP 9-16
14 H NORMA SEP 14-20
15 MH OTIS SEP 20-26
16 T PILAR SEP 30-OCT 1
17 MH RAMON OCT 5-12
18 T SELMA OCT 27-31
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°

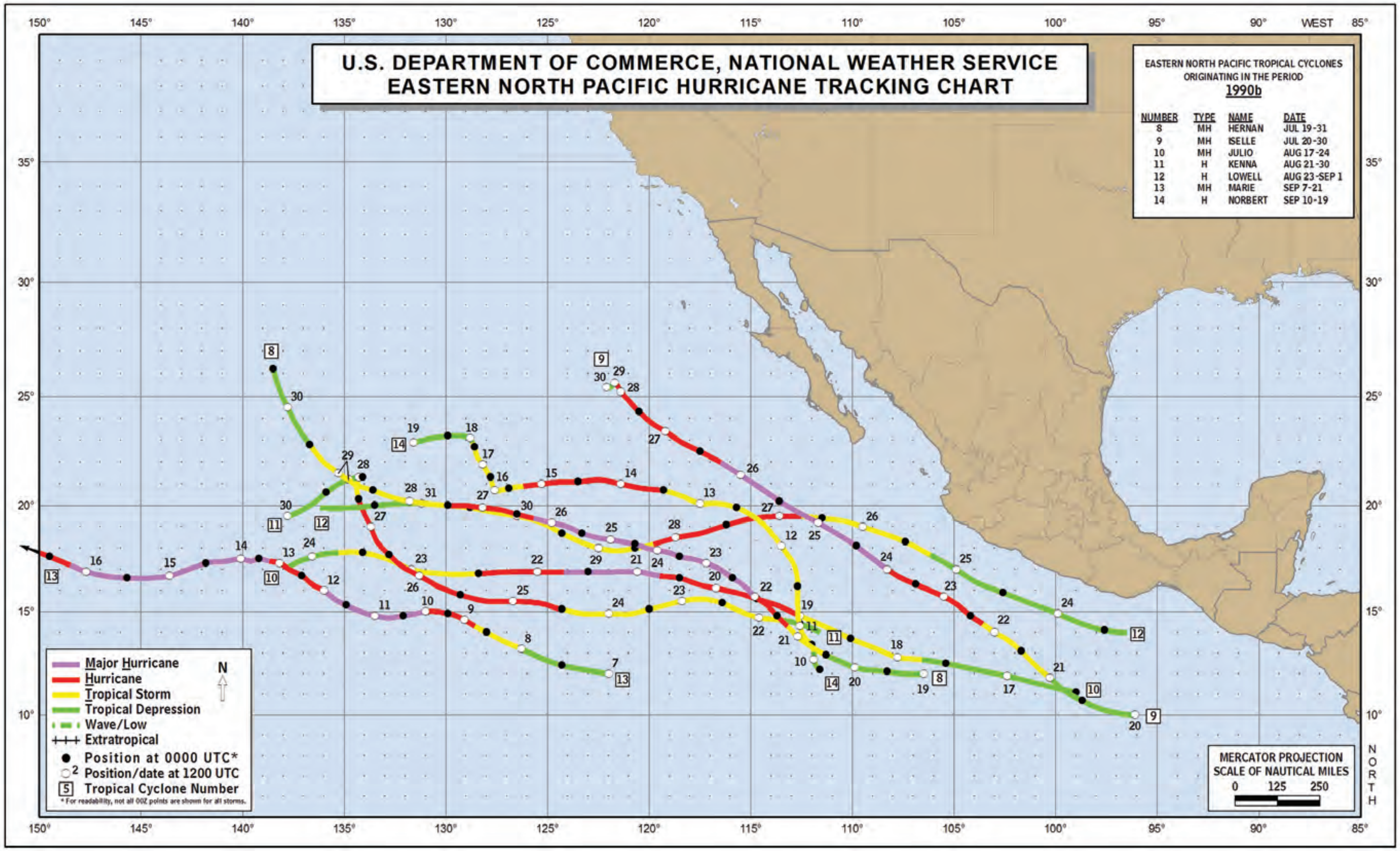

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1988a
NUMBER TYPE NAME DATE
1 T ALETTA JUN 16-21
2 T BUD JUN 20-22
3 H CARLOTTA JUL 8-15
4 T DANIEL JUL 19-26
5 T EMELIA JUL 27-AUG 2
6 H* FABIO JUL 28-AUG 9
7 T GILMA JUL 28-AUG 3
*Reached MH stage between 140°W-150°W
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

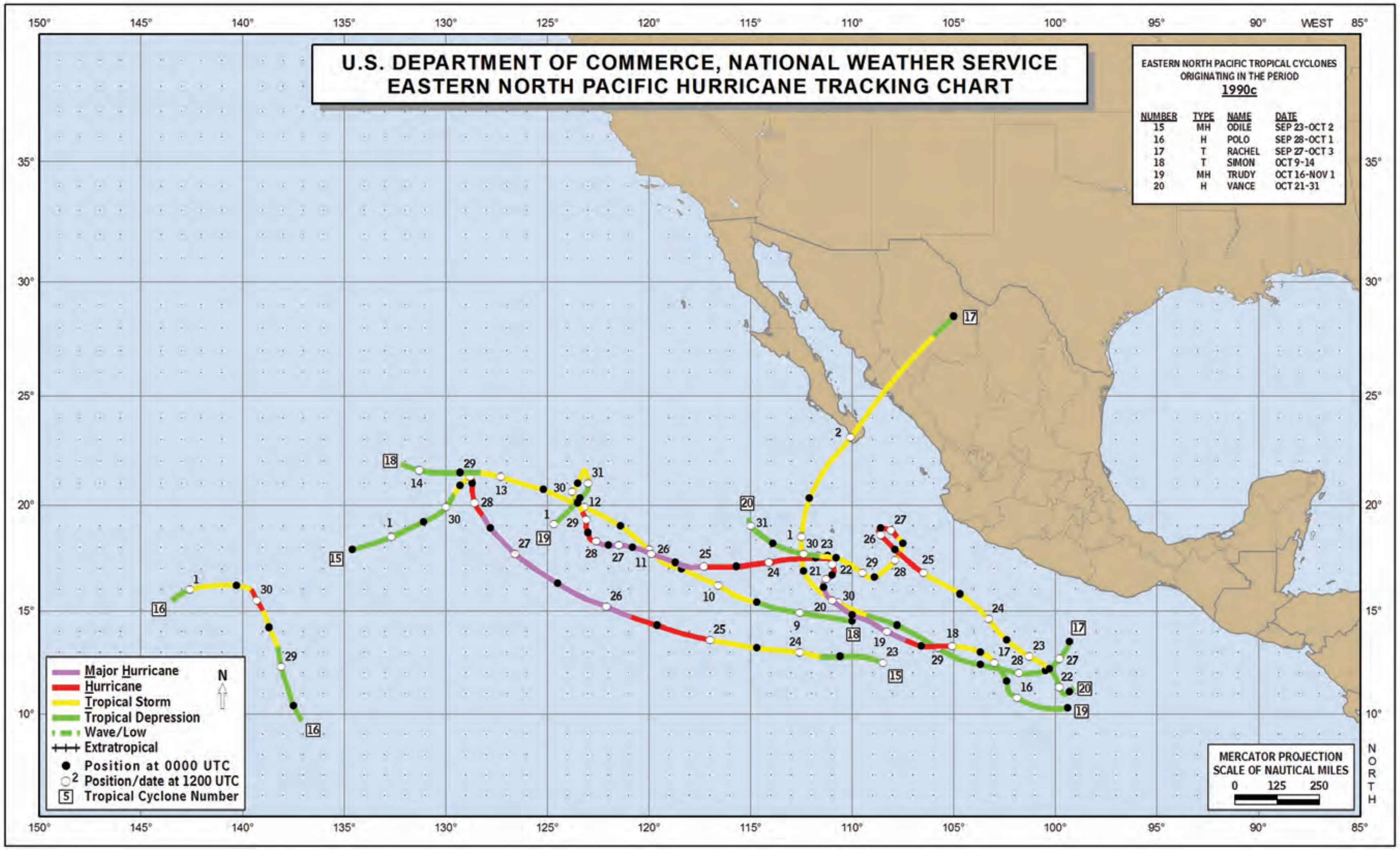

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1988b
NUMBER TYPE NAME DATE
8 MH HECTOR JUL 30-AUG 9
9 H IVA AUG 5-13
10 T JOHN AUG 16-21
11 H KRISTY AUG 29-SEP 6
12 H LANE SEP 21-30
13 T MIRIAM OCT 23-NOV 2
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°

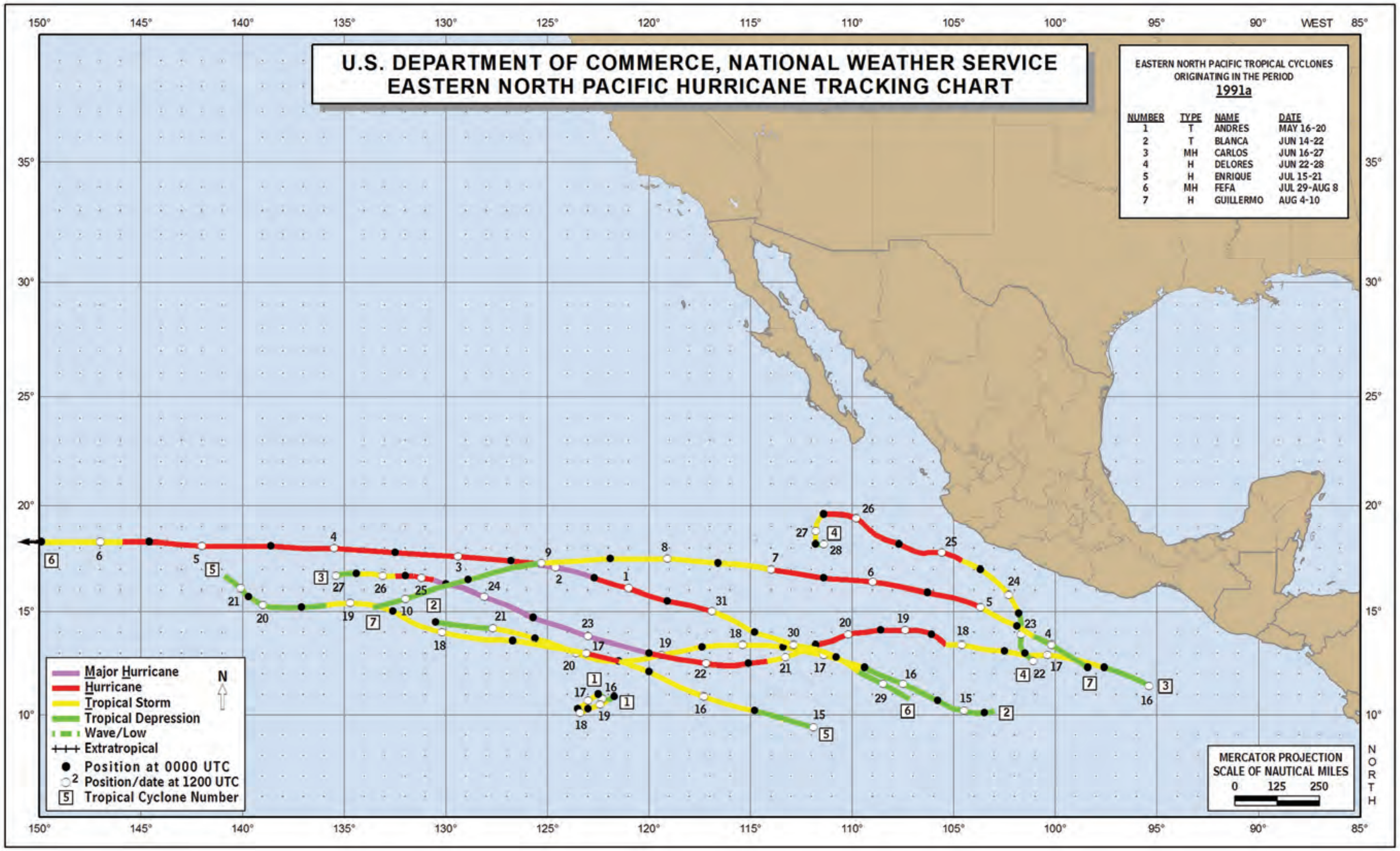

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1989a
NUMBER TYPE NAME DATE
1 T ADOLPH MAY 31-JUN 5
2 H BARBARA JUN 15-21
3 H COSME JUN 18-23
4 H DALILIA JUL 11-21
5 T ERICK JUL 19-21
6 T FLOSSIE JUL 23-28
7 H GIL JUL 30-AUG 5
8 T HENRIETTE AUG 15-18
9 MH ISMAEL AUG 14-25
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

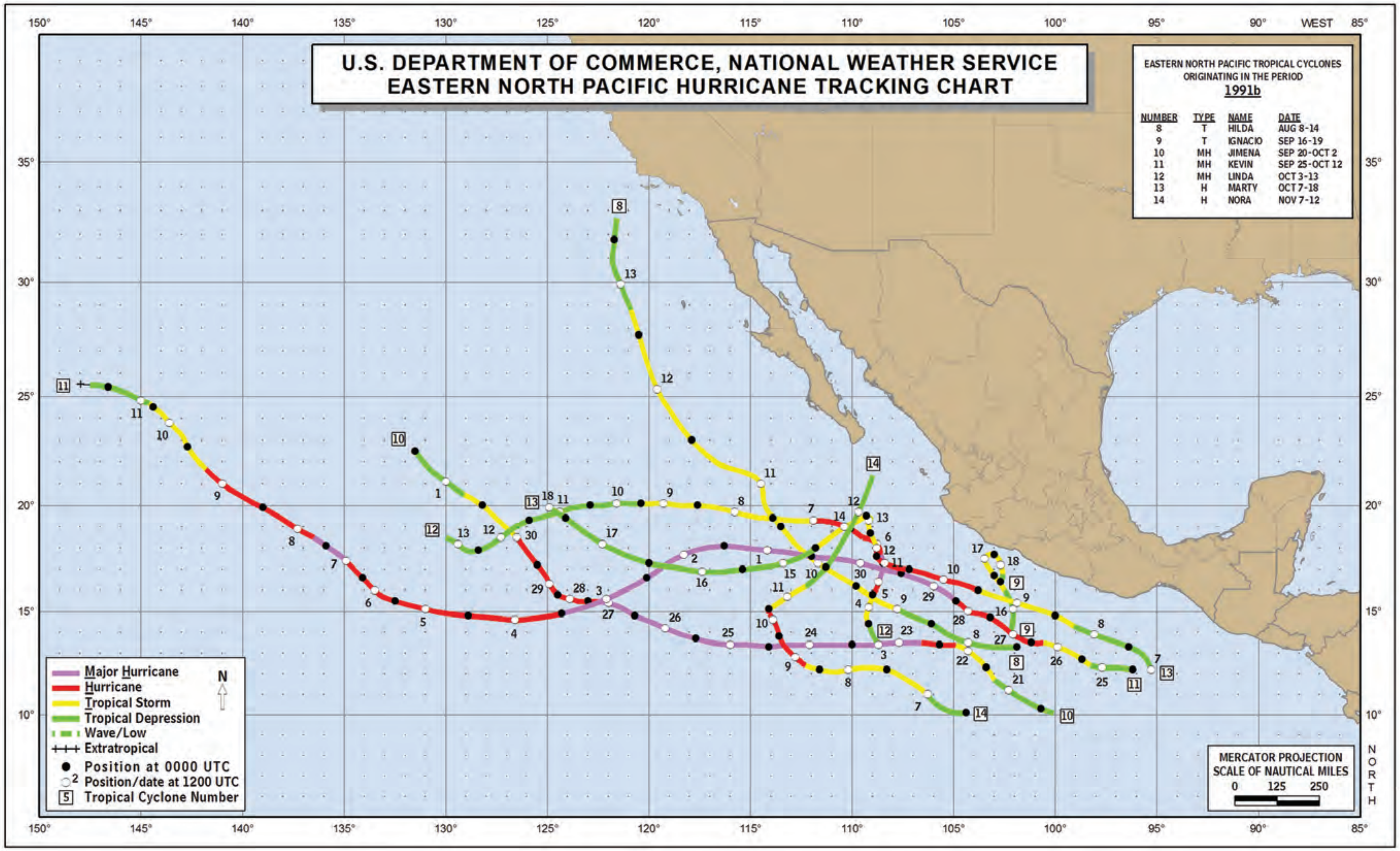

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1989b
NUMBER TYPE NAME DATE
10 T JULIETTE AUG 21-25
11 MH KIKO AUG 25-29
12 H LORENA AUG 27-SEP 6
13 T MANUEL AUG 28-31
14 T NARDA SEP 3-8
15 MH OCTAVE SEP 8-16
16 T PRISCILLA SEP 21-25
17 MH RAYMOND SEP 25-OCT 5
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

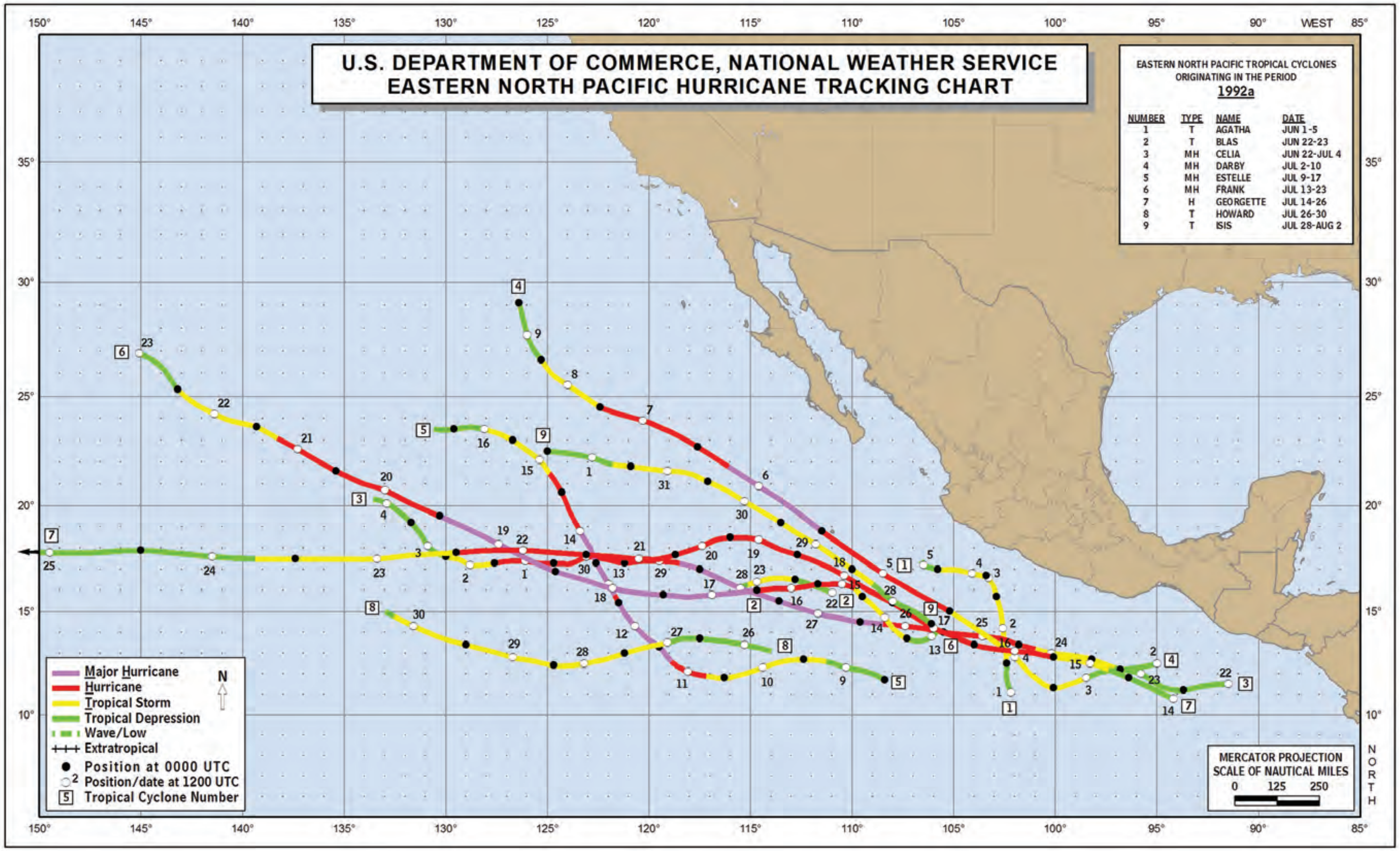

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1990a
NUMBER TYPE NAME DATE
1 H ALMA MAY 12-18
2 H BORIS JUN 2-8
3 T CRISTINA JUN 8-16
4 T DOUGLAS JUN 19-23
5 H ELIDA JUN 26-JUL 2
6 H FAUSTO JUL 6-12
7 H GENEVIEVE JUL 10-18
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

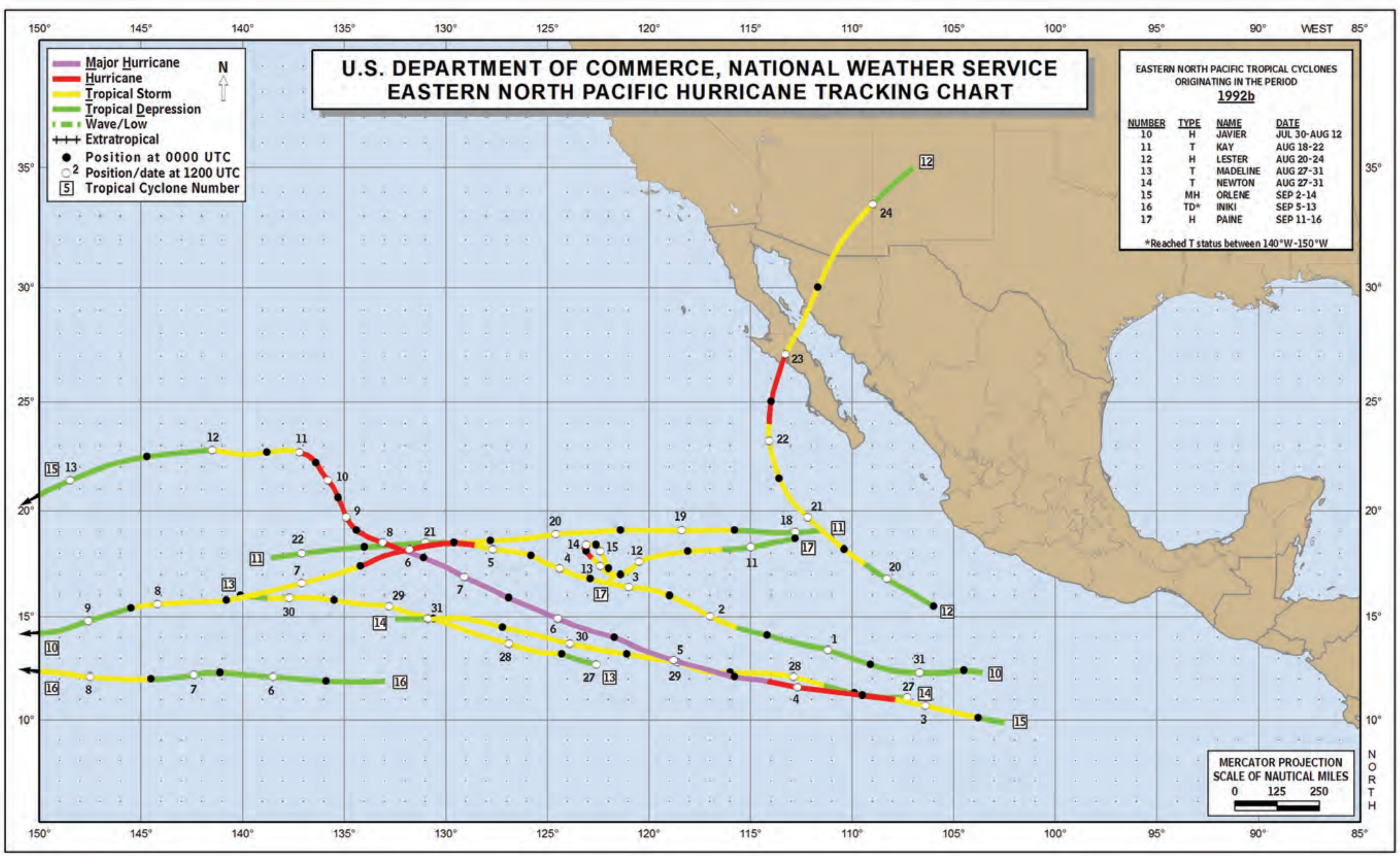

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1990b
NUMBER TYPE NAME DATE
8 MH HERNAN JUL 19-31
9 MH ISELLE JUL 20-30
10 MH JULIO AUG 17-24
11 H KENNA AUG 21-30
12 H LOWELL AUG 23-SEP 1
13 MH MARIE SEP 7-21
14 H NORBERT SEP 10-19
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC*
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

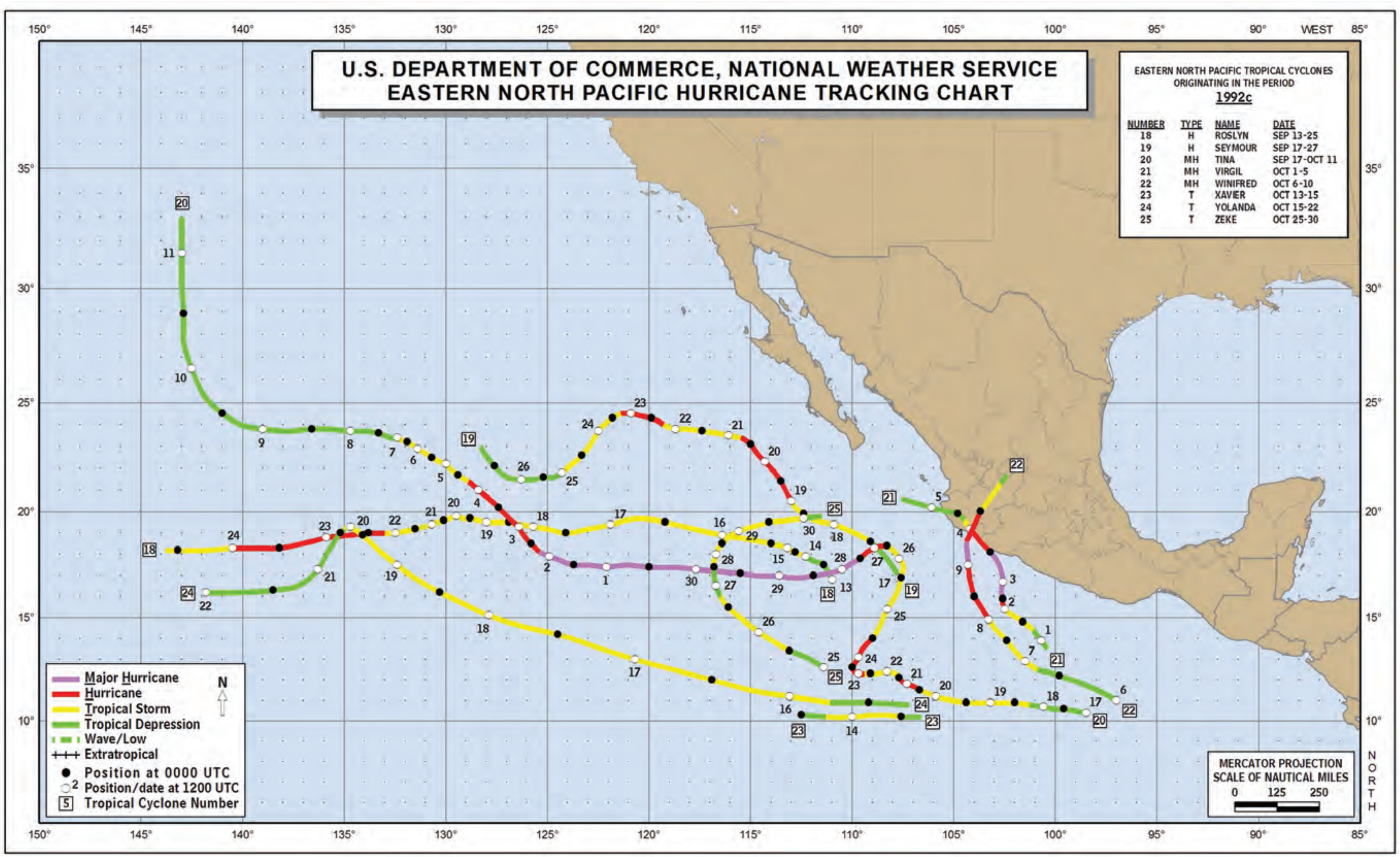

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1990c
NUMBER TYPE NAME DATE
15 MH ODILE SEP 23-OCT 2
16 H POLO SEP 28-OCT 1
17 T RACHEL SEP 27-OCT 3
18 T SIMON OCT 9-14
19 MH TRUDY OCT 16-NOV 1
20 H VANCE OCT 21-31
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

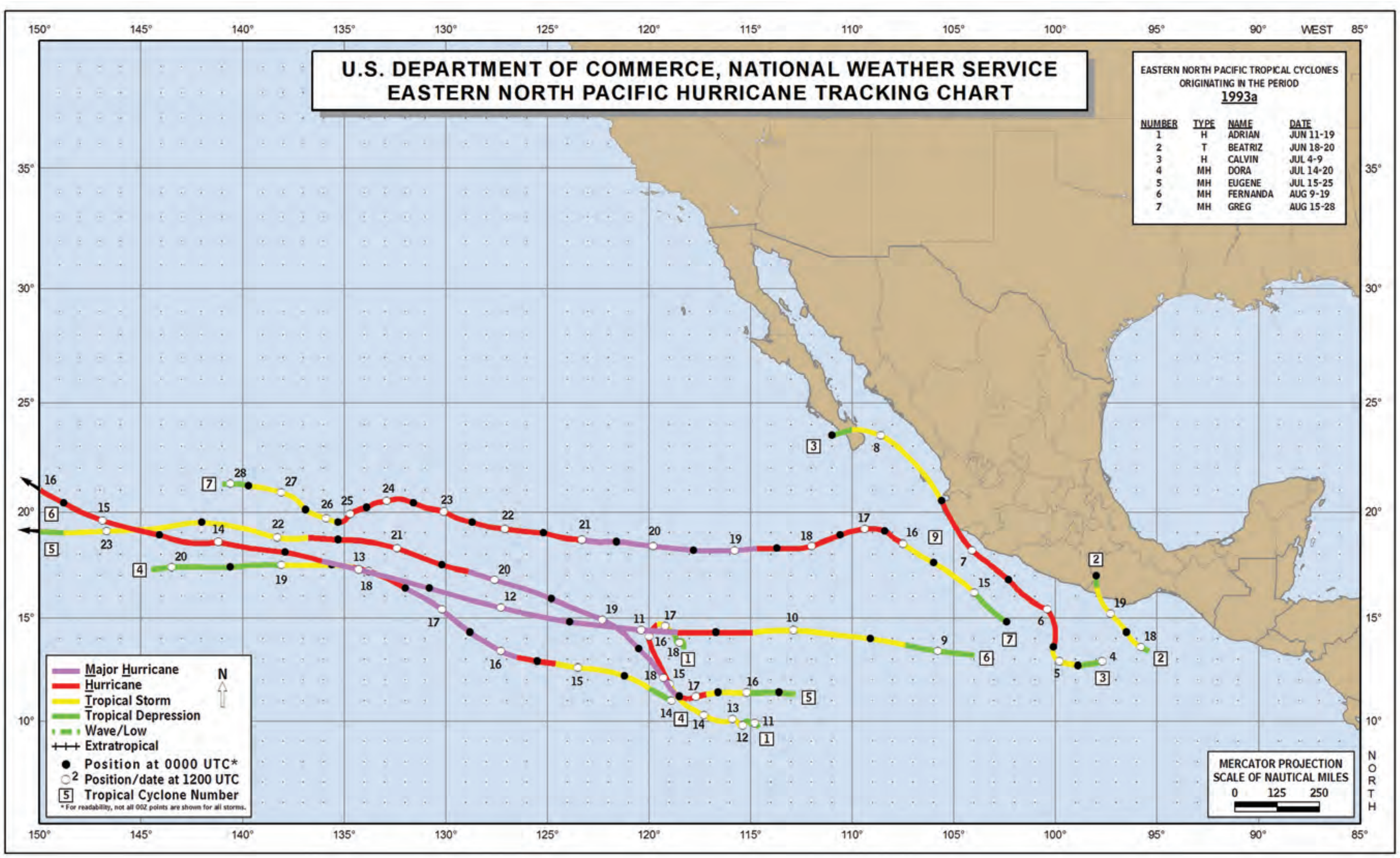

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1991a
NUMBER TYPE NAME DATE
1 T ANDRES MAY 16-20
2 T BLANCA JUN 14-22
3 MH CARLOS JUN 16-27
4 H DELORES JUN 22-28
5 H ENRIQUE JUL 15-21
6 MH FEFA JUL 29-AUG 8
7 H GUILLERMO AUG 4-10
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1991b
NUMBER TYPE NAME DATE
8 T HILDA AUG 8-14
9 T IGNACIO SEP 16-19
10 MH JIMENA SEP 20-OCT 2
11 MH KEVIN SEP 25-OCT 12
12 MH LINDA OCT 3-13
13 H MARTY OCT 7-18
14 H NORA NOV 7-12
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1992a
NUMBER TYPE NAME DATE
1 T AGATHA JUN 1-5
2 T BLAS JUN 22-23
3 MH CELIA JUN 22-JUL 4
4 MH DARBY JUL 2-10
5 MH ESTELLE JUL 9-17
6 MH FRANK JUL 13-23
7 H GEORGETTE JUL 14-26
8 T HOWARD JUL 26-30
9 T ISIS JUL 28-AUG 2
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
2 Position/date at 1200 UTC
5 Tropical Cyclone Number
N
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1992b
NUMBER TYPE NAME DATE
10 H JAVIER JUL 30-AUG 12
11 T KAY AUG 18-22
12 H LESTER AUG 20-24
13 T MADELINE AUG 27-31
14 T NEWTON AUG 27-31
15 MH ORLENE SEP 2-14
16 TD* INIKI SEP 5-13
17 H PAINE SEP 11-16
*Reached T status between 140°W-150°W
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
1992c
NUMBER TYPE NAME DATE
18 H ROSLYN SEP 13-25
19 H SEYMOUR SEP 17-27
20 MH TINA SEP 17-OCT 11
21 MH VIRGIL OCT 1-5
22 MH WINIFRED OCT 6-10
23 T XAVIER OCT 13-15
24 T YOLANDA OCT 15-22
25 T ZEKE OCT 25-30
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH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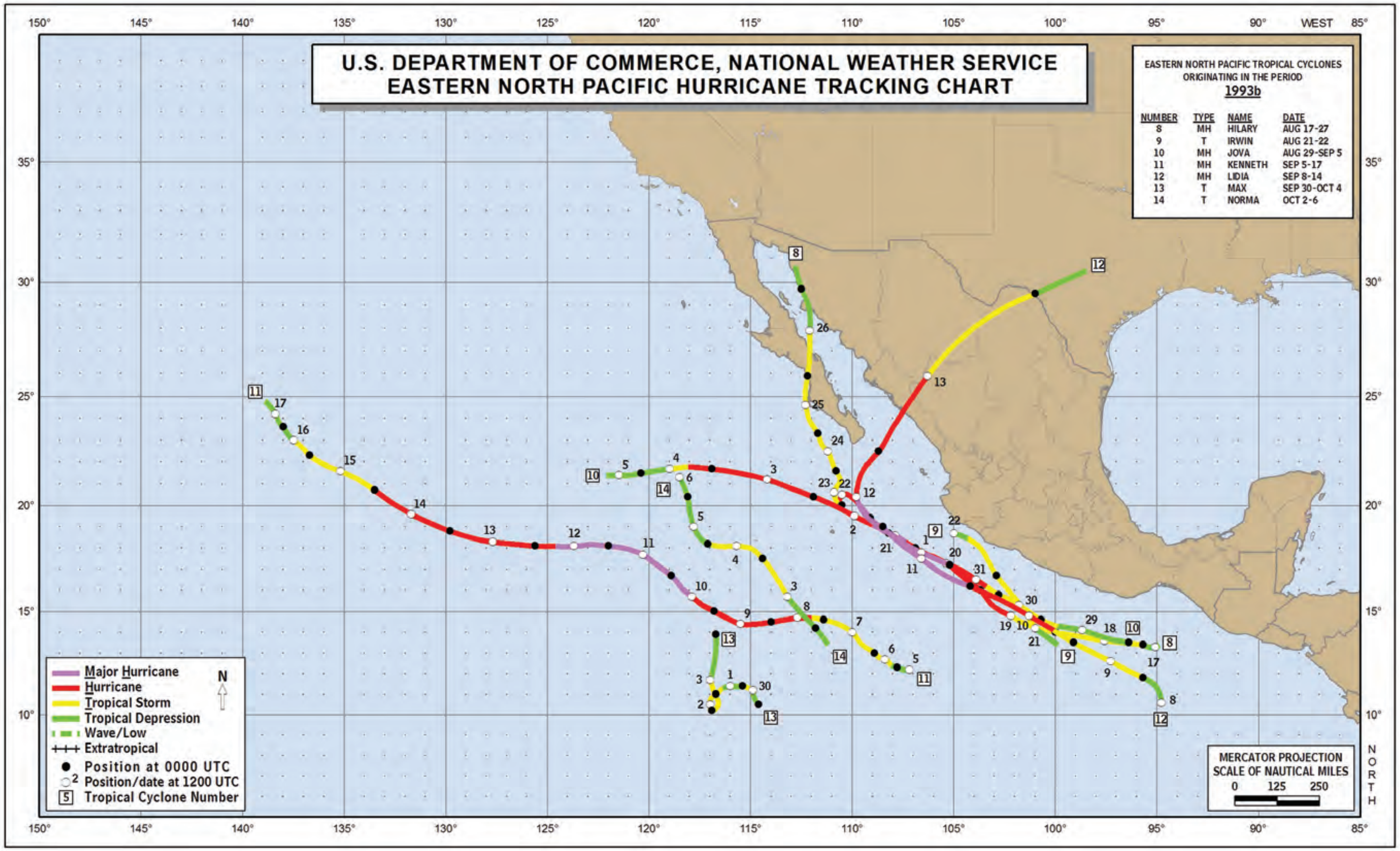
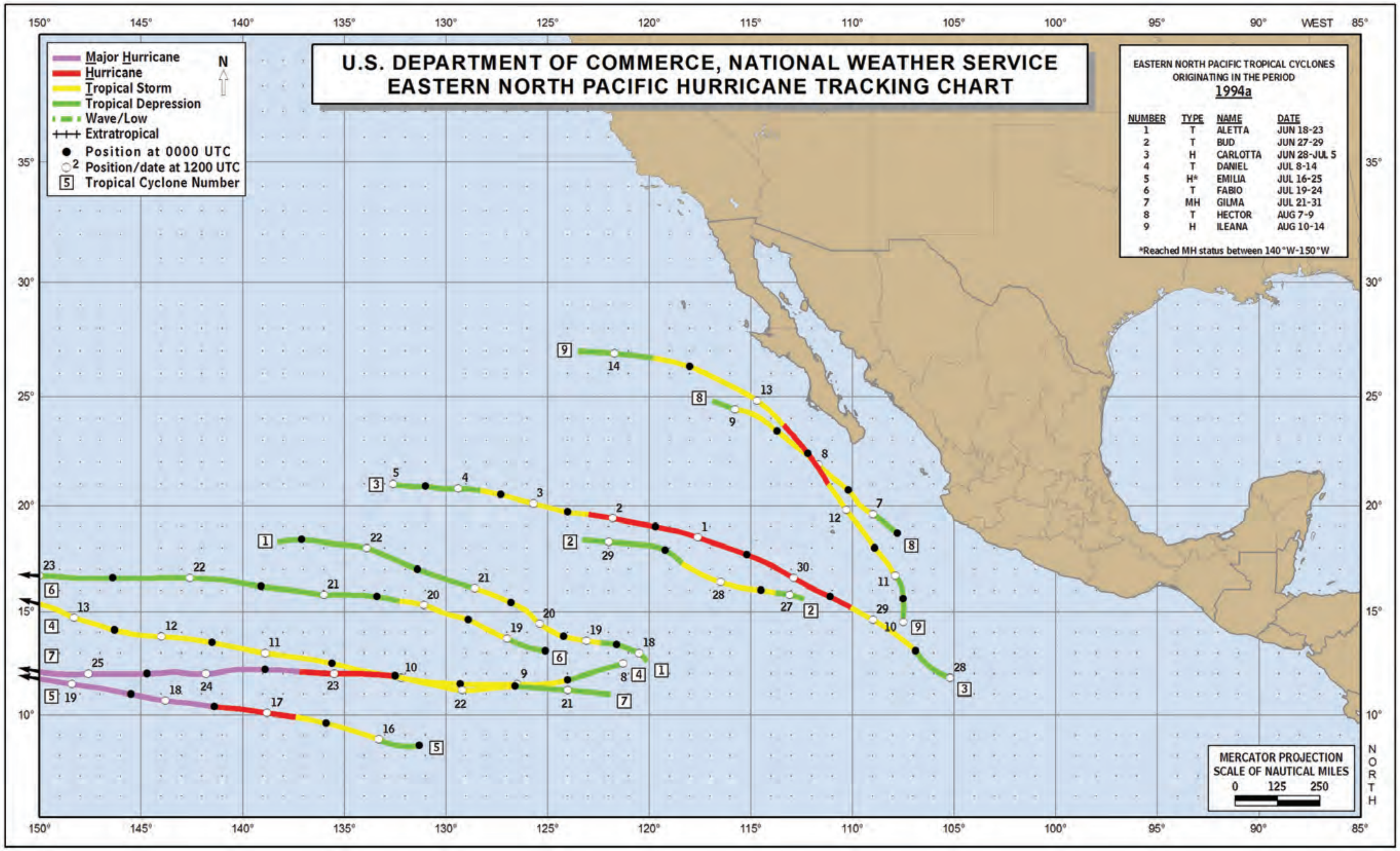
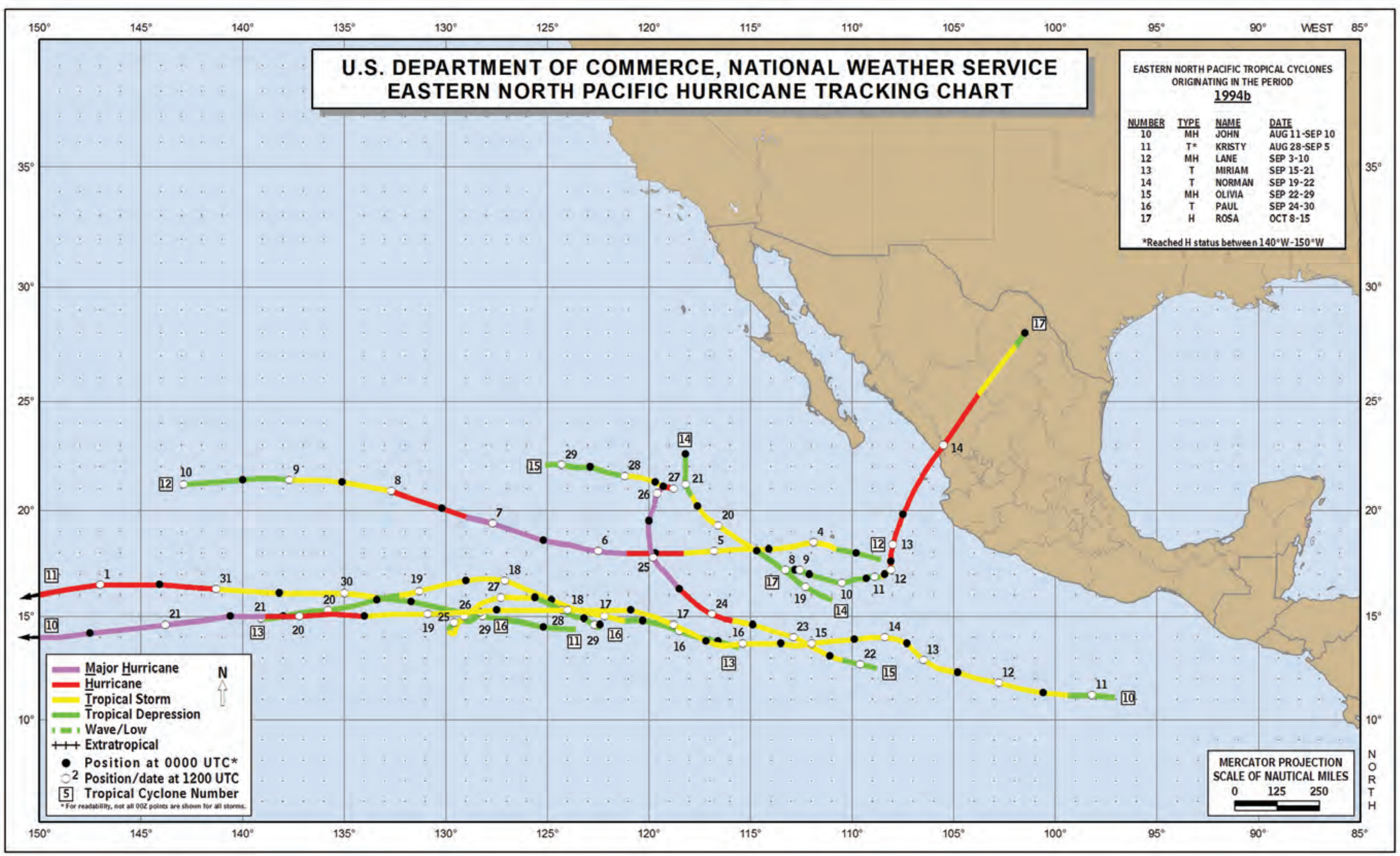
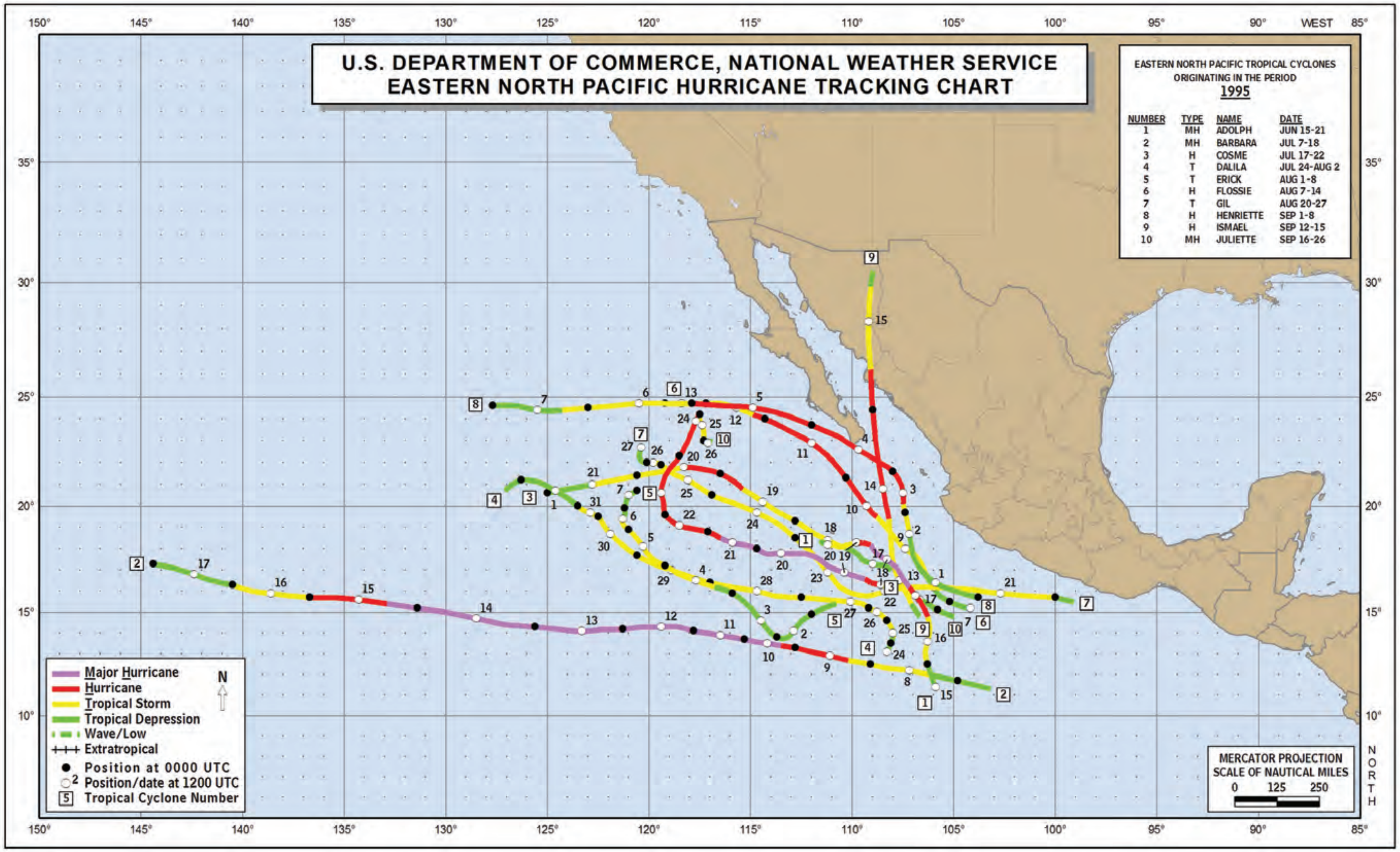
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1993a
NUMBER TYPE NAME DATE
1 H ADRIAN JUN 11-19
2 T BEATRIZ JUN 18-20
3 H CALVIN JUL 4-9
4 MH DORA JUL 14-20
5 MH EUGENE JUL 15-25
6 MH FERNANDA AUG 9-19
7 MH GREG AUG 15-28
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC*
Position/date at 1200 UTC
Tropical Cyclone Number
* For readability, not all 00Z points are shown for all storms.
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

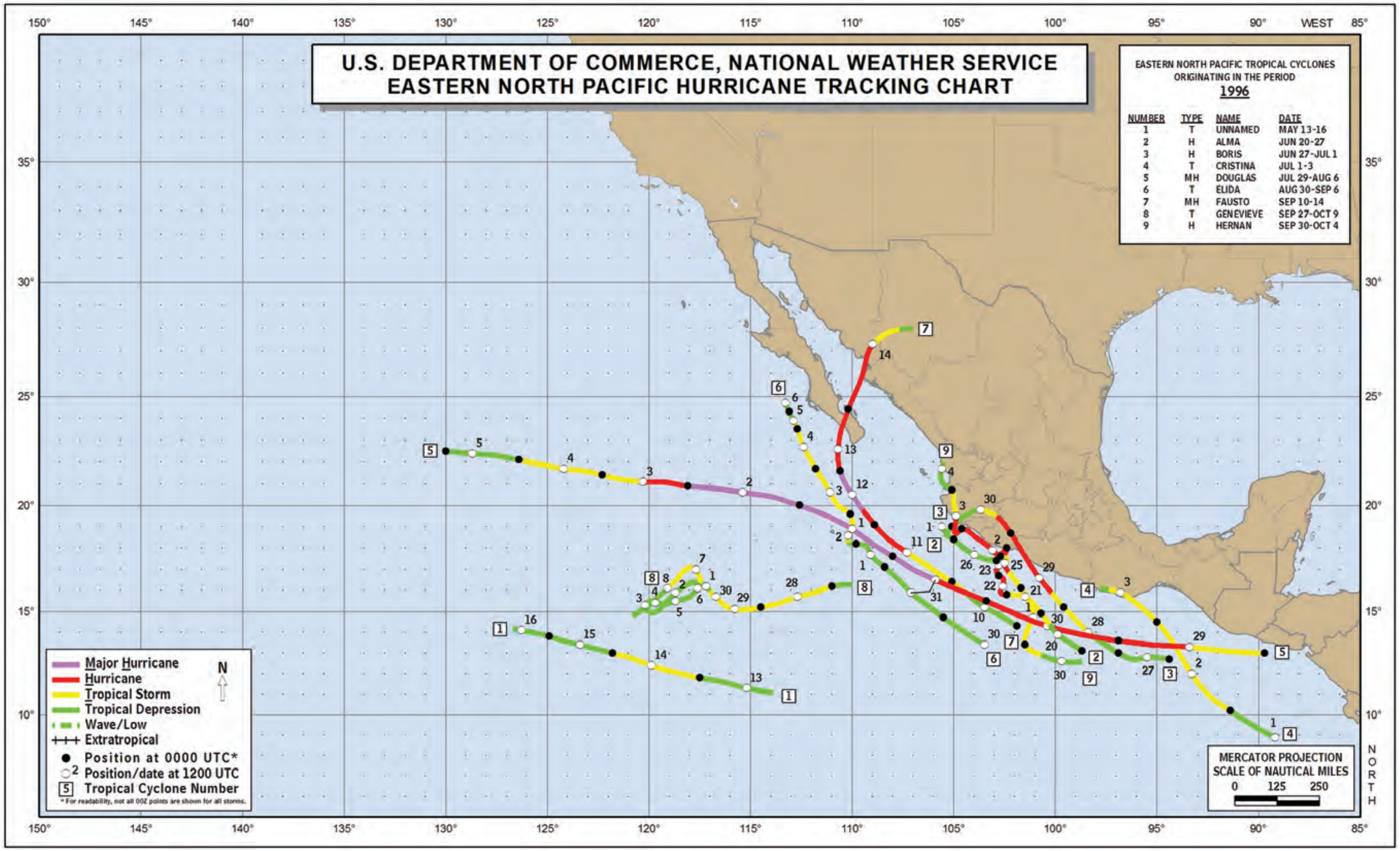

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1993b
NUMBER TYPE NAME DATE
8 MH HILARY AUG 17-27
9 T IRWIN AUG 21-22
10 MH JOVA AUG 29-SEP 5
11 MH KENNETH SEP 5-17
12 MH LIDIA SEP 8-14
13 T MAX SEP 30-OCT 4
14 T NORMA OCT 2-6
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

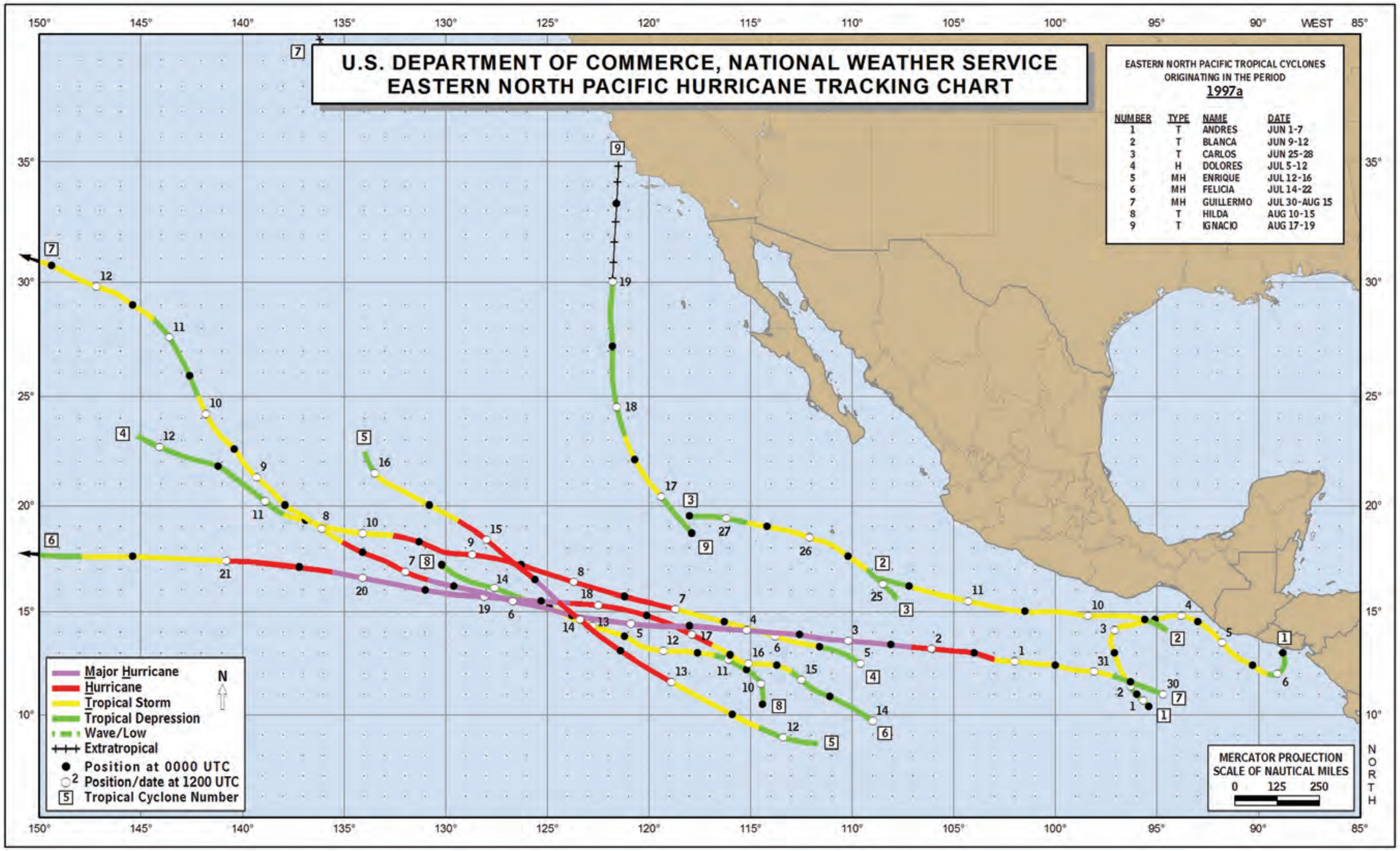

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1994a
NUMBER TYPE NAME DATE
1 T ALETTA JUN 18-23
2 T BUD JUN 27-29
3 H CARLOTTA JUN 28-JUL 5
4 T DANIEL JUL 8-14
5 H* EMILIA JUL 16-25
6 T FABIO JUL 19-24
7 MH GILMA JUL 21-31
8 T HECTOR AUG 7-9
9 H ILEANA AUG 10-14
*Reached MH status between 140°W-150°W
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1994b
NUMBER TYPE NAME DATE
10 MH JOHN AUG 11-SEP 10
11 T* KRISTY AUG 28-SEP 5
12 MH LANE SEP 3-10
13 T MIRIAM SEP 15-21
14 T NORMAN SEP 19-22
15 MH OLIVIA SEP 22-29
16 T PAUL SEP 24-30
17 H ROSA OCT 8-15
*Reached H status between 140°W-150°W
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC*
Position/date at 1200 UTC
Tropical Cyclone Number
* For readability, not all 00Z points are shown for all storms.
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°

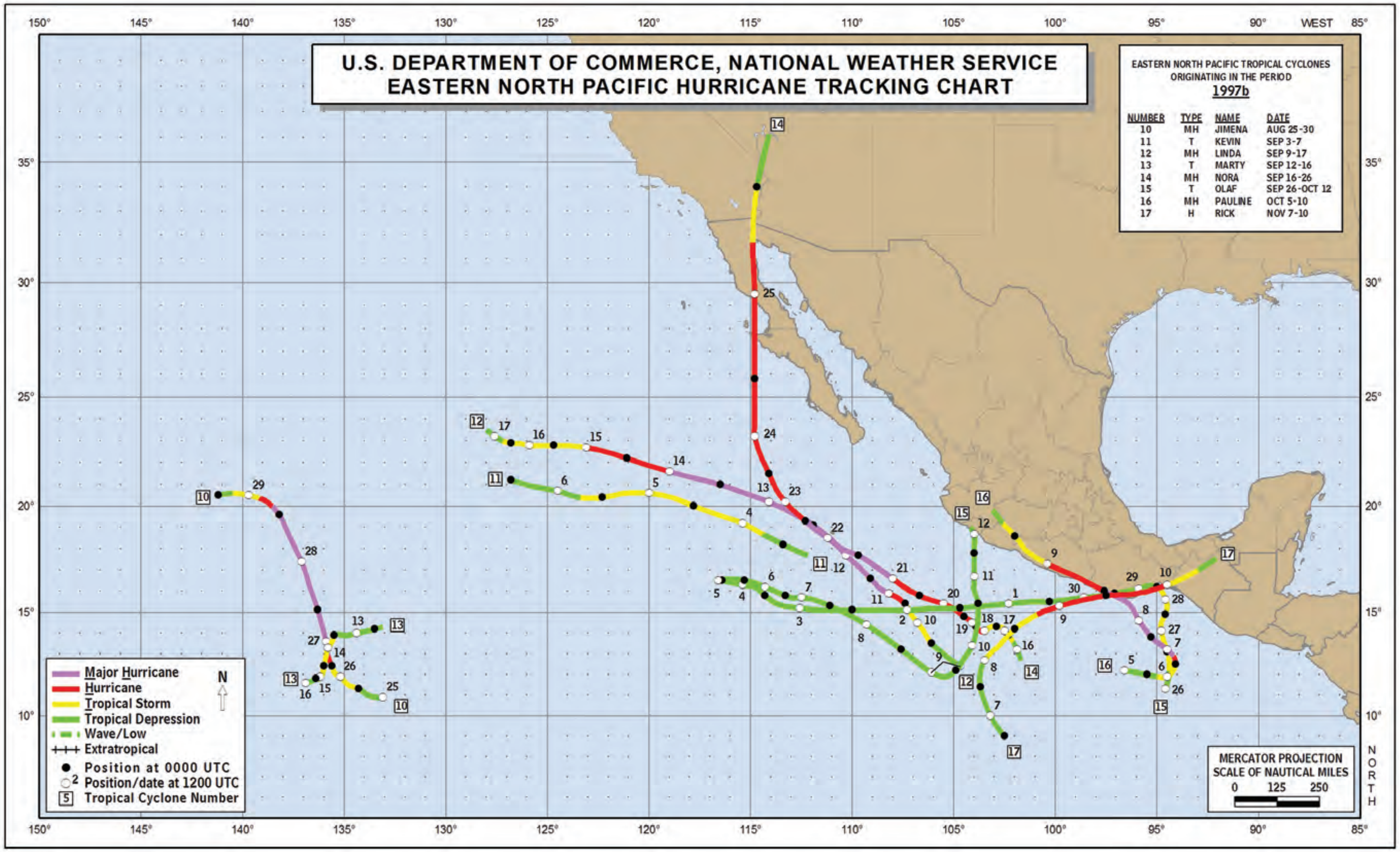


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1995
NUMBER TYPE NAME DATE
1 MH ADOLPH JUN 15-21
2 MH BARBARA JUL 7-18
3 H COSME JUL 17-22
4 T DALILA JUL 24-AUG 2
5 T ERICK AUG 1-8
6 H FLOSSIE AUG 7-14
7 T GIL AUG 20-27
8 H HENRIETTE SEP 1-8
9 H ISMAEL SEP 12-15
10 MH JULIETTE SEP 16-26
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

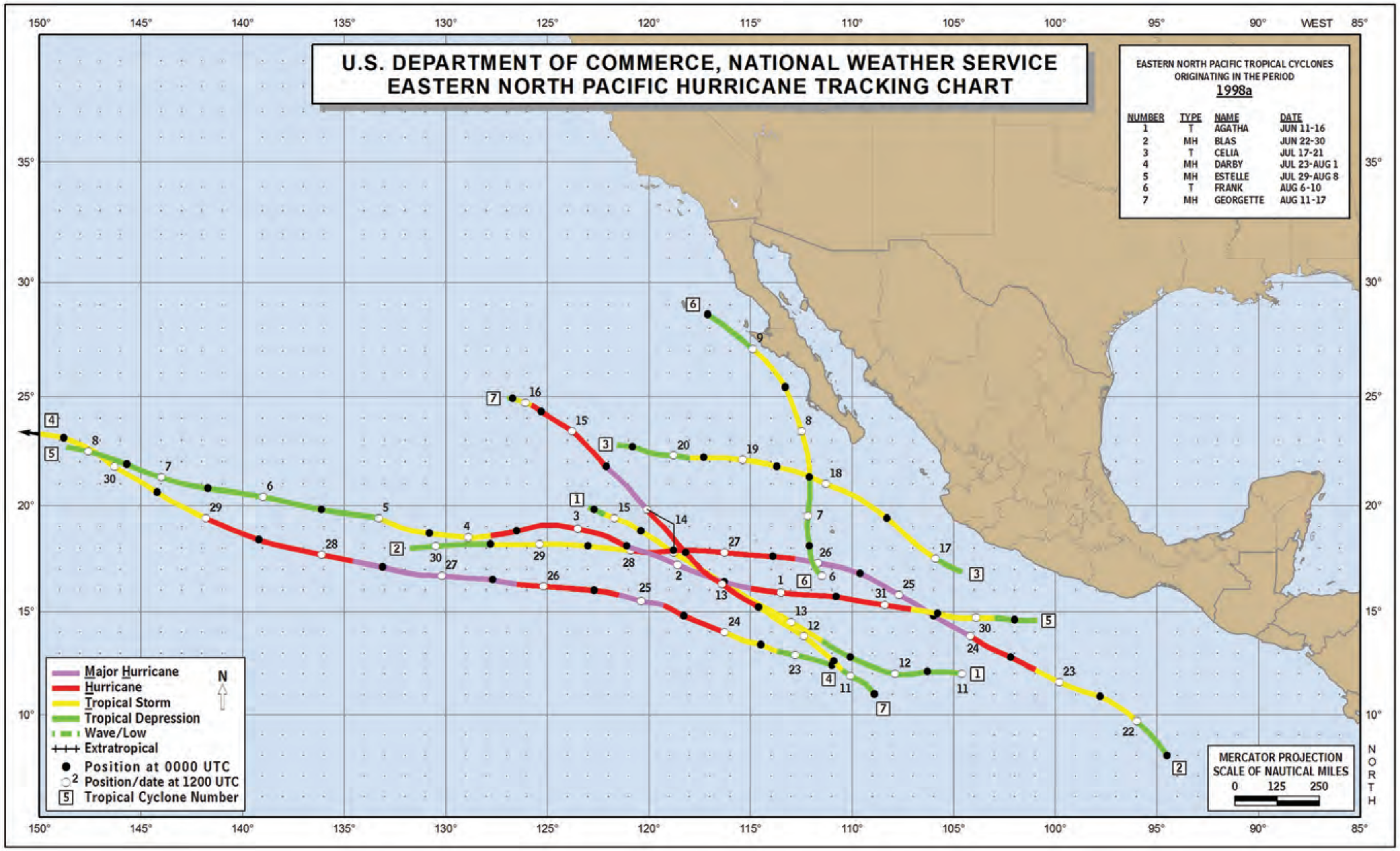

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1996
NUMBER TYPE NAME DATE
1 T UNNAMED MAY 13-16
2 H ALMA JUN 20-27
3 H BORIS JUN 27-JUL 1
4 T CRISTINA JUL 1-3
5 MH DOUGLAS JUL 29-AUG 6
6 T ELIDA AUG 30-SEP 6
7 MH FAUSTO SEP 10-14
8 T GENEVIEVE SEP 27-OCT 9
9 H HERNAN SEP 30-OCT 4
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC*
Position/date at 1200 UTC
Tropical Cyclone Number
* For readability, not all 00Z points are shown for all storms.
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

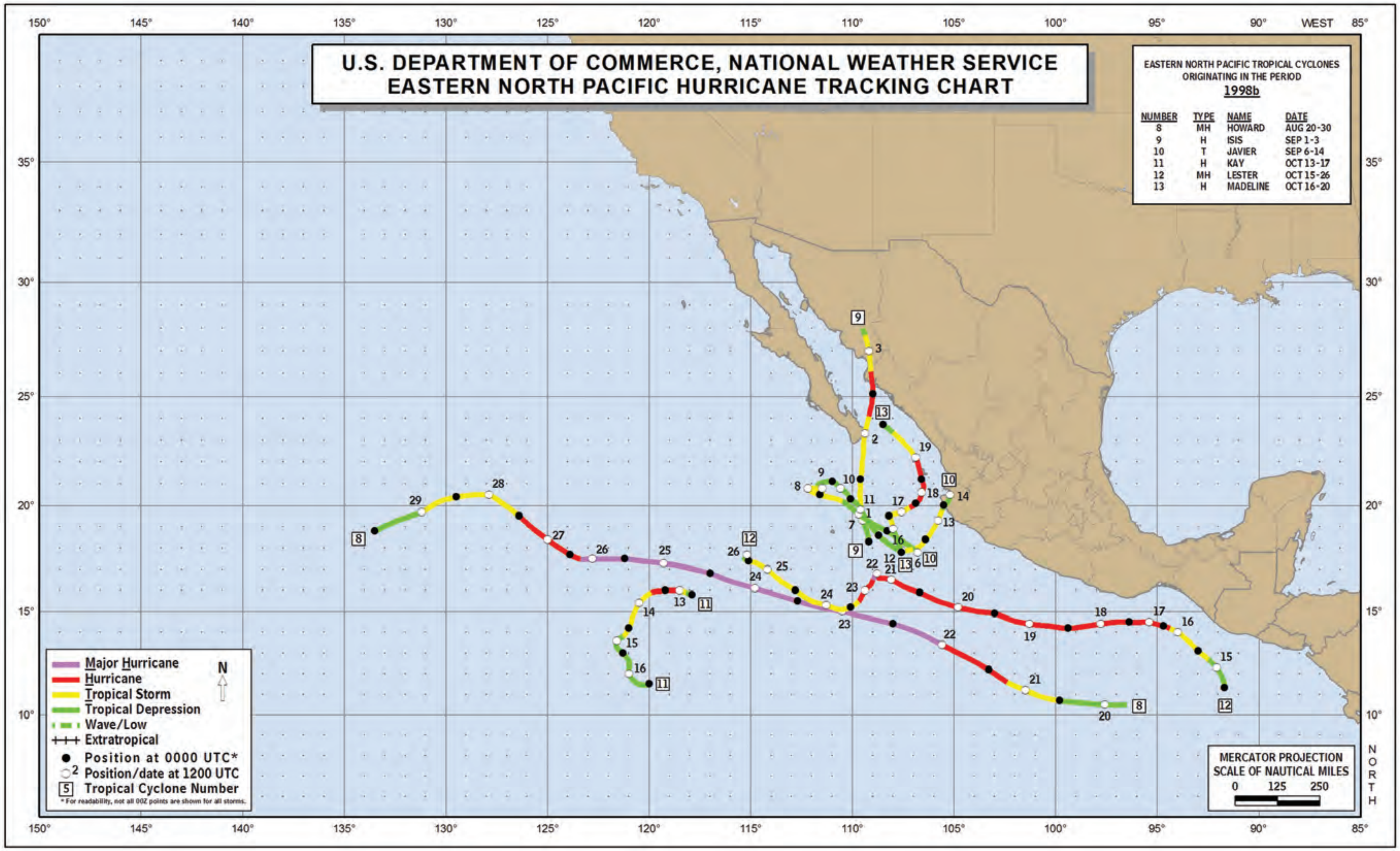


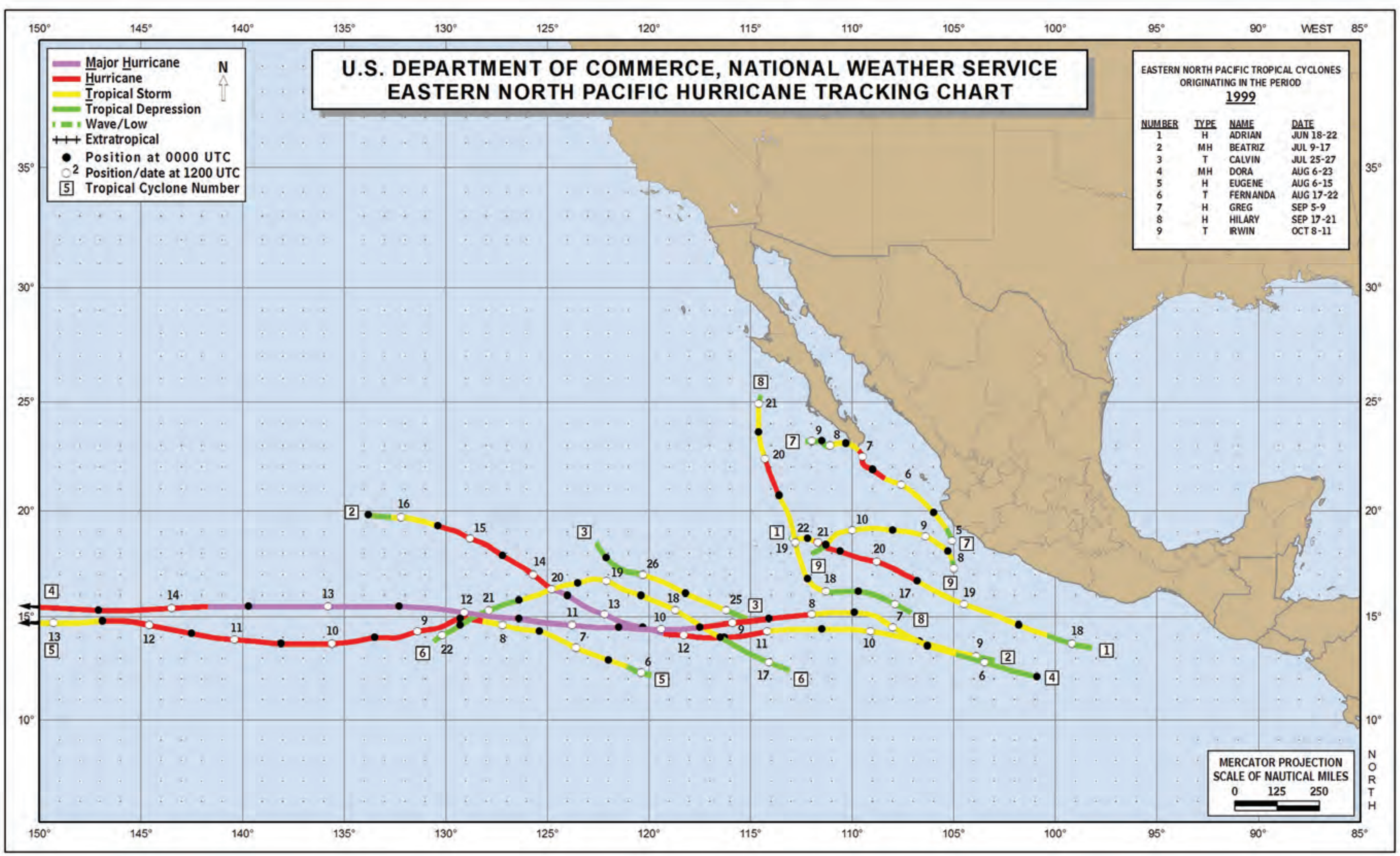
U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1997a
NUMBER TYPE NAME DATE
1 T ANDRES JUN 1-7
2 T BLANCA JUN 9-12
3 T CARLOS JUN 25-28
4 H DOLORES JUL 5-12
5 MH ENRIQUE JUL 12-16
6 MH FELICIA JUL 14-22
7 MH GUILLERMO JUL 30-AUG 15
8 T HILDA AUG 10-15
9 T IGNACIO AUG 17-19
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

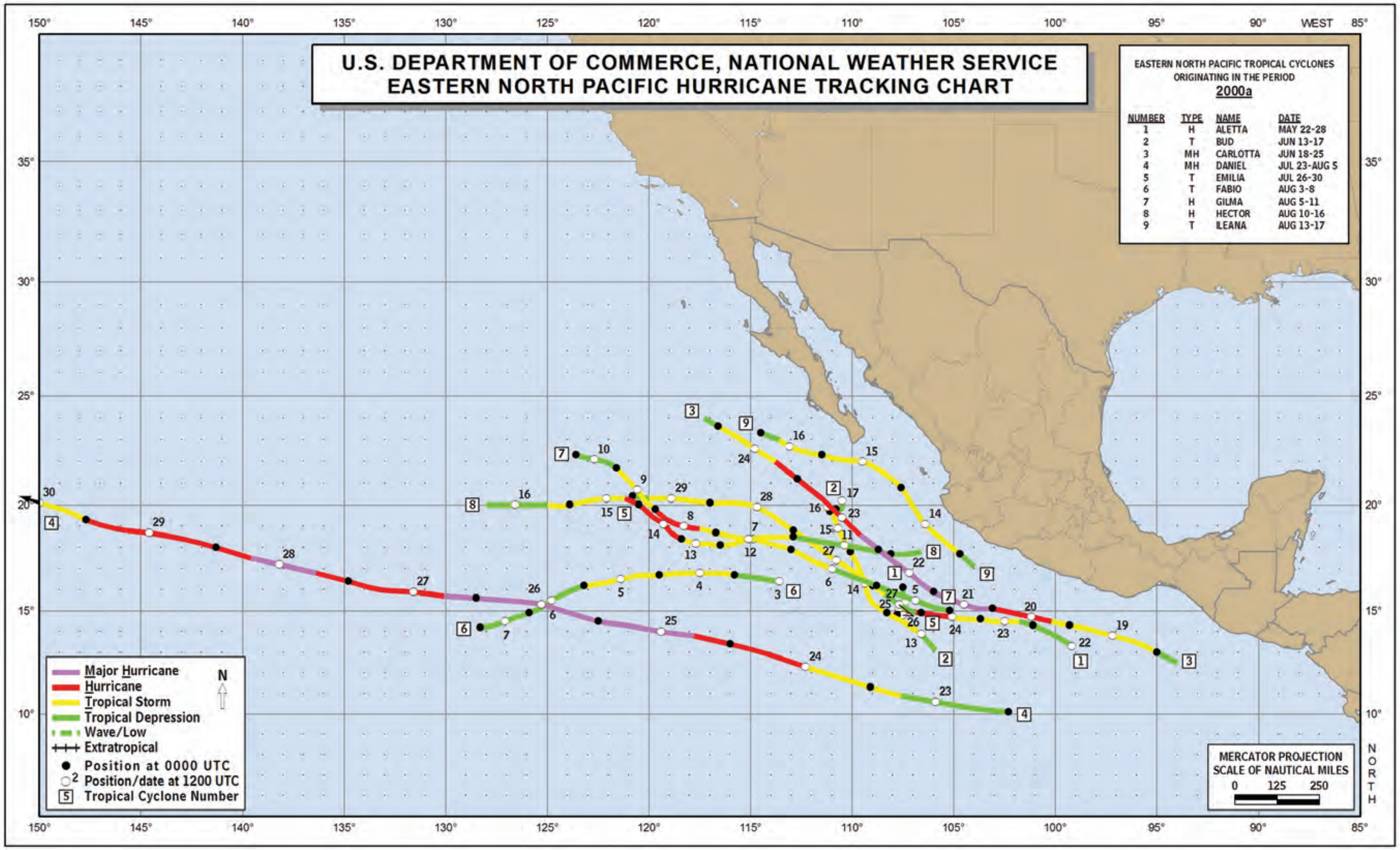


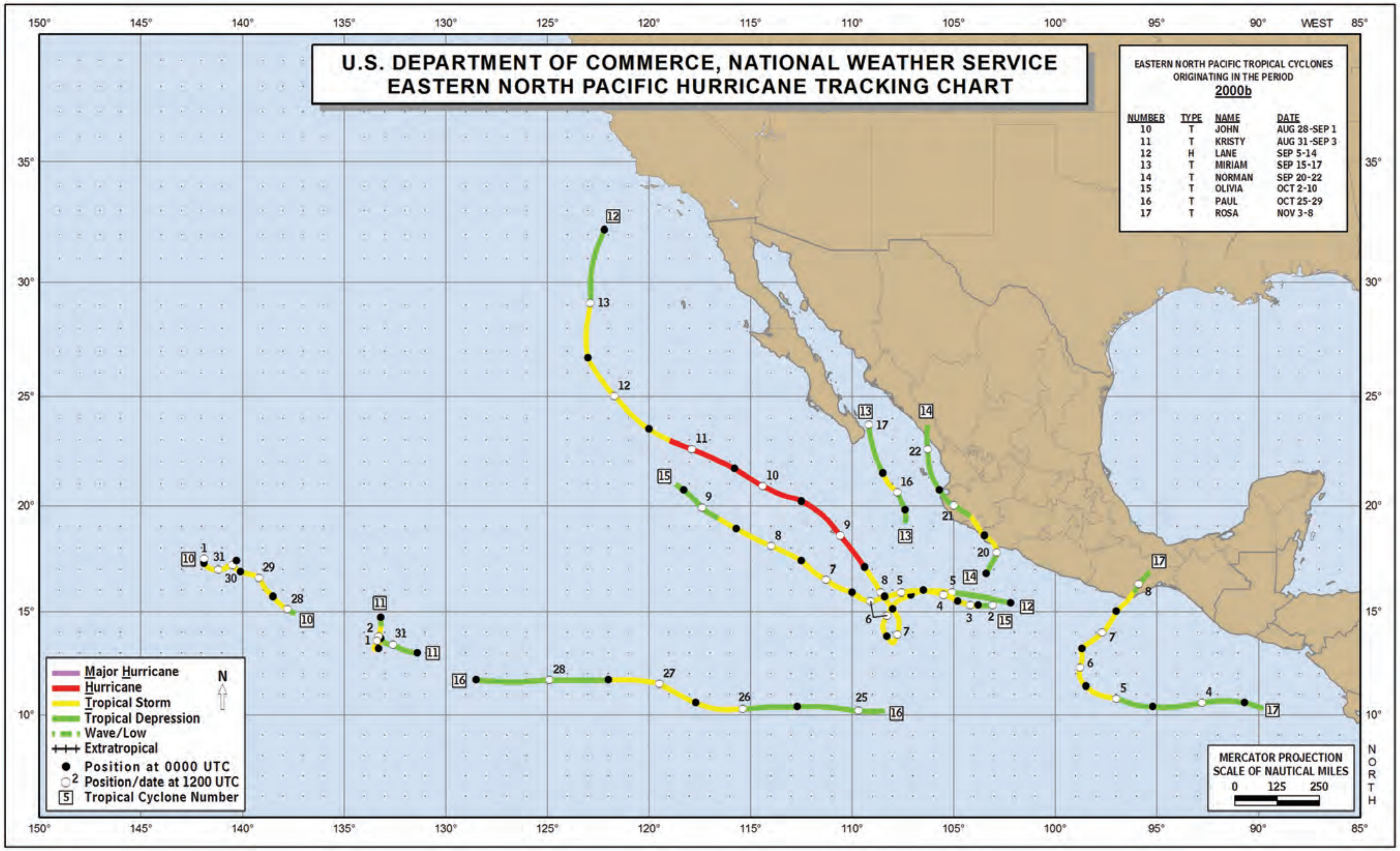
U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1997b
NUMBER TYPE NAME DATE
10 MH JIMENA AUG 25-30
11 T KEVIN SEP 3-7
12 MH LINDA SEP 9-17
13 T MARTY SEP 12-16
14 MH NORA SEP 16-26
15 T OLAF SEP 26-OCT 12
16 MH PAULINE OCT 5-10
17 H RICK NOV 7-10
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

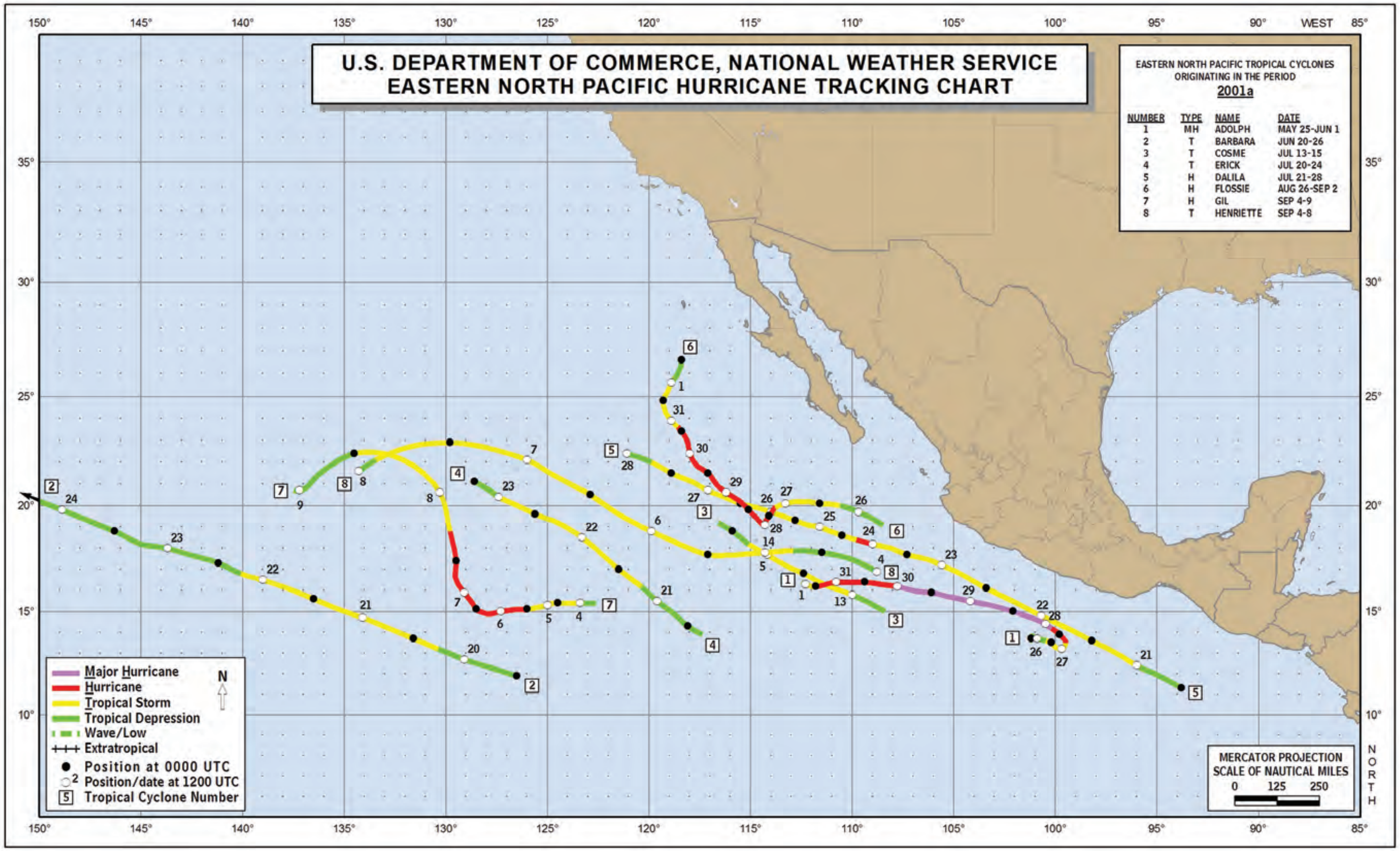

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1998a
NUMBER TYPE NAME DATE
1 T AGATHA JUN 11-16
2 MH BLAS JUN 22-30
3 T CELIA JUL 17-21
4 MH DARBY JUL 23-AUG 1
5 MH ESTELLE JUL 29-AUG 8
6 T FRANK AUG 6-10
7 MH GEORGETTE AUG 11-17
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

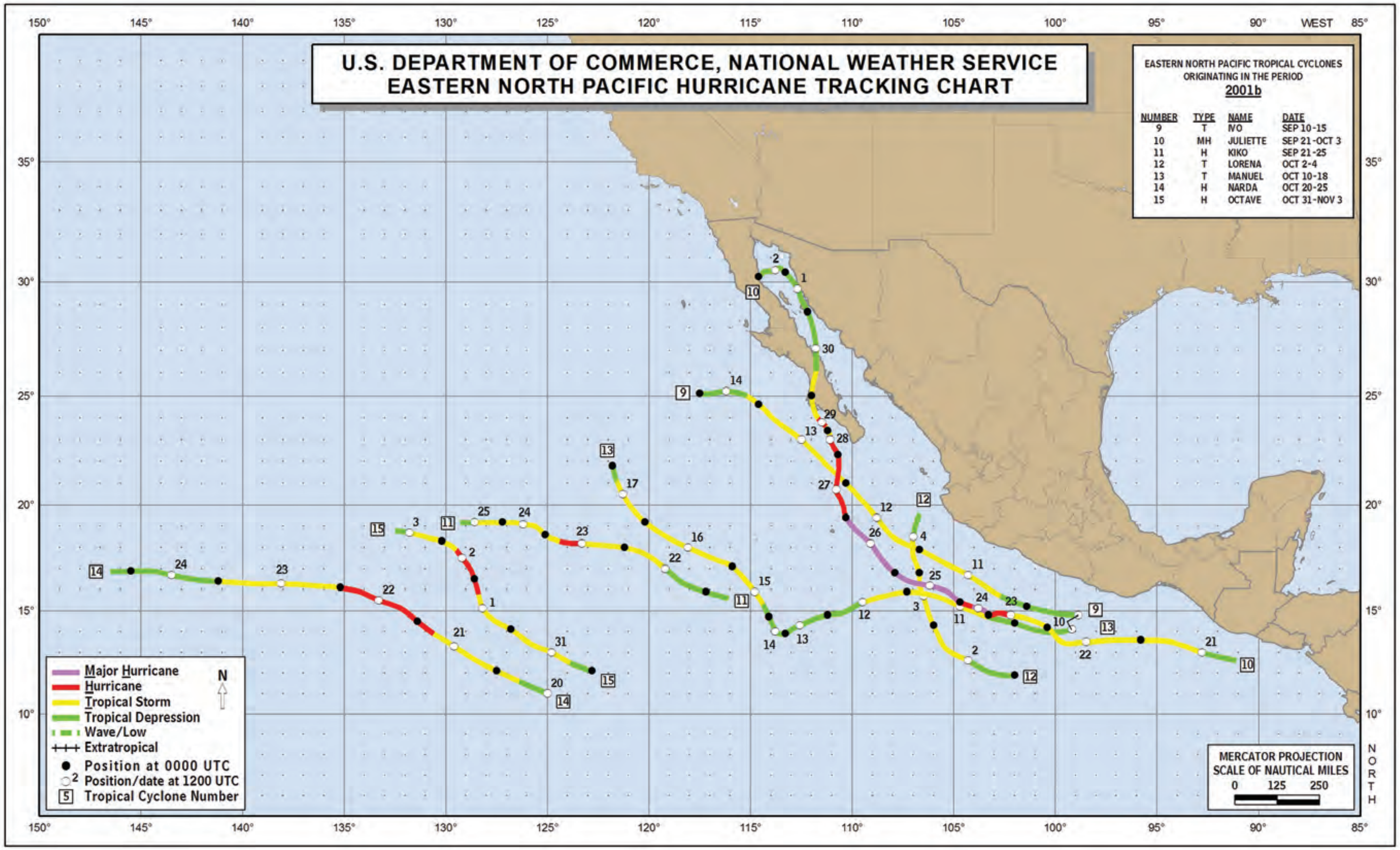

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1998b
NUMBER TYPE NAME DATE
8 MH HOWARD AUG 20-30
9 H ISIS SEP 1-3
10 T JAVIER SEP 6-14
11 H KAY OCT 13-17
12 MH LESTER OCT 15-26
13 H MADELINE OCT 16-20
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC*
Position/date at 1200 UTC
Tropical Cyclone Number
* For readability, not all 00Z points are shown for all storms.
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

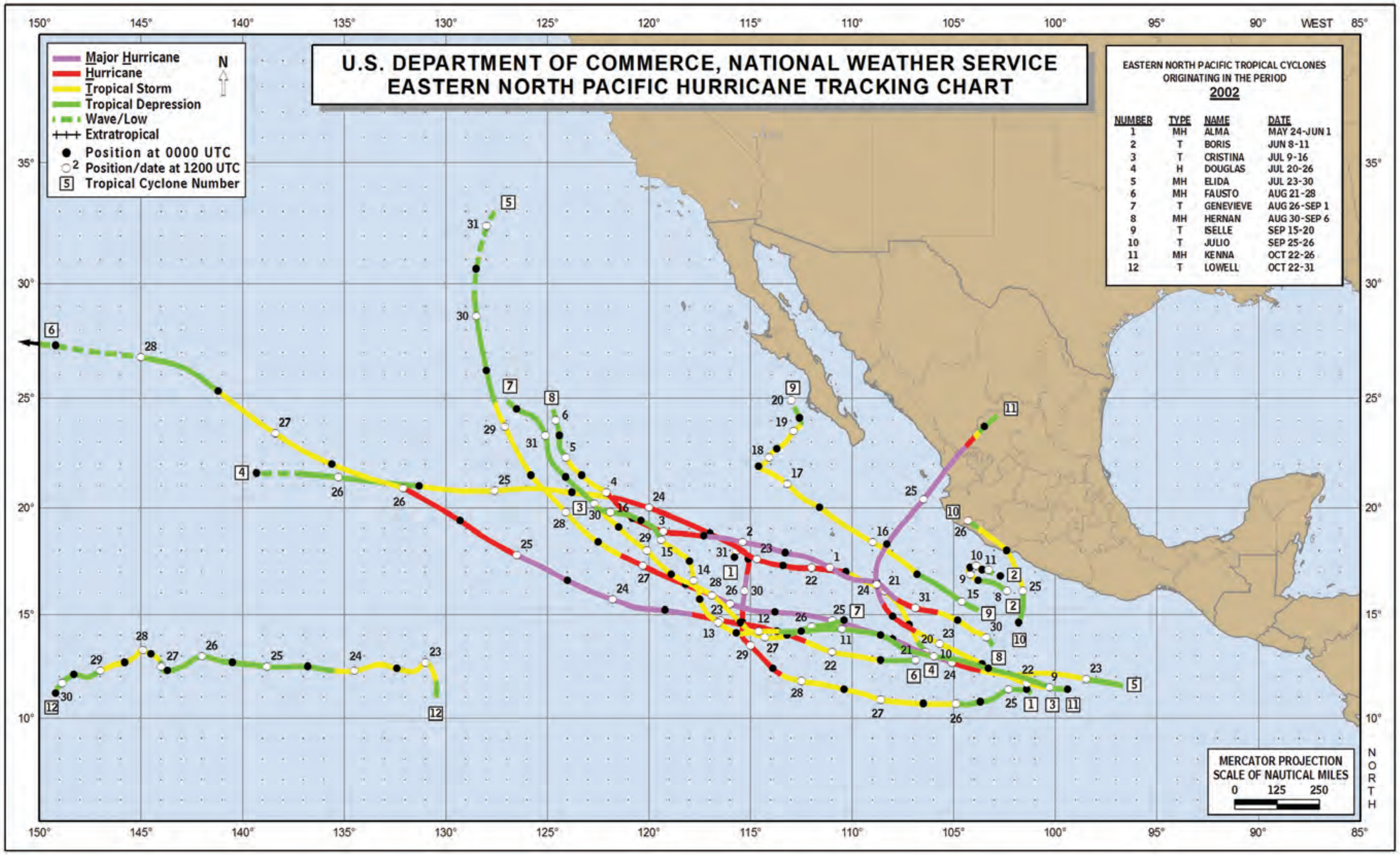

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
1999
NUMBER TYPE NAME DATE
1 H ADRIAN JUN 18-22
2 MH BEATRIZ JUL 9-17
3 T CALVIN JUL 25-27
4 MH DORA AUG 6-23
5 H EUGENE AUG 6-15
6 T FERNANDA AUG 17-22
7 H GREG SEP 5-9
8 H HILARY SEP 17-21
9 T IRWIN OCT 8-11
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

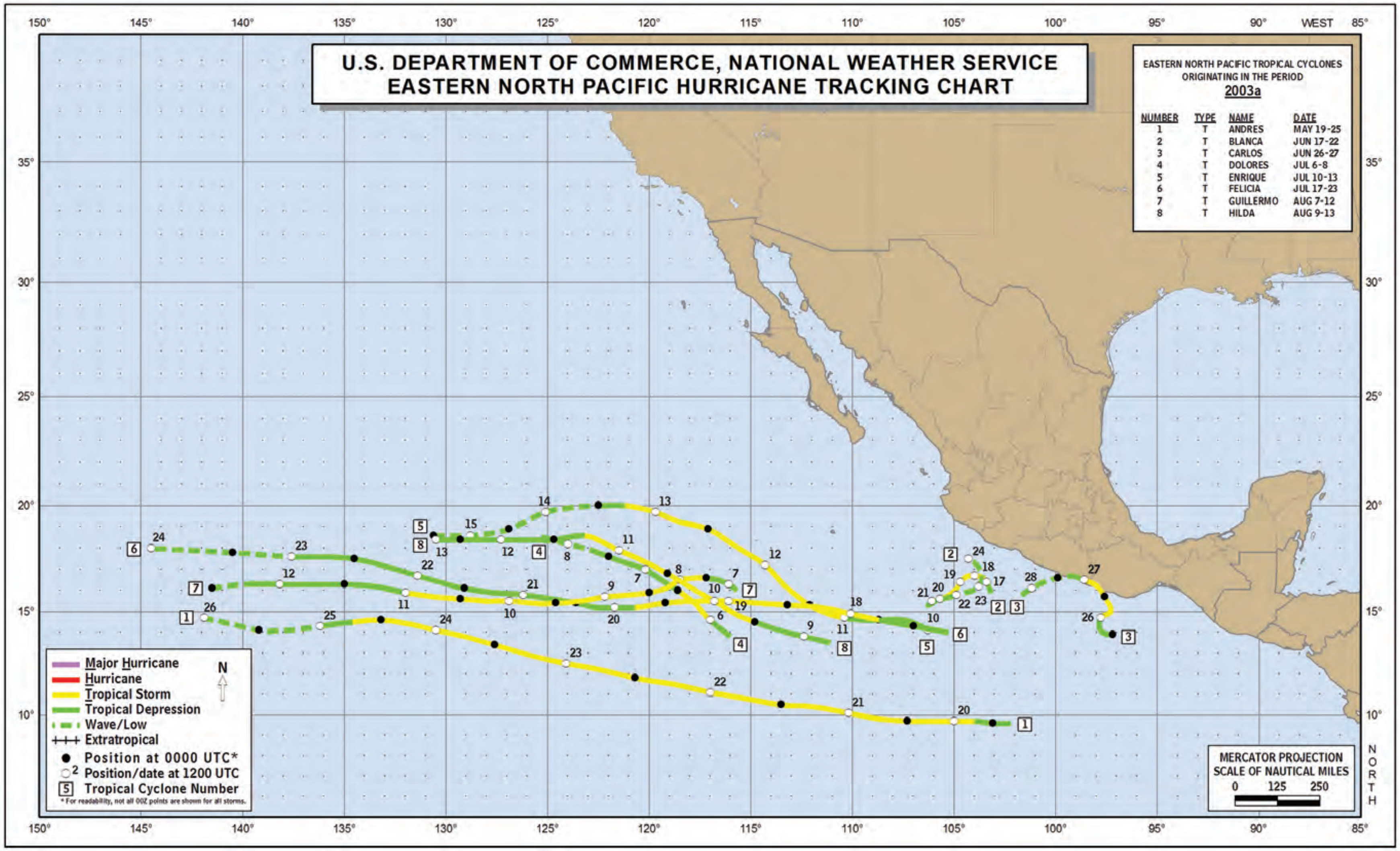

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
2000a
NUMBER TYPE NAME DATE
1 H ALETTA MAY 22-28
2 T BUD JUN 13-17
3 MH CARLOTTA JUN 18-25
4 MH DANIEL JUL 23-AUG 5
5 T EMILIA JUL 26-30
6 T FABIO AUG 3-8
7 H GILMA AUG 5-11
8 H HECTOR AUG 10-16
9 T ILEANA AUG 13-17
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°

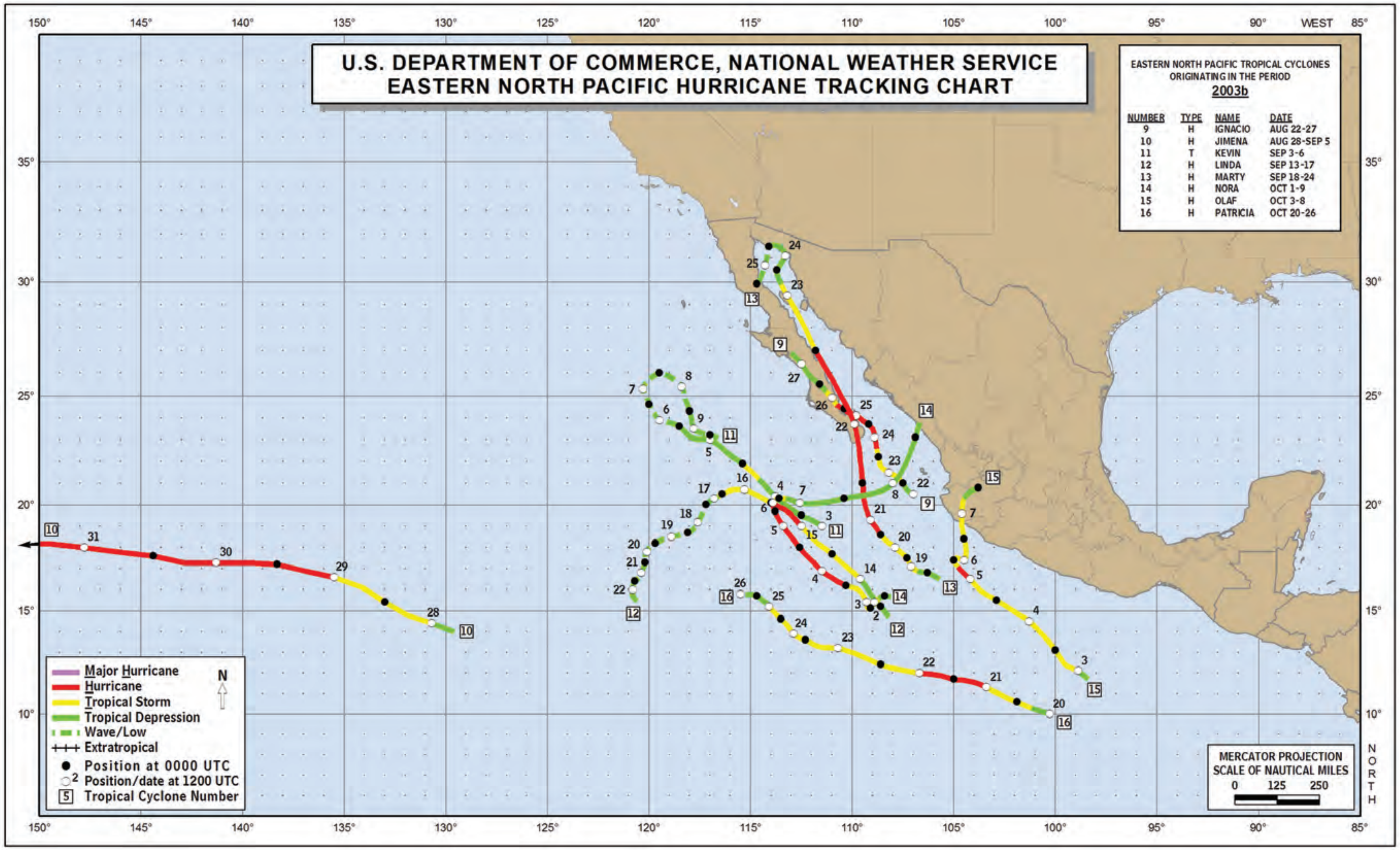

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
2000b
NUMBER TYPE NAME DATE
10 T JOHN AUG 28-SEP 1
11 T KRISTY AUG 31-SEP 3
12 H LANE SEP 5-14
13 T MIRIAM SEP 15-17
14 T NORMAN SEP 20-22
15 T OLIVIA OCT 2-10
16 T PAUL OCT 25-29
17 T ROSA NOV 3-8
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

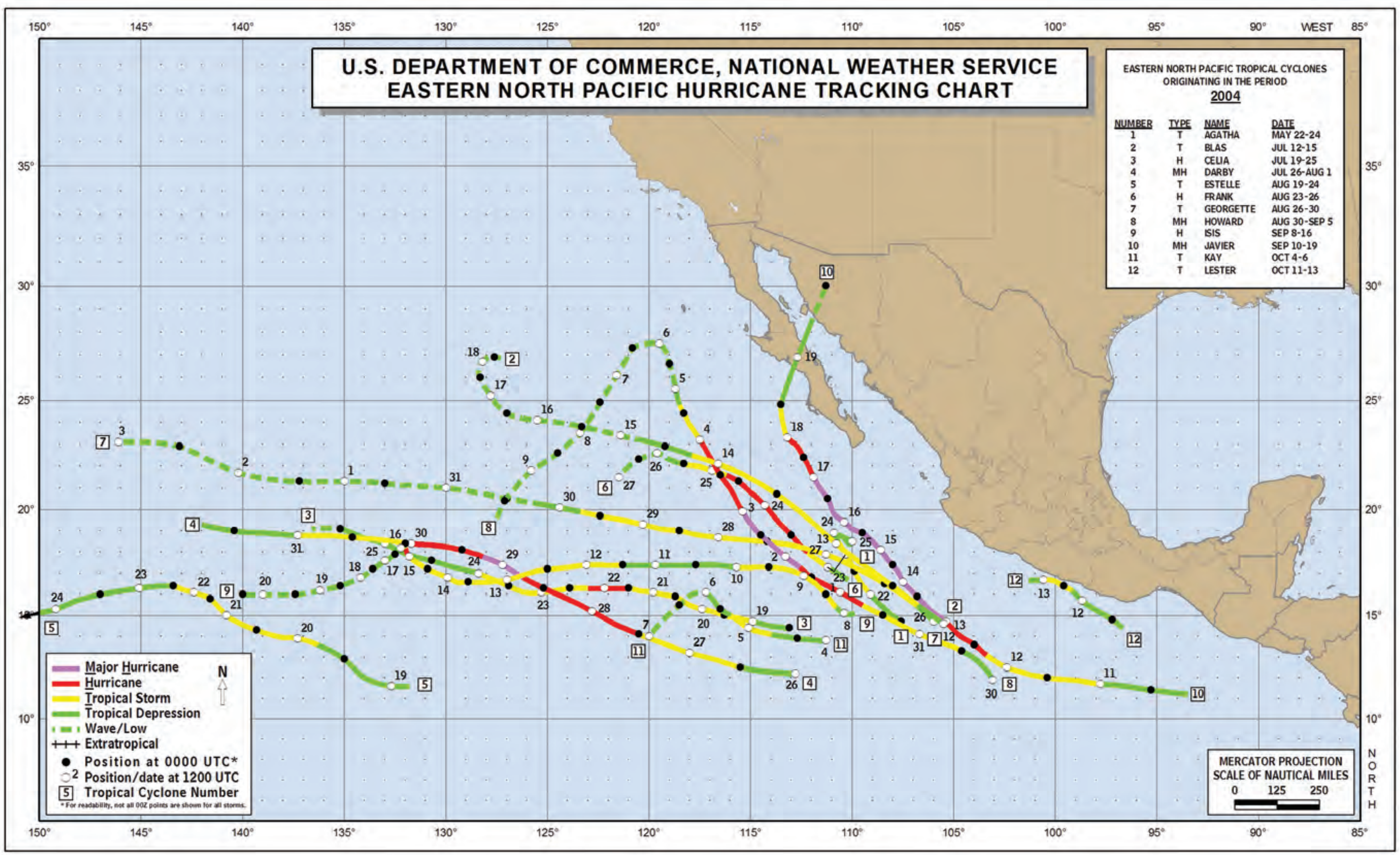

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
2001a
NUMBER TYPE NAME DATE
1 MH ADOLPH MAY 25-JUN 1
2 T BARBARA JUN 20-26
3 T COSME JUL 13-15
4 T ERICK JUL 20-24
5 H DALILA JUL 21-28
6 H FLOSSIE AUG 26-SEP 2
7 H GIL SEP 4-9
8 T HENRIETTE SEP 4-8
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

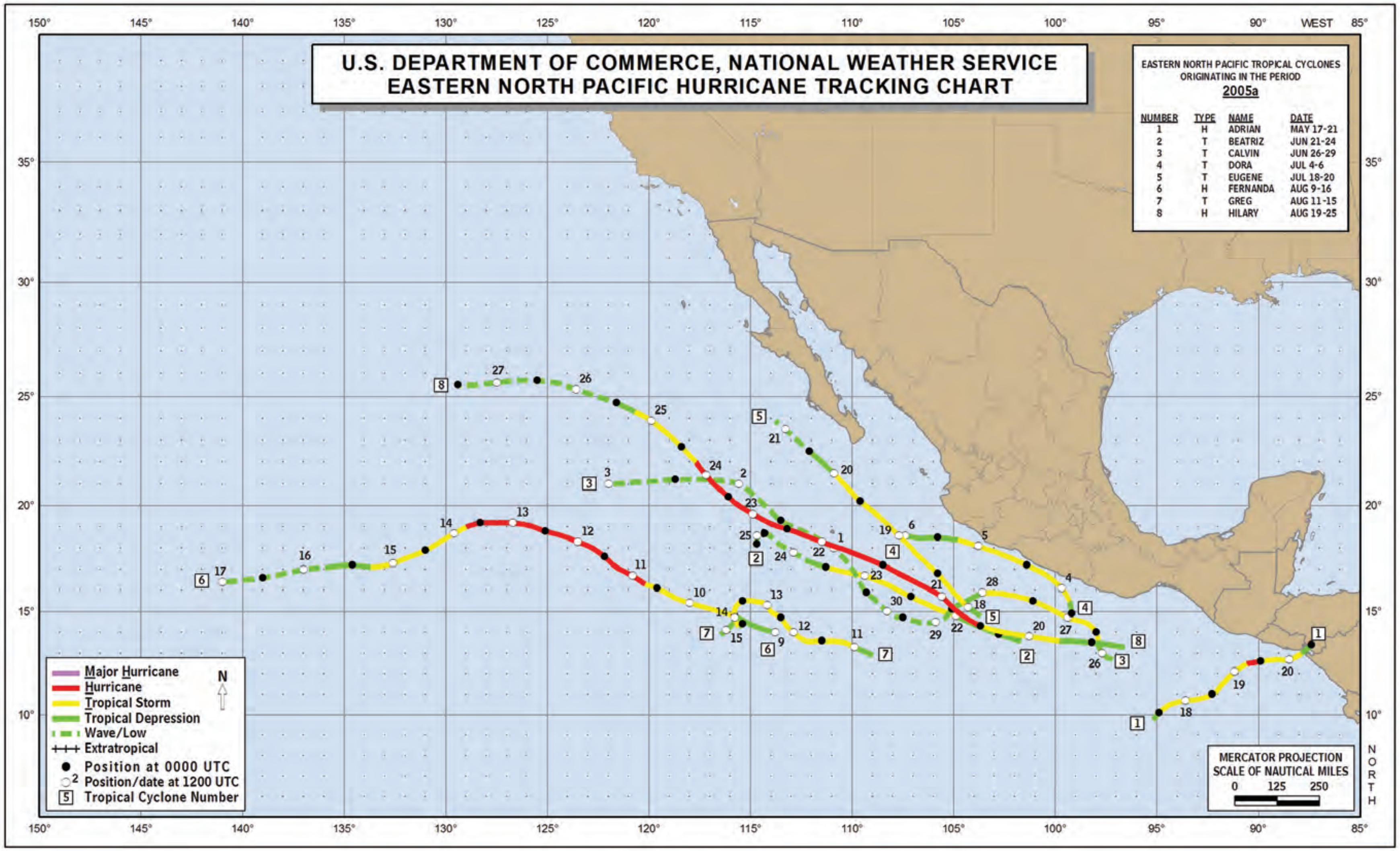

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
2001b
NUMBER TYPE NAME DATE
9 T IVO SEP 10-15
10 MH JULIETTE SEP 21-OCT 3
11 H KIKO SEP 21-25
12 T LORENA OCT 2-4
13 T MANUEL OCT 10-18
14 H NARDA OCT 20-25
15 H OCTAVE OCT 31-NOV 3
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

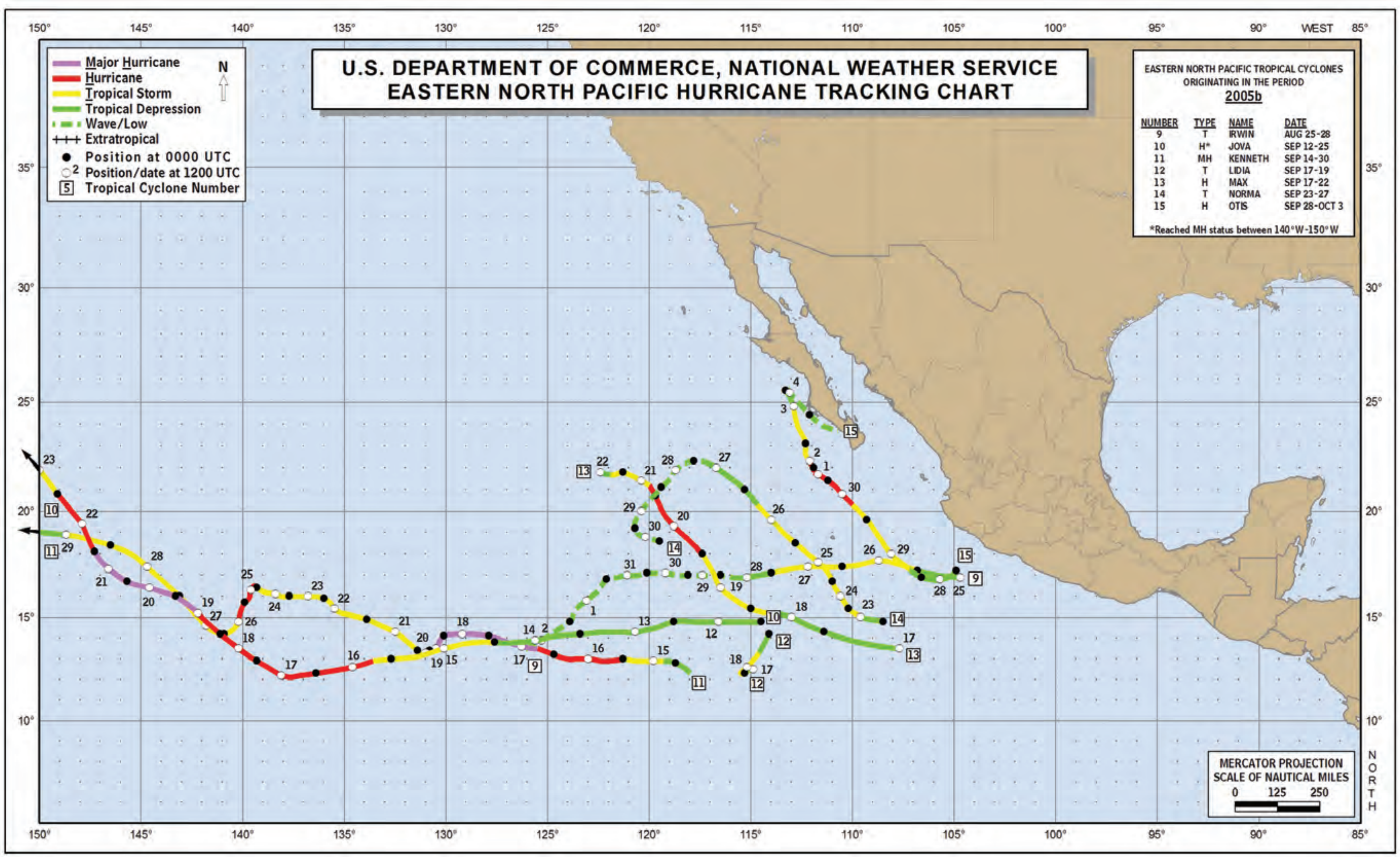

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
2002
NUMBER TYPE NAME DATE
1 MH ALMA MAY 24-JUN 1
2 T BORIS JUN 8-11
3 T CRISTINA JUL 9-16
4 H DOUGLAS JUL 20-26
5 MH ELIDA JUL 23-30
6 MH FAUSTO AUG 21-28
7 T GENEVIEVE AUG 26-SEP 1
8 MH HERNAN AUG 30-SEP 6
9 T ISELLE SEP 15-20
10 T JULIO SEP 25-26
11 MH KENNA OCT 22-26
12 T LOWELL OCT 22-31
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

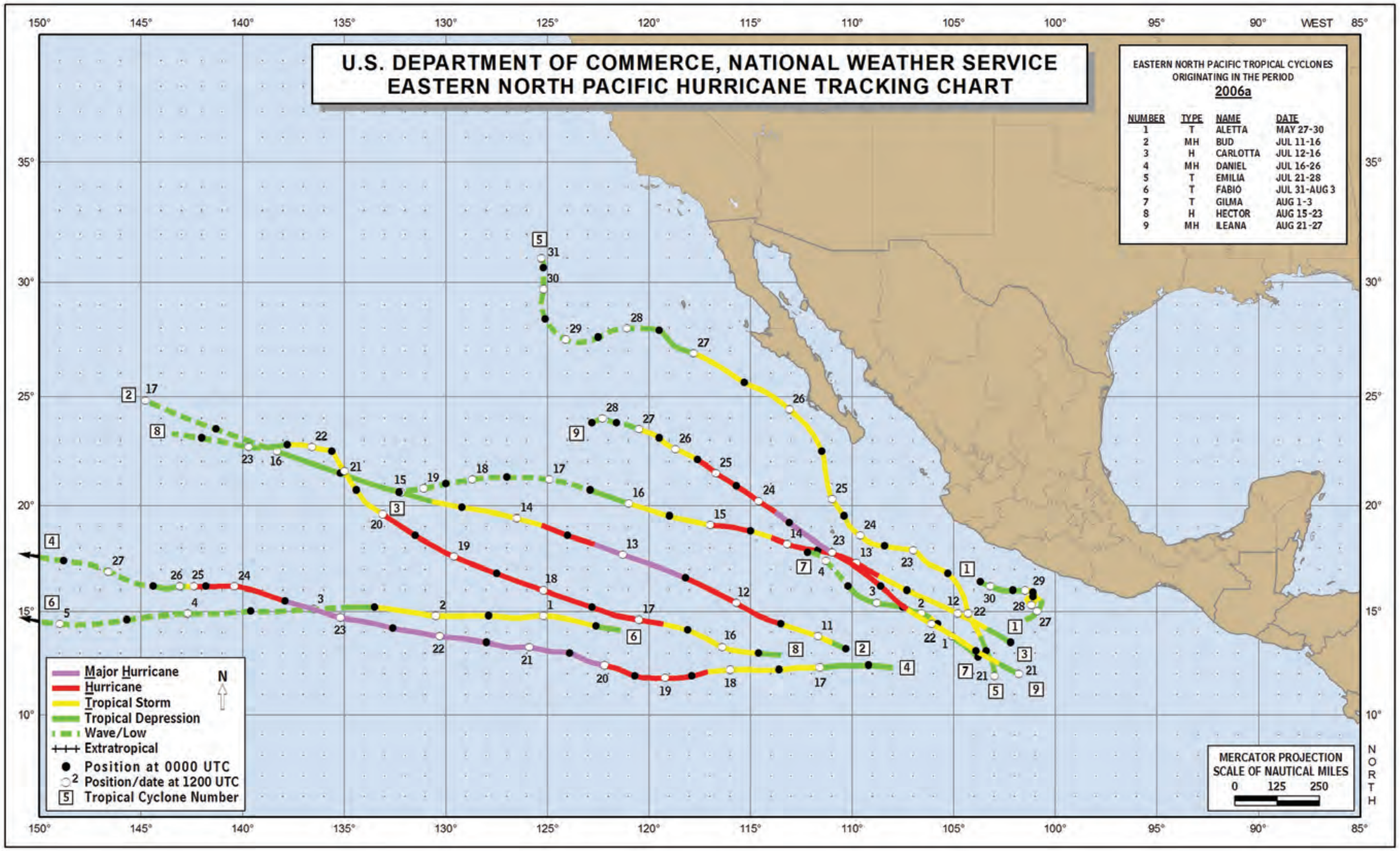

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
2003a
NUMBER TYPE NAME DATE
1 T ANDRES MAY 19-25
2 T BLANCA JUN 17-22
3 T CARLOS JUN 26-27
4 T DOLORES JUL 6-8
5 T ENRIQUE JUL 10-13
6 T FELICIA JUL 17-23
7 T GUILLERMO AUG 7-12
8 T HILDA AUG 9-13
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC*
Position/date at 1200 UTC
Tropical Cyclone Number
* For readability, not all 00Z points are shown for all storms.
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
2003b
NUMBER TYPE NAME DATE
9 H IGNACIO AUG 22-27
10 H JIMENA AUG 28-SEP 5
11 T KEVIN SEP 3-6
12 H LINDA SEP 13-17
13 H MARTY SEP 18-24
14 H NORA OCT 1-9
15 H OLAF OCT 3-8
16 H PATRICIA OCT 20-26
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

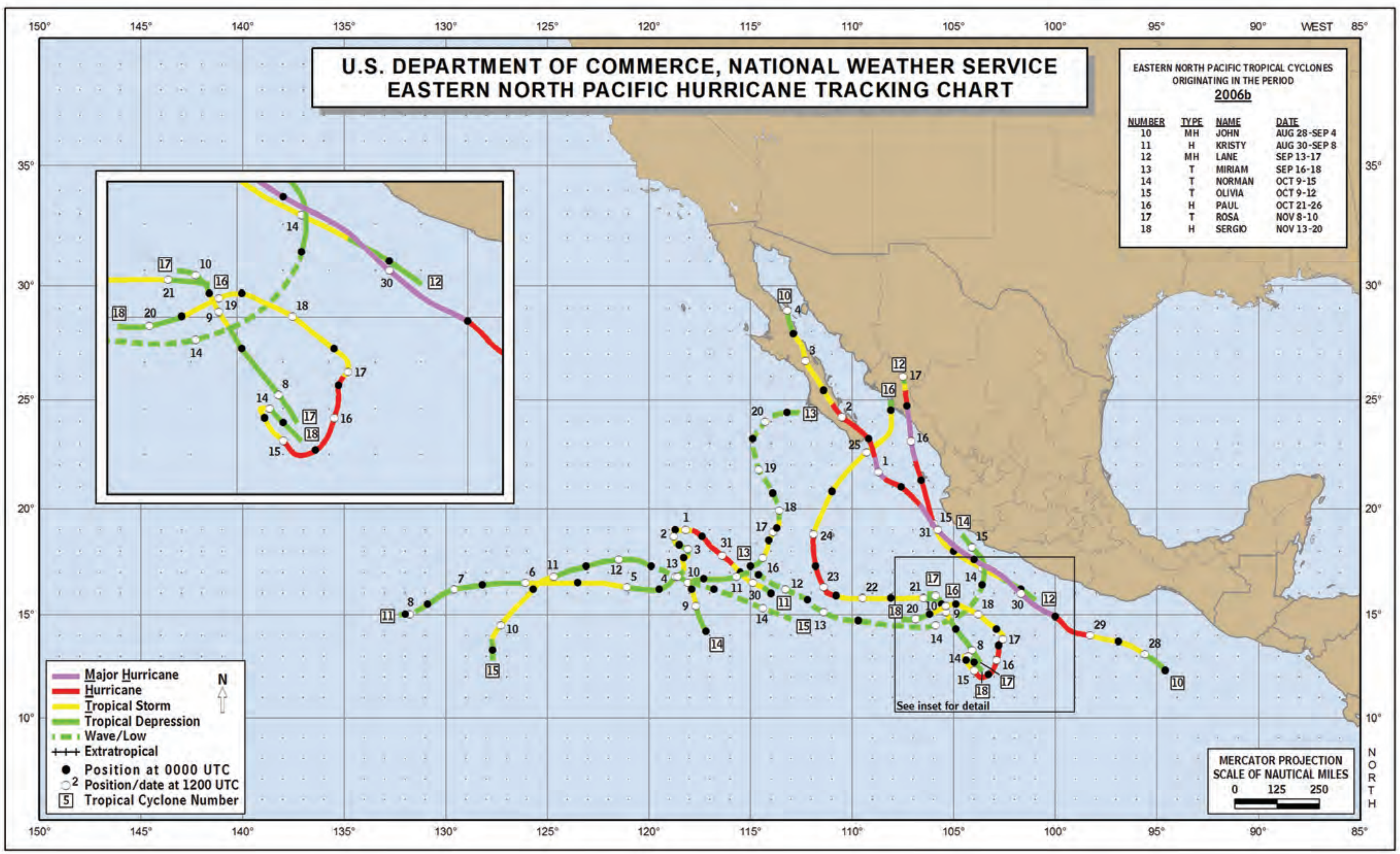

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
2004
NUMBER TYPE NAME DATE
1 T AGATHA MAY 22-24
2 T BLAS JUL 12-15
3 H CELIA JUL 19-25
4 MH DARBY JUL 26-AUG 1
5 T ESTELLE AUG 19-24
6 H FRANK AUG 23-26
7 T GEORGETTE AUG 26-30
8 MH HOWARD AUG 30-SEP 5
9 H ISIS SEP 8-16
10 MH JAVIER SEP 10-19
11 T KAY OCT 4-6
12 T LESTER OCT 11-13
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC*
Position/date at 1200 UTC
Tropical Cyclone Number
* For readability, not all 00Z points are shown for all storms.
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°

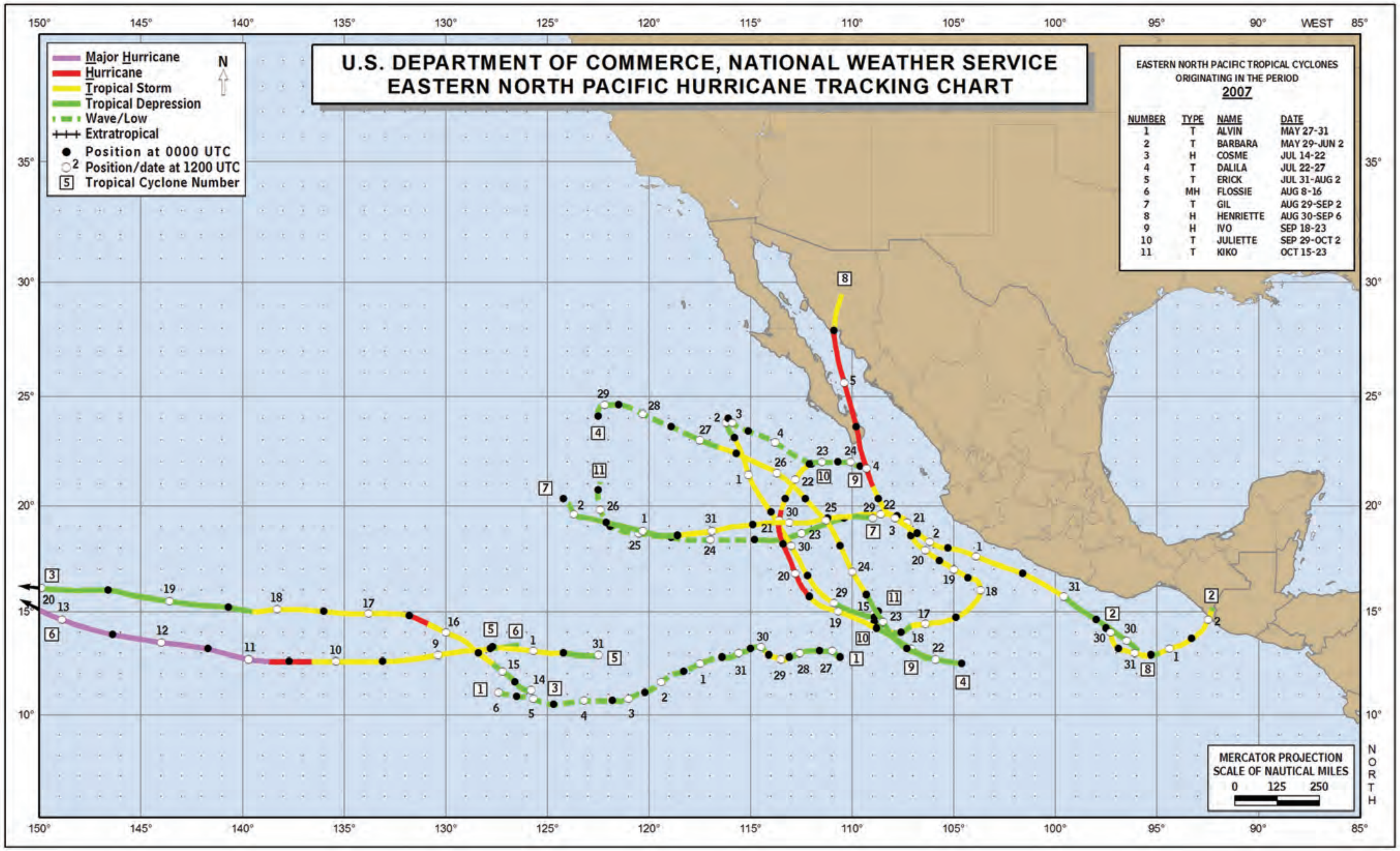

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
2005a
NUMBER TYPE NAME DATE
1 H ADRIAN MAY 17-21
2 T BEATRIZ JUN 21-24
3 T CALVIN JUN 26-29
4 T DORA JUL 4-6
5 T EUGENE JUL 18-20
6 H FERNANDA AUG 9-16
7 T GREG AUG 11-15
8 H HILARY AUG 19-25
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST

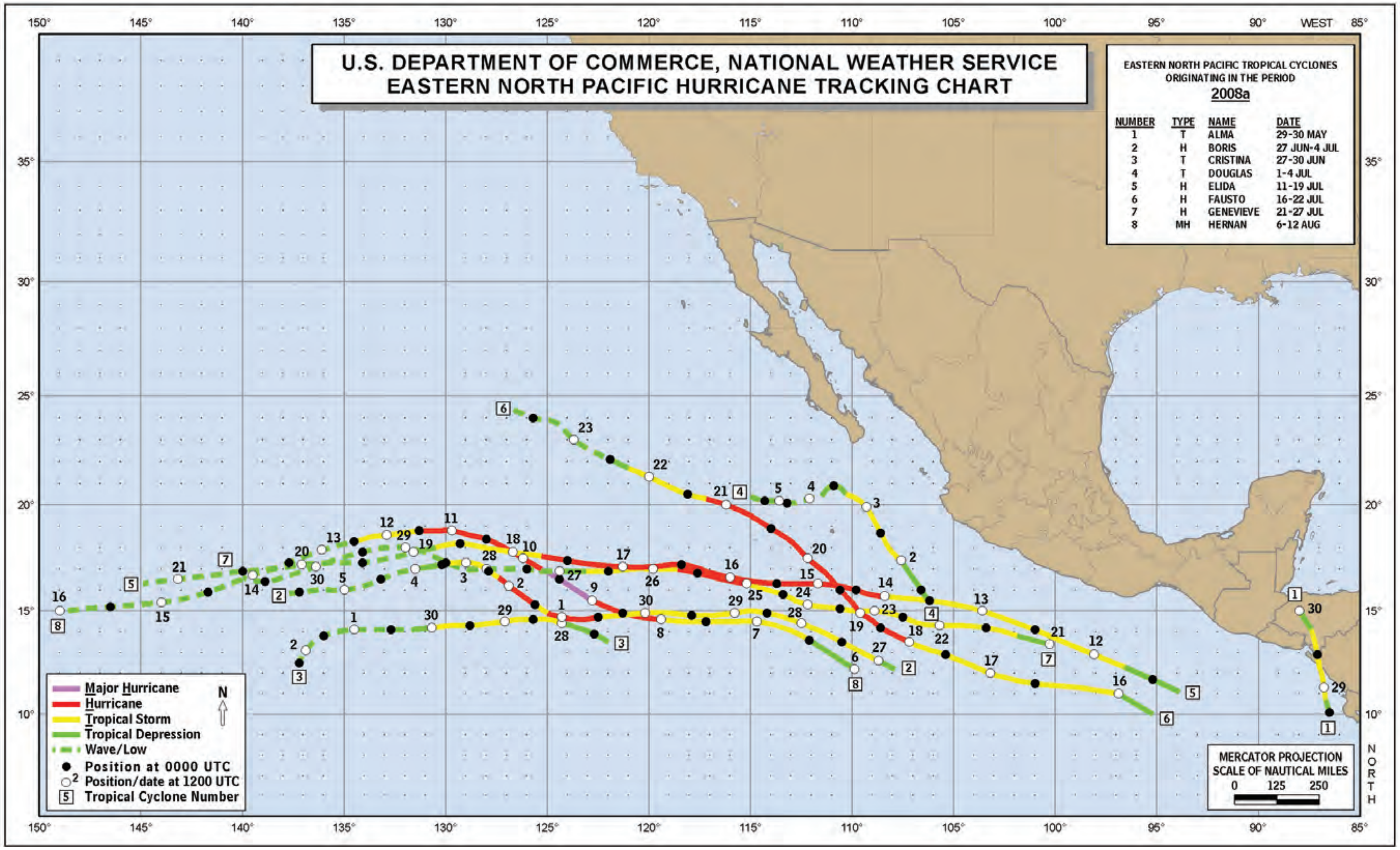

U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
2005b
NUMBER TYPE NAME DATE
9 T IRWIN AUG 25-28
10 H* JOVA SEP 12-25
11 MH KENNETH SEP 14-30
12 T LIDIA SEP 17-19
13 H MAX SEP 17-22
14 T NORMA SEP 23-27
15 H OTIS SEP 28-OCT 3
*Reached MH status between 140°W-150°W
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

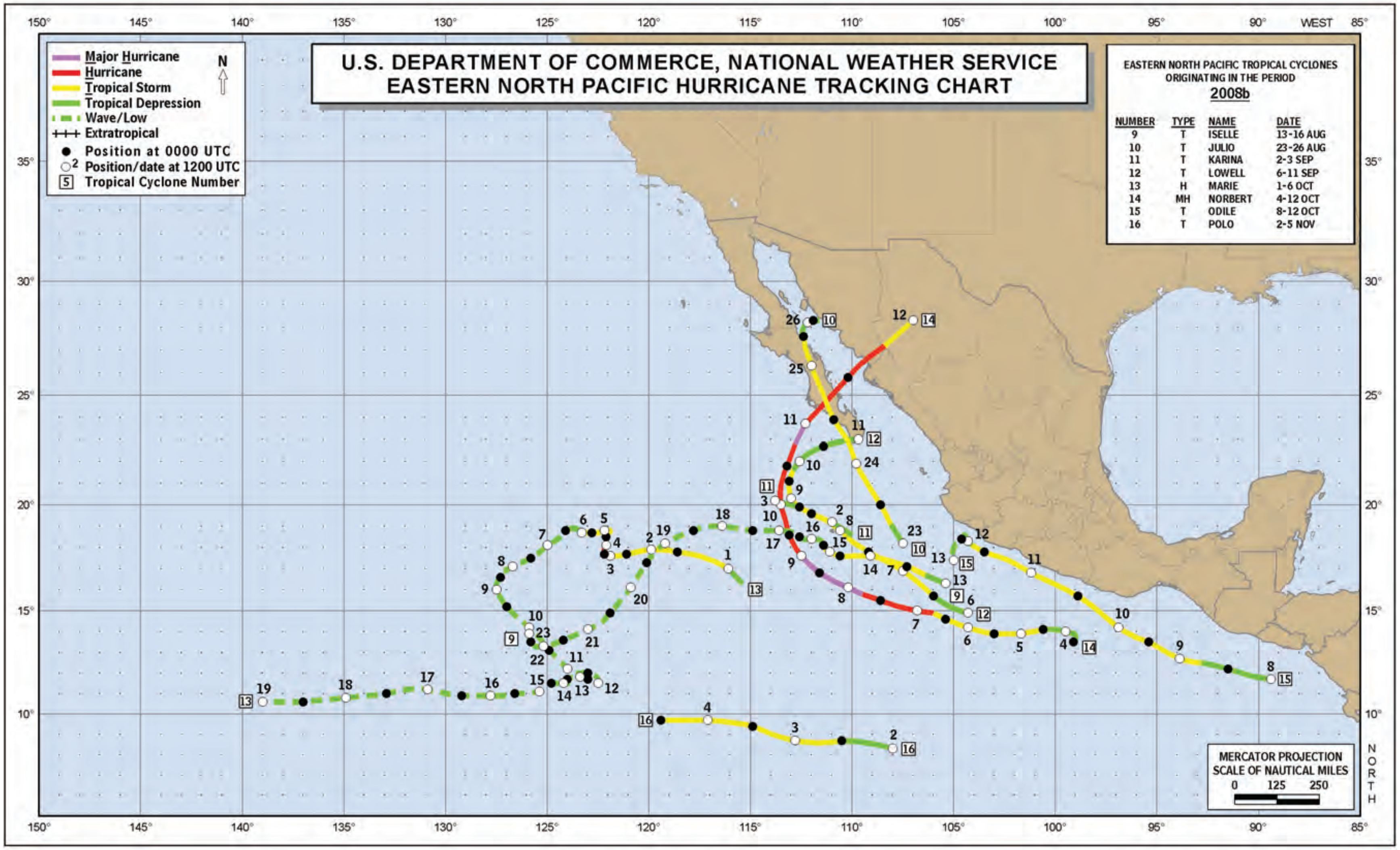


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
2006a
NUMBER TYPE NAME DATE
1 T ALETTA MAY 27-30
2 MH BUD JUL 11-16
3 H CARLOTTA JUL 12-16
4 MH DANIEL JUL 16-26
5 T EMILIA JUL 21-28
6 T FABIO JUL 31-AUG 3
7 T GILMA AUG 1-3
8 H HECTOR AUG 15-23
9 MH ILEANA AUG 21-27
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
2006b
NUMBER TYPE NAME DATE
10 MH JOHN AUG 28-SEP 4
11 H KRISTY AUG 30-SEP 8
12 MH LANE SEP 13-17
13 T MIRIAM SEP 16-18
14 T NORMAN OCT 9-15
15 T OLIVIA OCT 9-12
16 H PAUL OCT 21-26
17 T ROSA NOV 8-10
18 H SERGIO NOV 13-20
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
See inset for detail
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
NORTH
WEST


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
N
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
2007
NUMBER TYPE NAME DATE
1 T ALVIN MAY 27-31
2 T BARBARA MAY 29-JUN 2
3 H COSME JUL 14-22
4 T DALILA JUL 22-27
5 T ERICK JUL 31-AUG 2
6 MH FLOSSIE AUG 8-16
7 T GIL AUG 29-SEP 2
8 H HENRIETTE AUG 30-SEP 6
9 H IVO SEP 18-23
10 T JULIETTE SEP 29-OCT 2
11 T KIKO OCT 15-23
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH
150° 145° 140° 135° 130° 125° 120° 115° 110° 105° 100° 95° 90° 85°
35° 30° 25° 20° 15° 10°


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
EASTERN NORTH PACIFIC TROPICAL CYCLONES ORIGINATING IN THE PERIOD
2008a
NUMBER TYPE NAME DATE
1 T ALMA 29-30 MAY
2 H BORIS 27 JUN-4 JUL
3 T CRISTINA 27-30 JUN
4 T DOUGLAS 1-4 JUL
5 H ELIDA 11-19 JUL
6 H FAUSTO 16-22 JUL
7 H GENEVIEVE 21-27 JUL
8 MH HERNAN 6-12 AUG
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH


U.S. DEPARTMENT OF COMMERCE, NATIONAL WEATHER SERVICE
EASTERN NORTH PACIFIC HURRICANE TRACKING CHART
Major Hurricane
Hurricane
Tropical Storm
Tropical Depression
Wave/Low
Extratropical
Position at 0000 UTC
Position/date at 1200 UTC
Tropical Cyclone Number
EASTERN NORTH PACIFIC TROPICAL CYCLONES
ORIGINATING IN THE PERIOD
2008b
NUMBER TYPE NAME DATE
9 T ISELLE 13-16 AUG
10 T JULIO 23-26 AUG
11 T KARINA 2-3 SEP
12 T LOWELL 6-11 SEP
13 H MARIE 1-6 OCT
14 MH NORBERT 4-12 OCT
15 T ODILE 8-12 OCT
16 T POLO 2-5 NOV
MERCATOR PROJECTION
SCALE OF NAUTICAL MILES
0 125 250
WEST
NORTH

ATTACH 2009 TRACK CHART

ATTACH 2010 TRACK CHART

ATTACH 2011 TRACK CHART

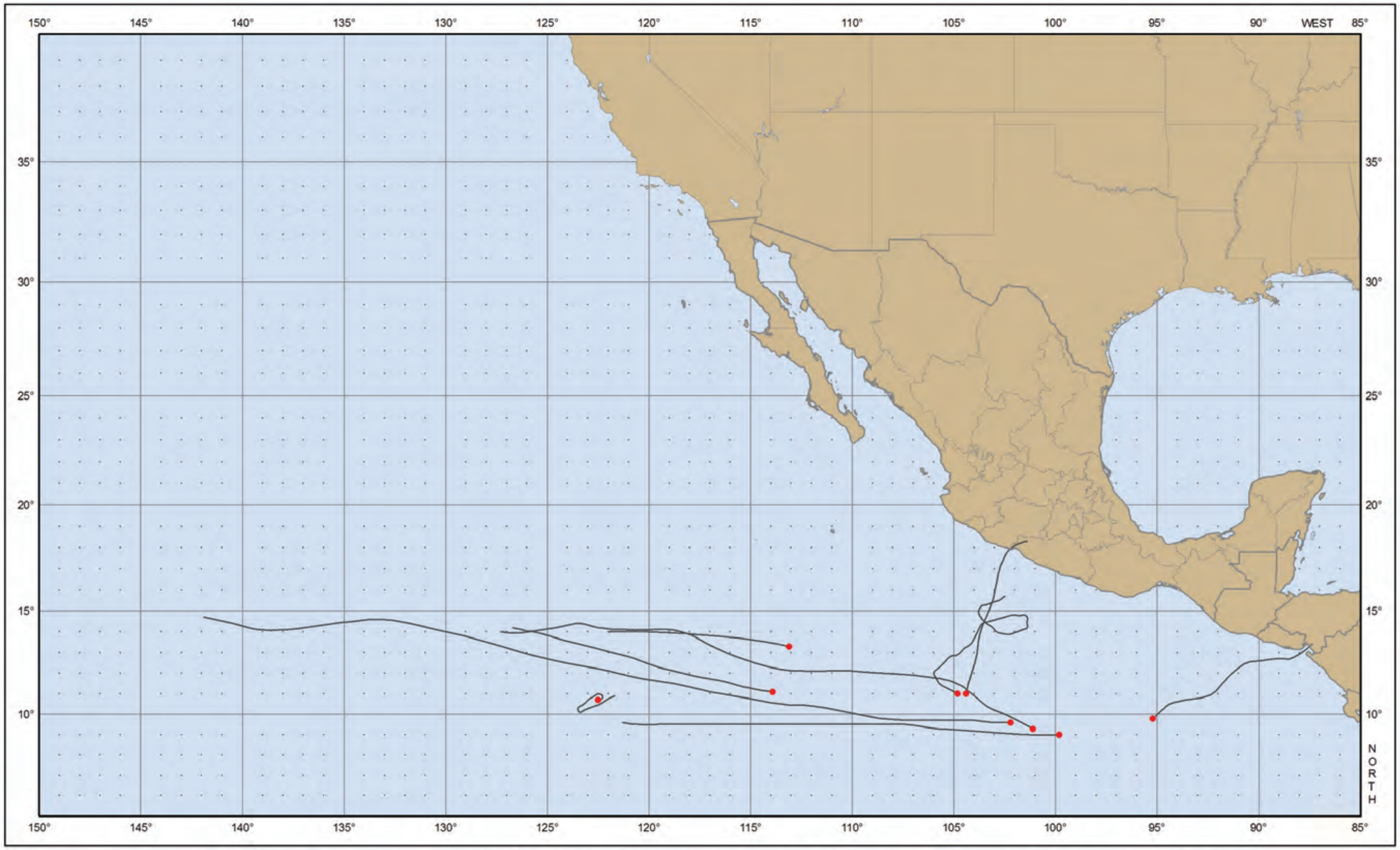
ATTACH 2012 TRACK CHART

ATTACH 2013 TRACK CHART

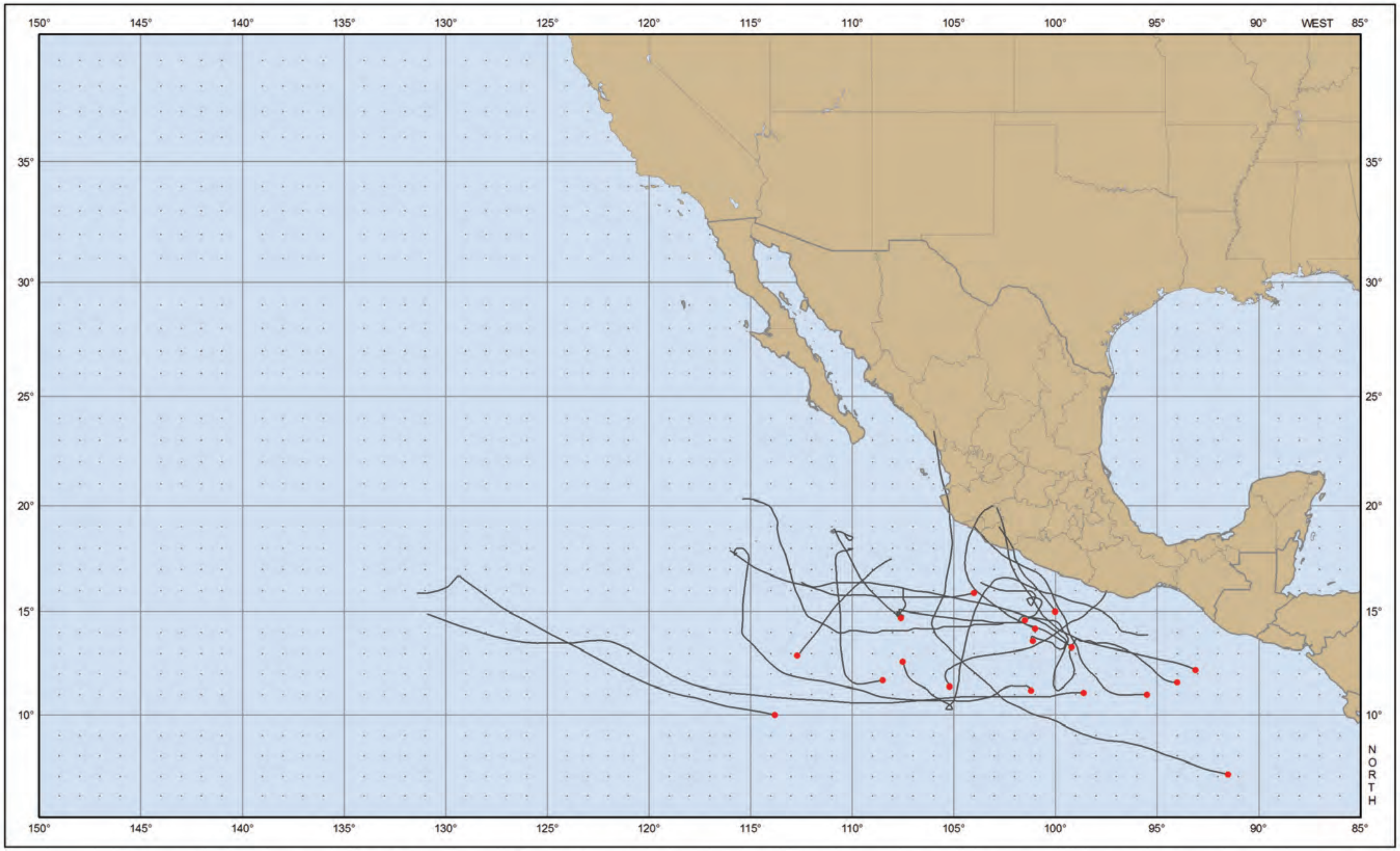
# APPENDIX B

# TRACKS OF EASTERN NORTH PACIFIC TROPICAL CYCLONES BY INTRASEASONAL PERIODS, 1949-2006 (CHART SERIES B)

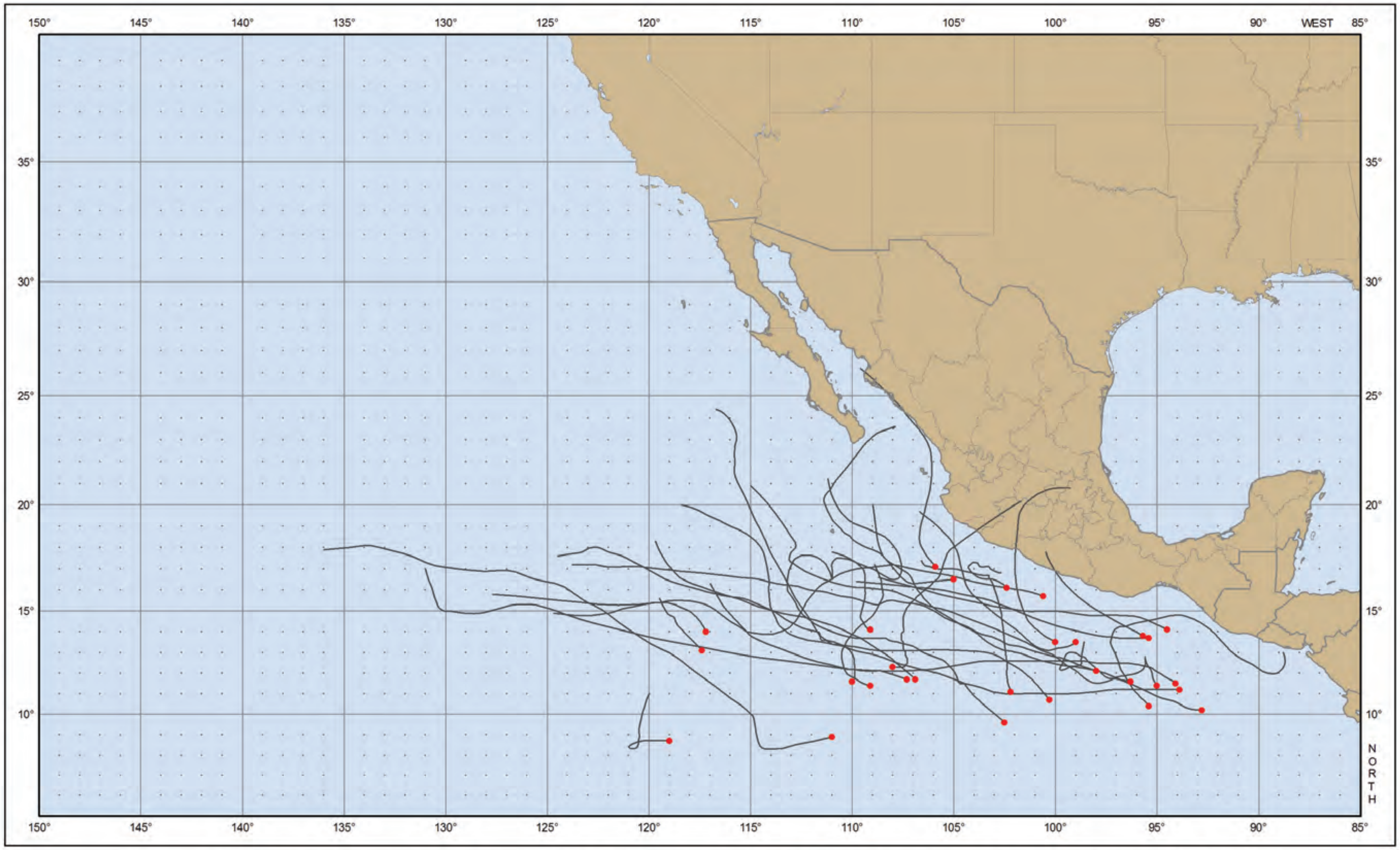
Tracks of eastern North Pacific tropical cyclones reaching at least storm strength, including depression stage if known, by months, May through December and by 10- (or 11-) day periods, May 10 through November 30. Red dots indicate the genesis point of each tropical cyclone that eventually reached at least tropical storm strength. The monthly numbers of tropical cyclones given in Appendix B do not necessarily match the totals of just tropical storms and hurricane formations given in Table 4 because Appendix B includes the tropical depression stage.



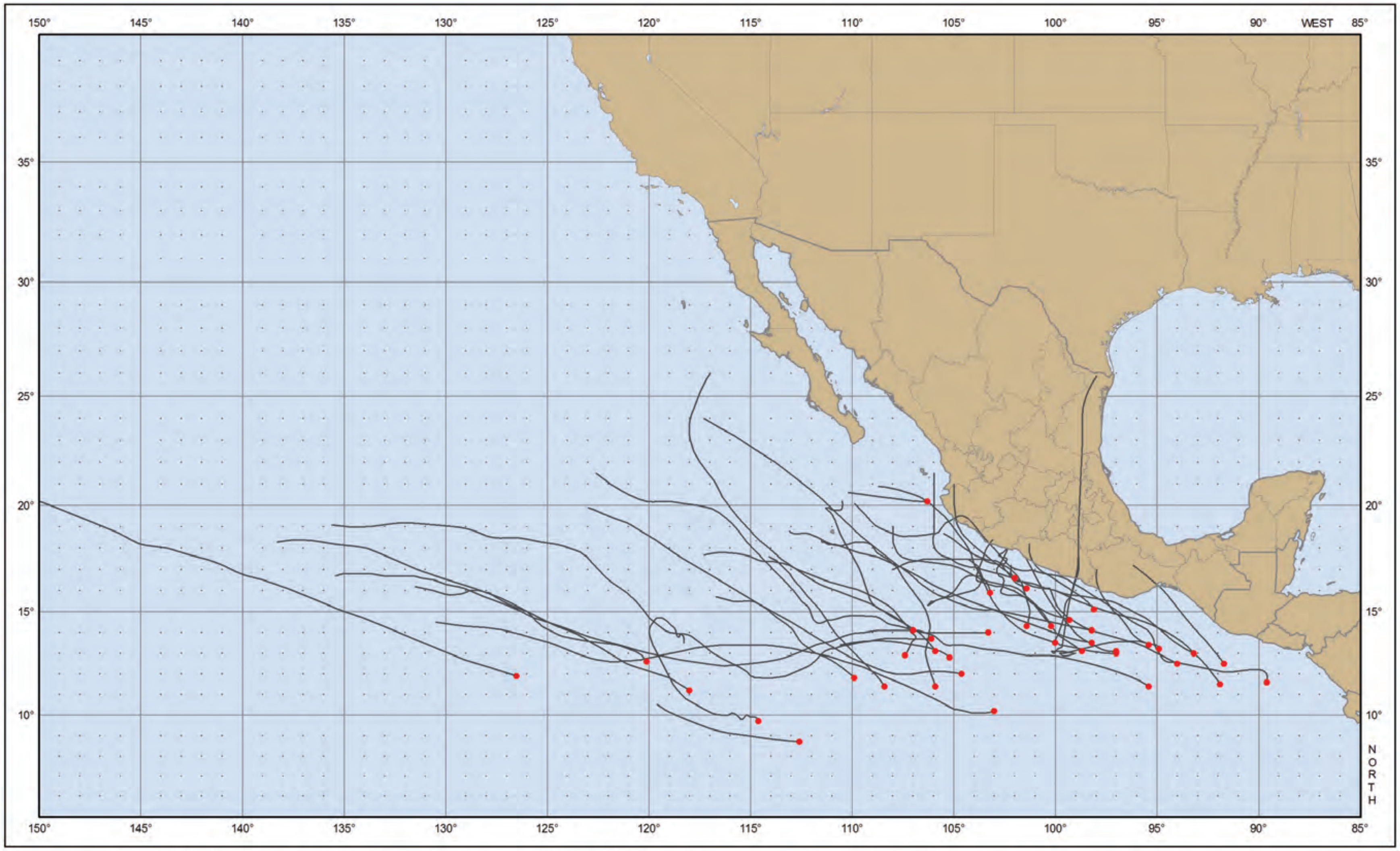

Tropical Cyclones Beginning May 10-20, 1949-2006, That Reached At Least Tropical Storm Status (9 Storms)



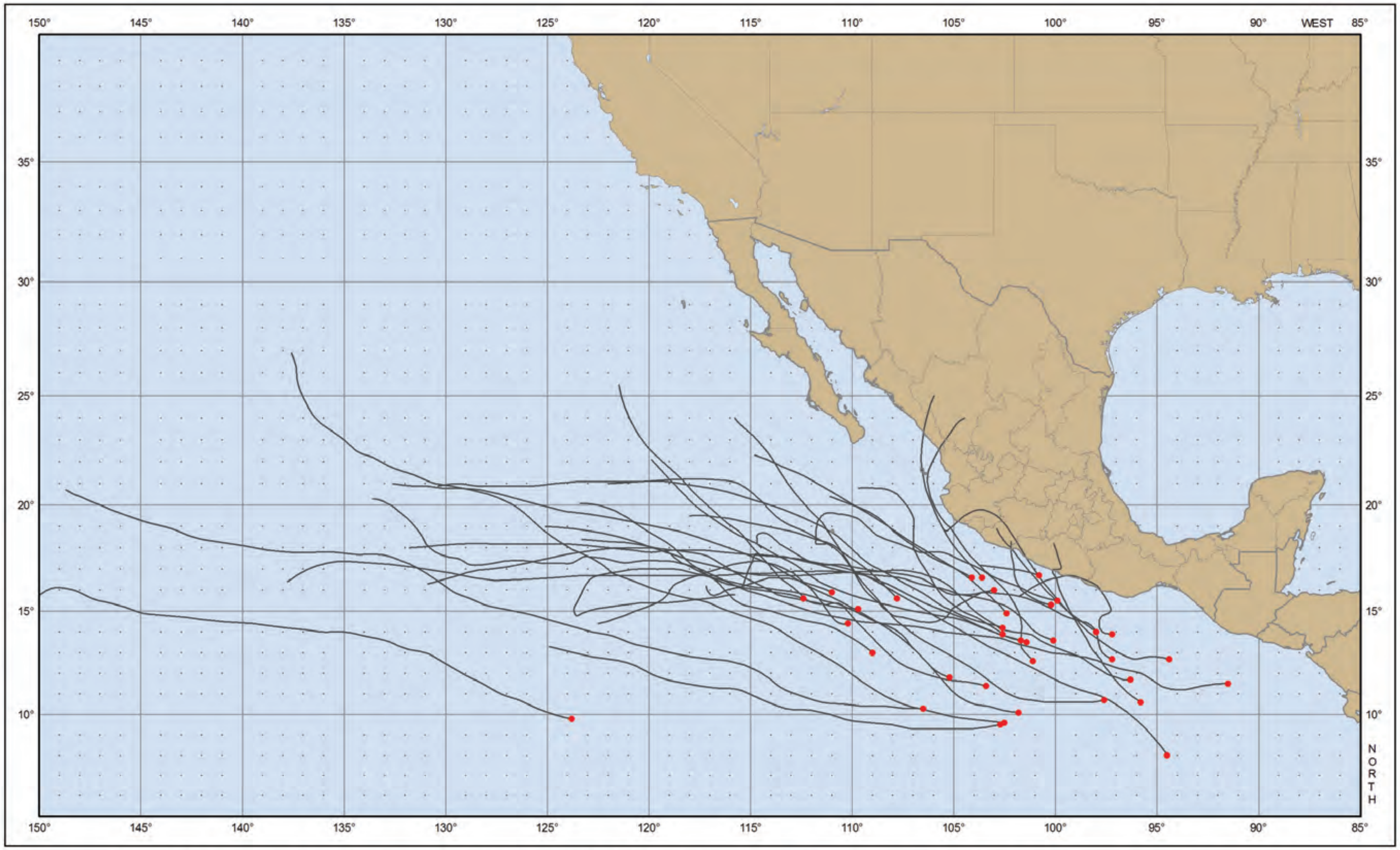

Tropical Cyclones Beginning May 21-31, 1949-2006, That Reached At Least Tropical Storm Status (18 Storms)



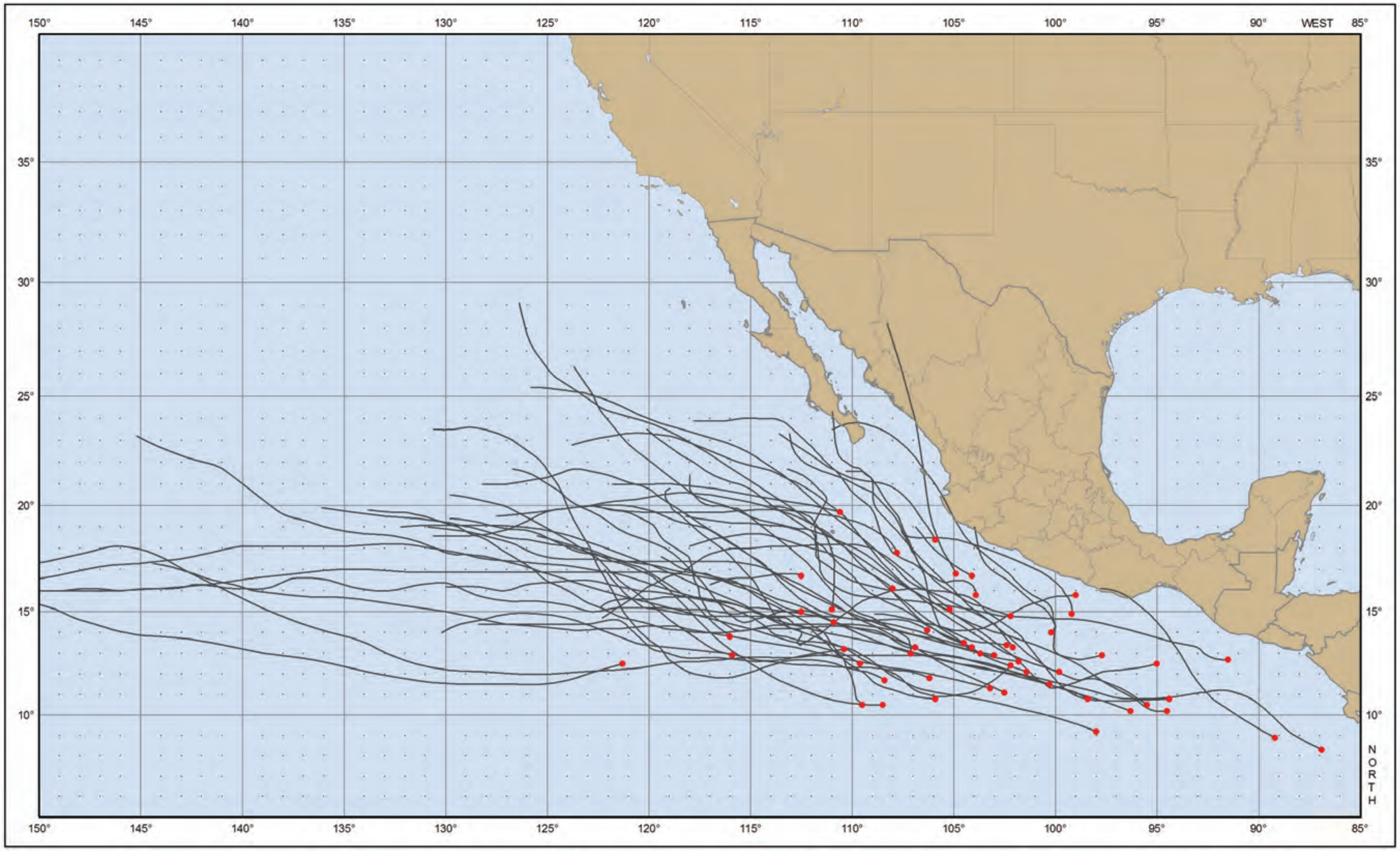
Tropical Cyclones Beginning June 1-10, 1949-2006, That Reached At Least Tropical Storm Status (29 Storms)



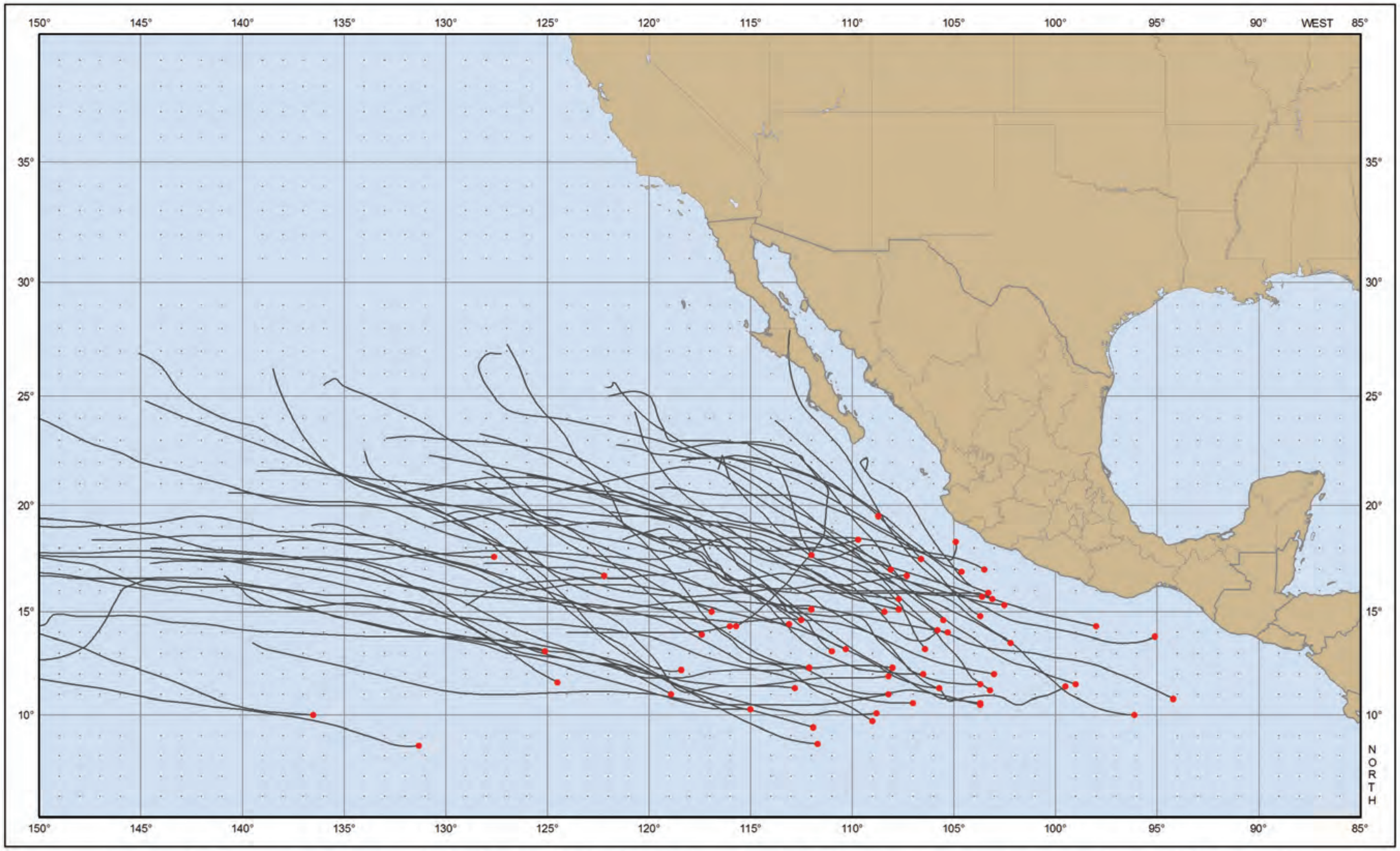

Tropical Cyclones Beginning June 11-20, 1949-2006, That Reached At Least Tropical Storm Status (38 Storms)



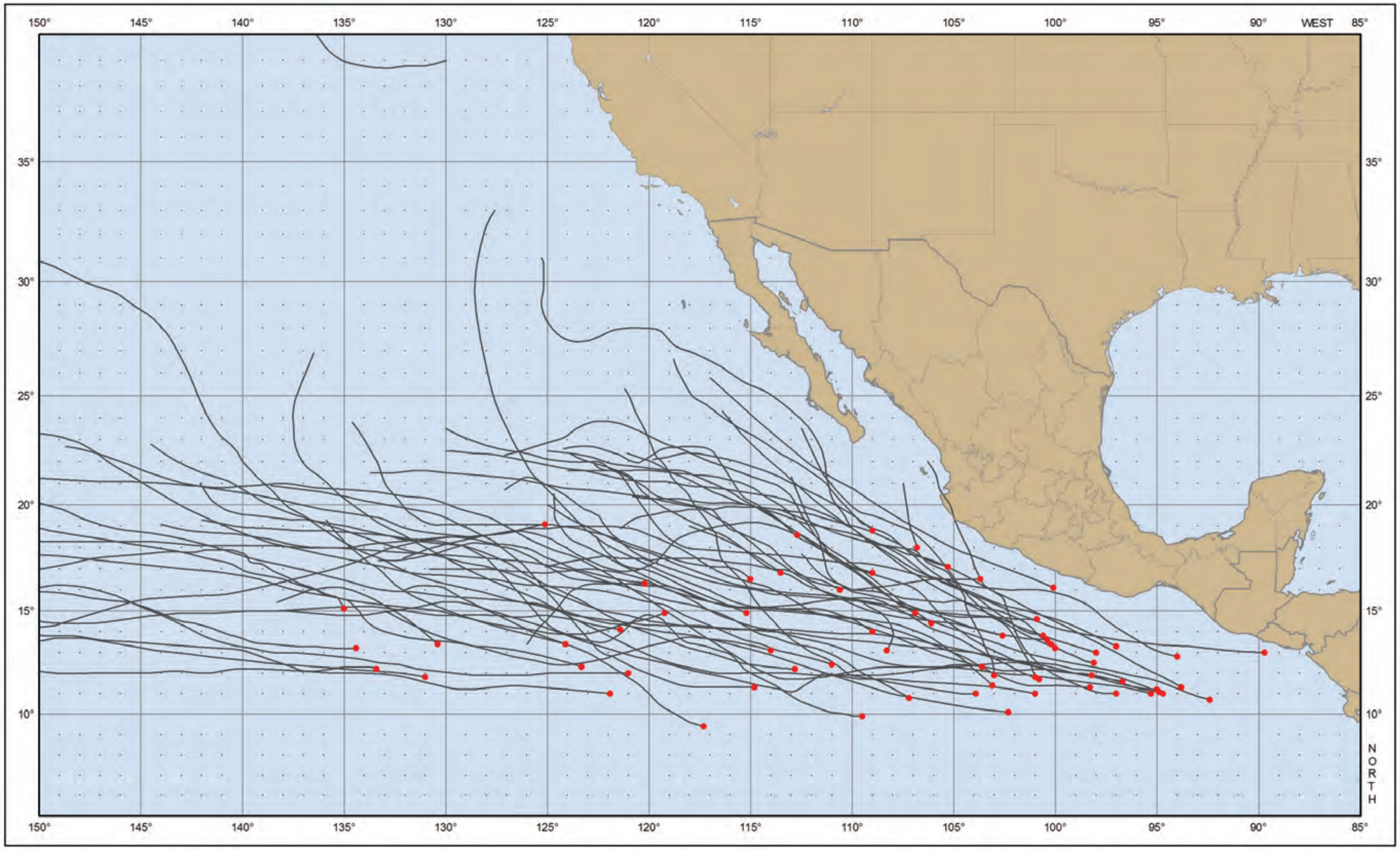

Tropical Cyclones Beginning June 21-30, 1949-2006, That Reached At Least Tropical Storm Status (35 Storms)



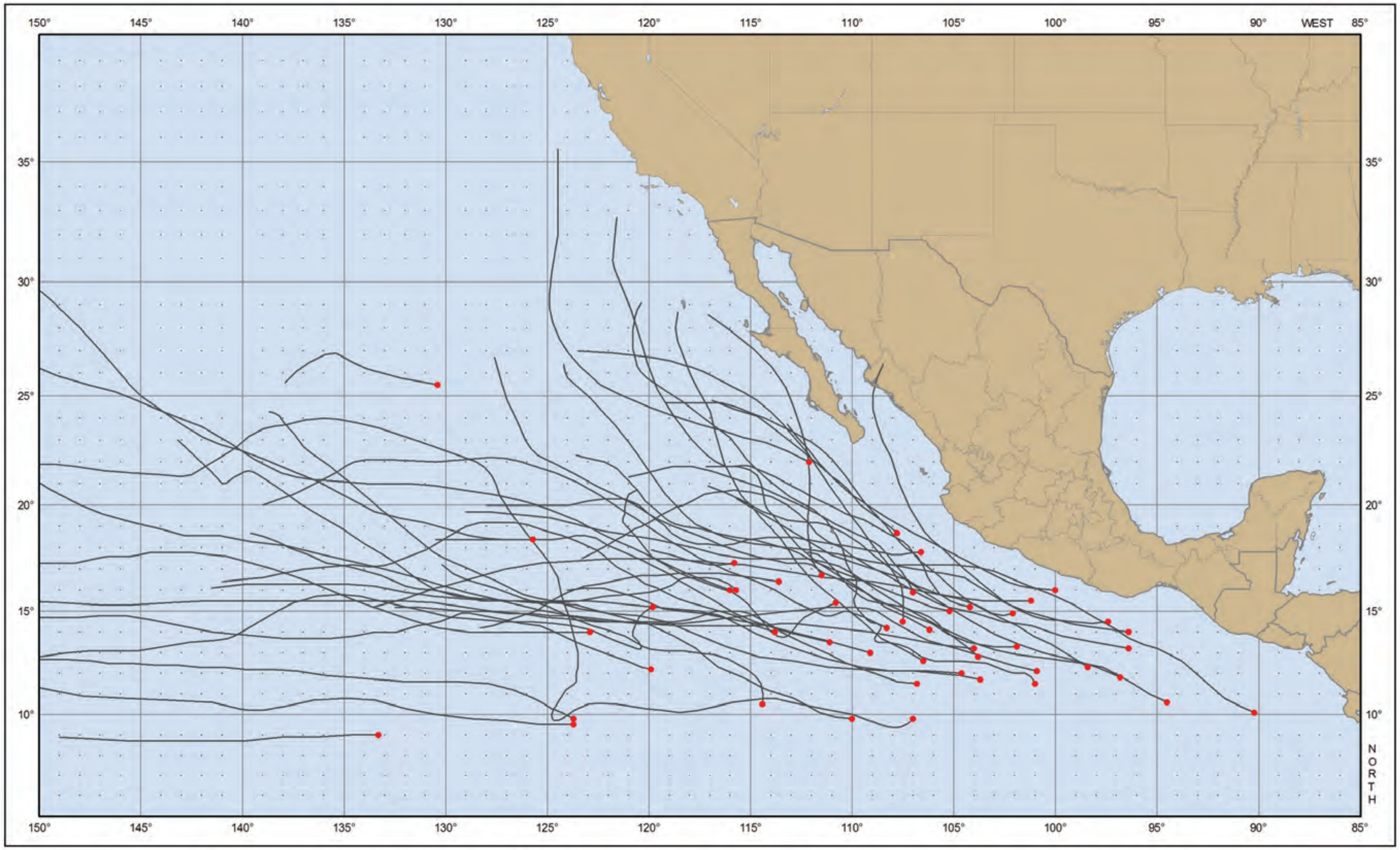

Tropical Cyclones Beginning July 1-10, 1949-2006, That Reached At Least Tropical Storm Status (53 Storms)



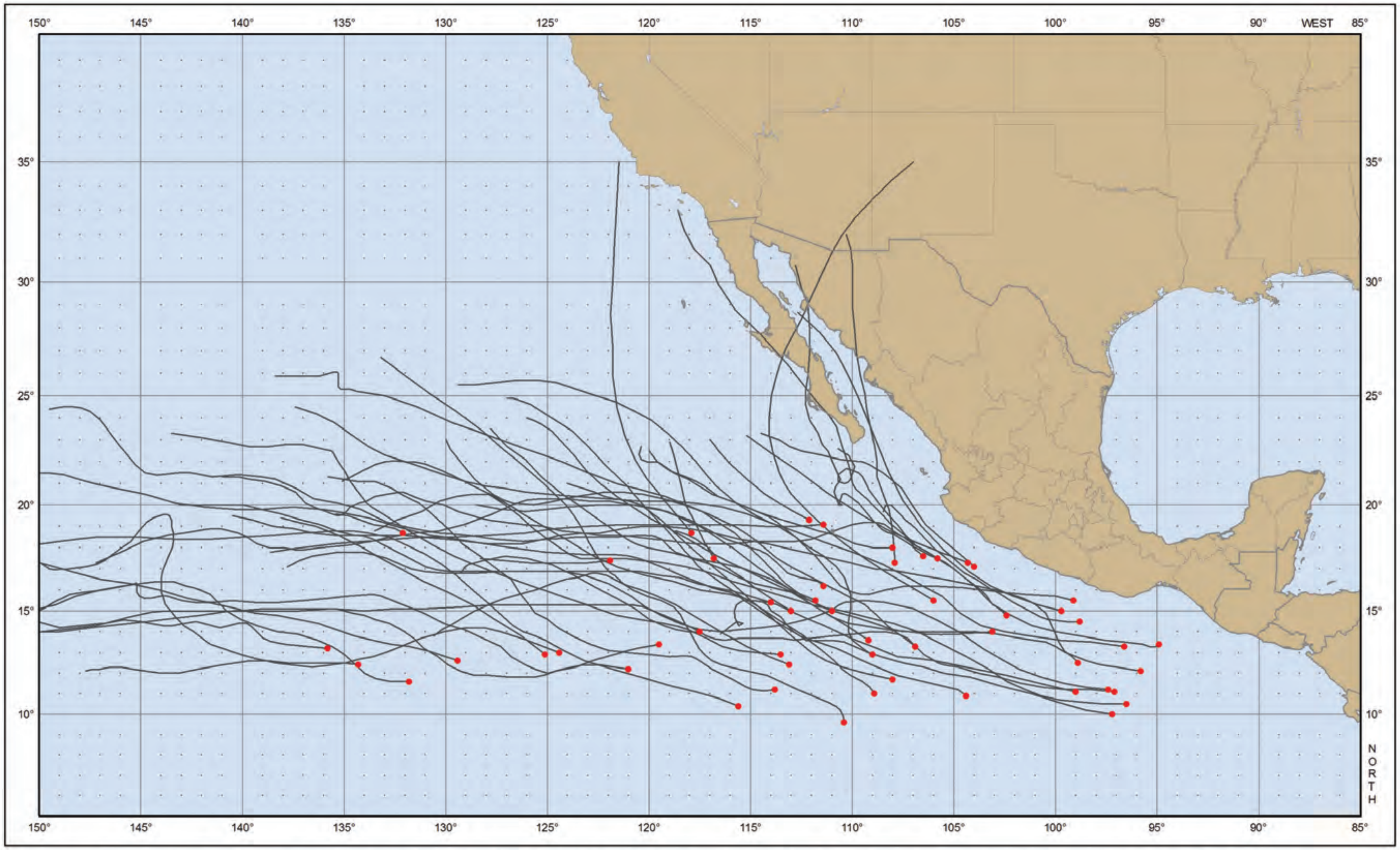

Tropical Cyclones Beginning July 11-20, 1949-2006, That Reached At Least Tropical Storm Status (64 Storms)



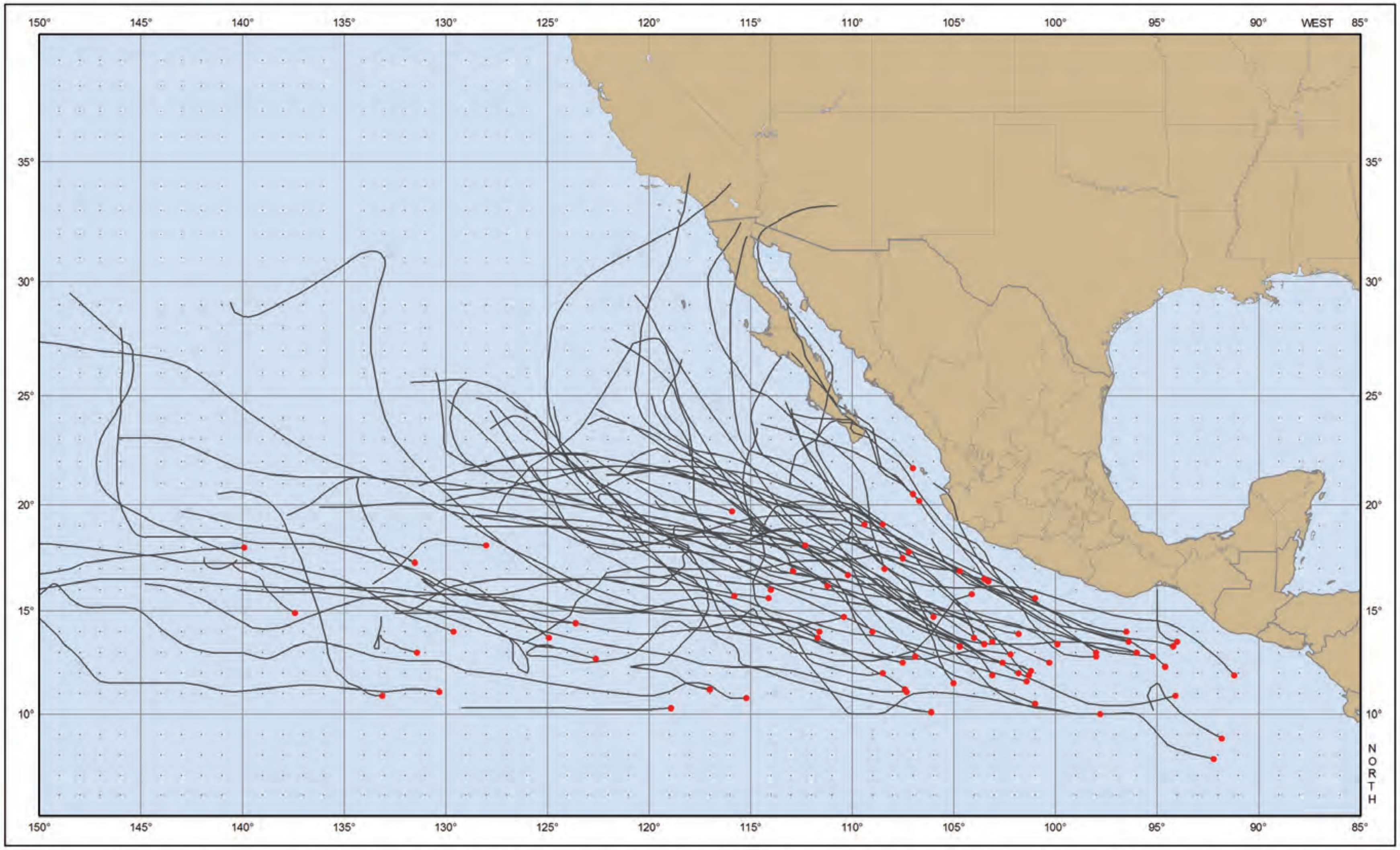

Tropical Cyclones Beginning July 21-31, 1949-2006, That Reached At Least Tropical Storm Status (64 Storms)



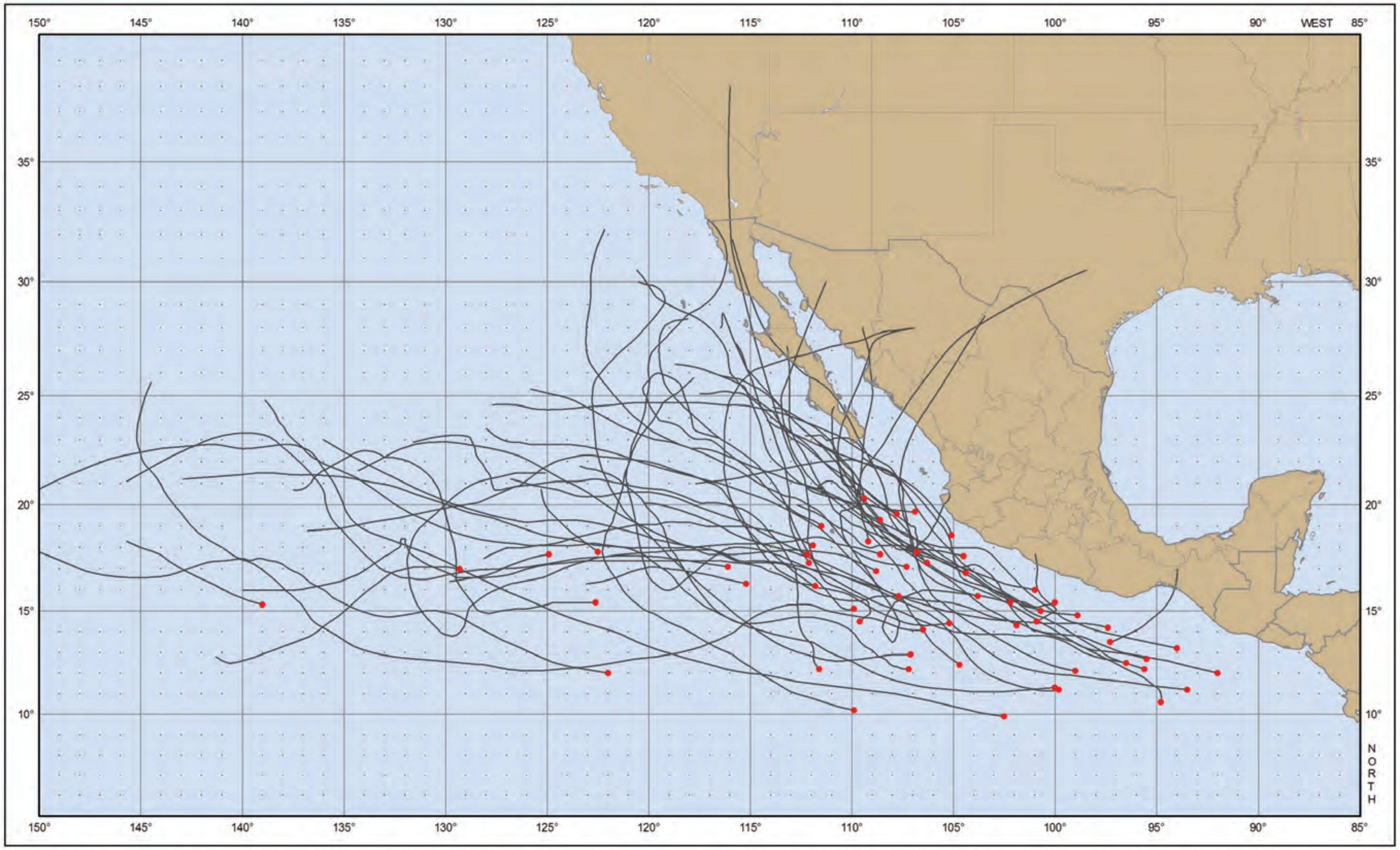

Tropical Cyclones Beginning August 1-10, 1949-2006, That Reached At Least Tropical Storm Status (48 Storms)



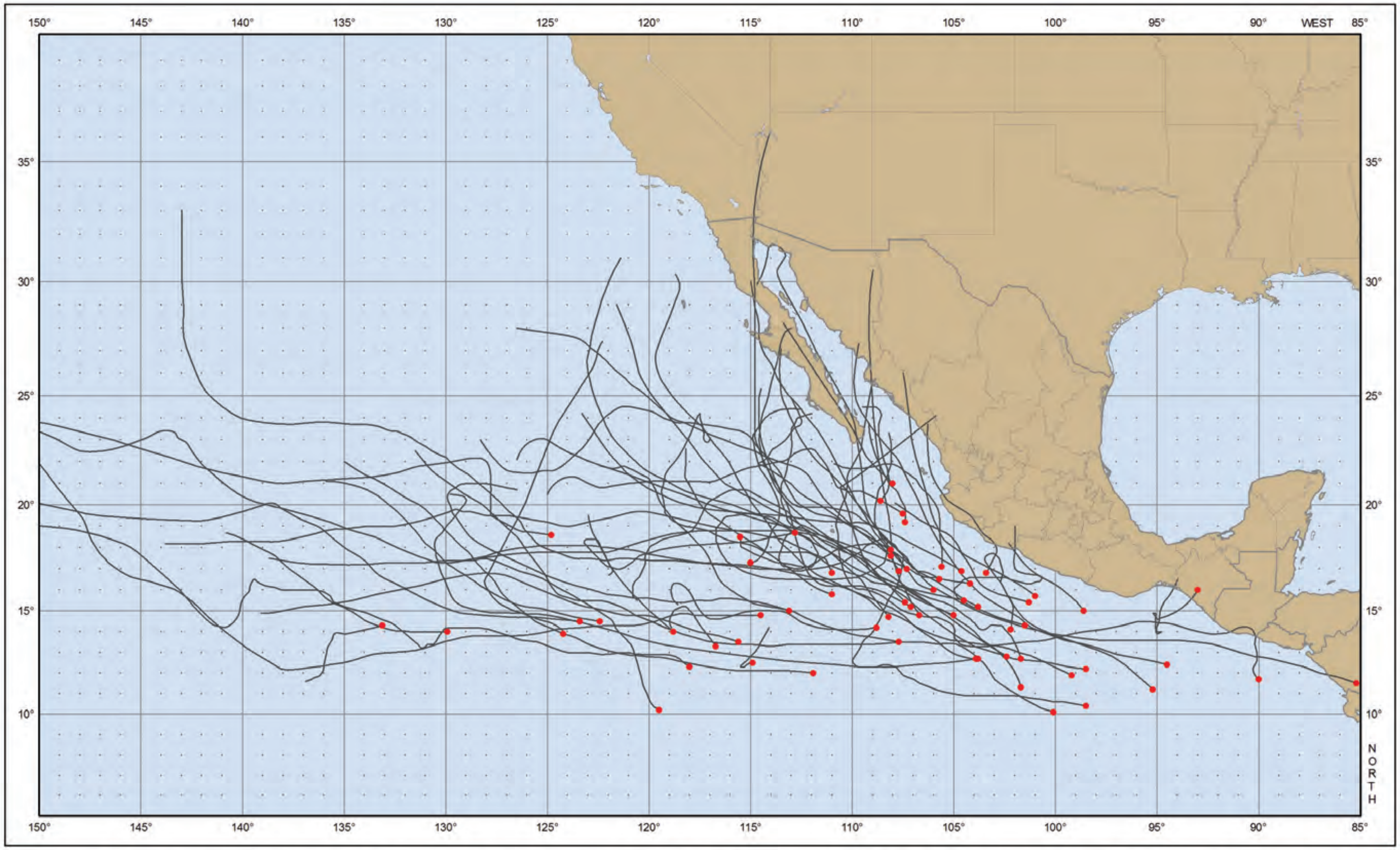

Tropical Cyclones Beginning August 11-20, 1949-2006, That Reached At Least Tropical Storm Status (52 Storms)



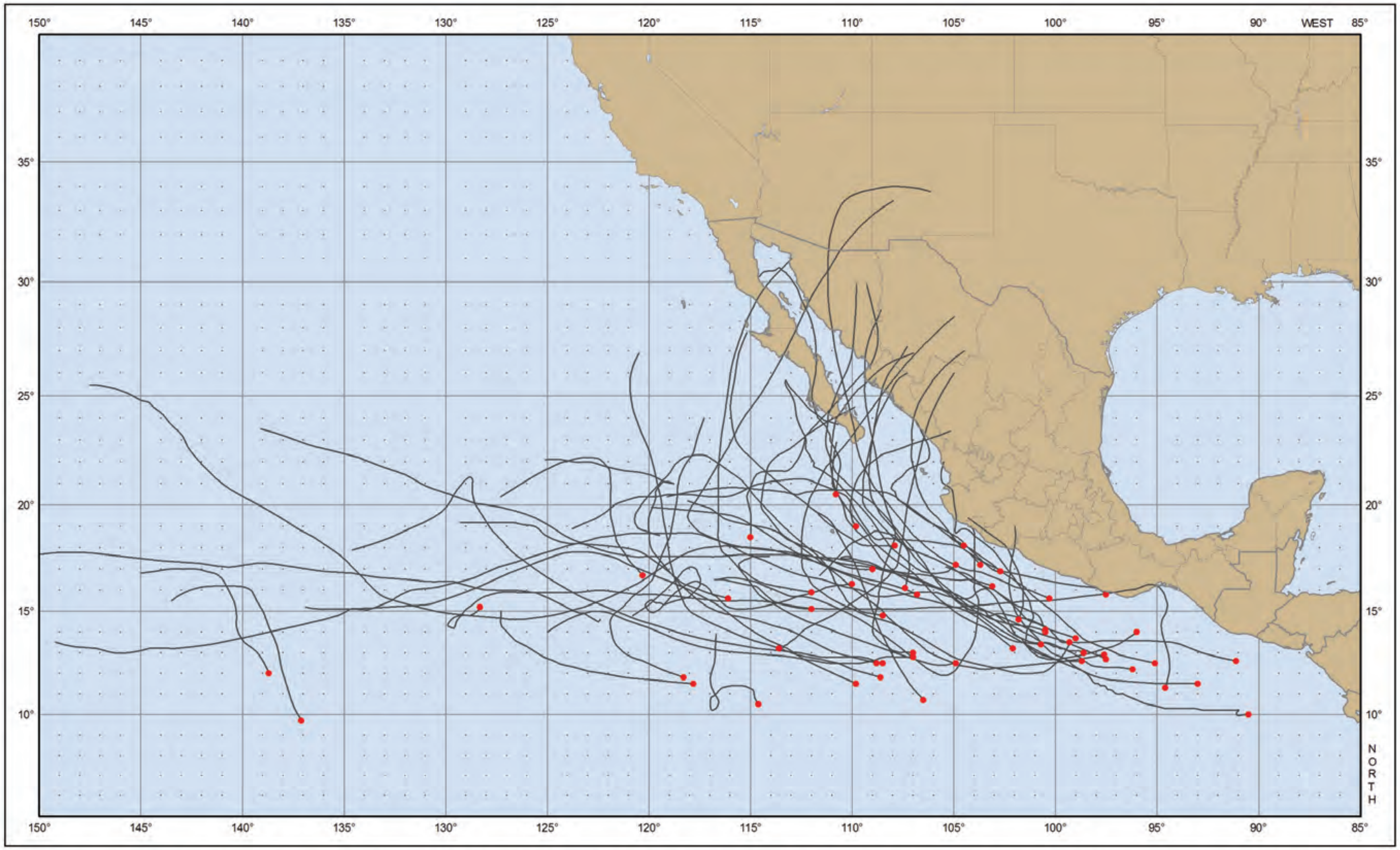

Tropical Cyclones Beginning August 21-31, 1949-2006, That Reached At Least Tropical Storm Status (77 Storms)



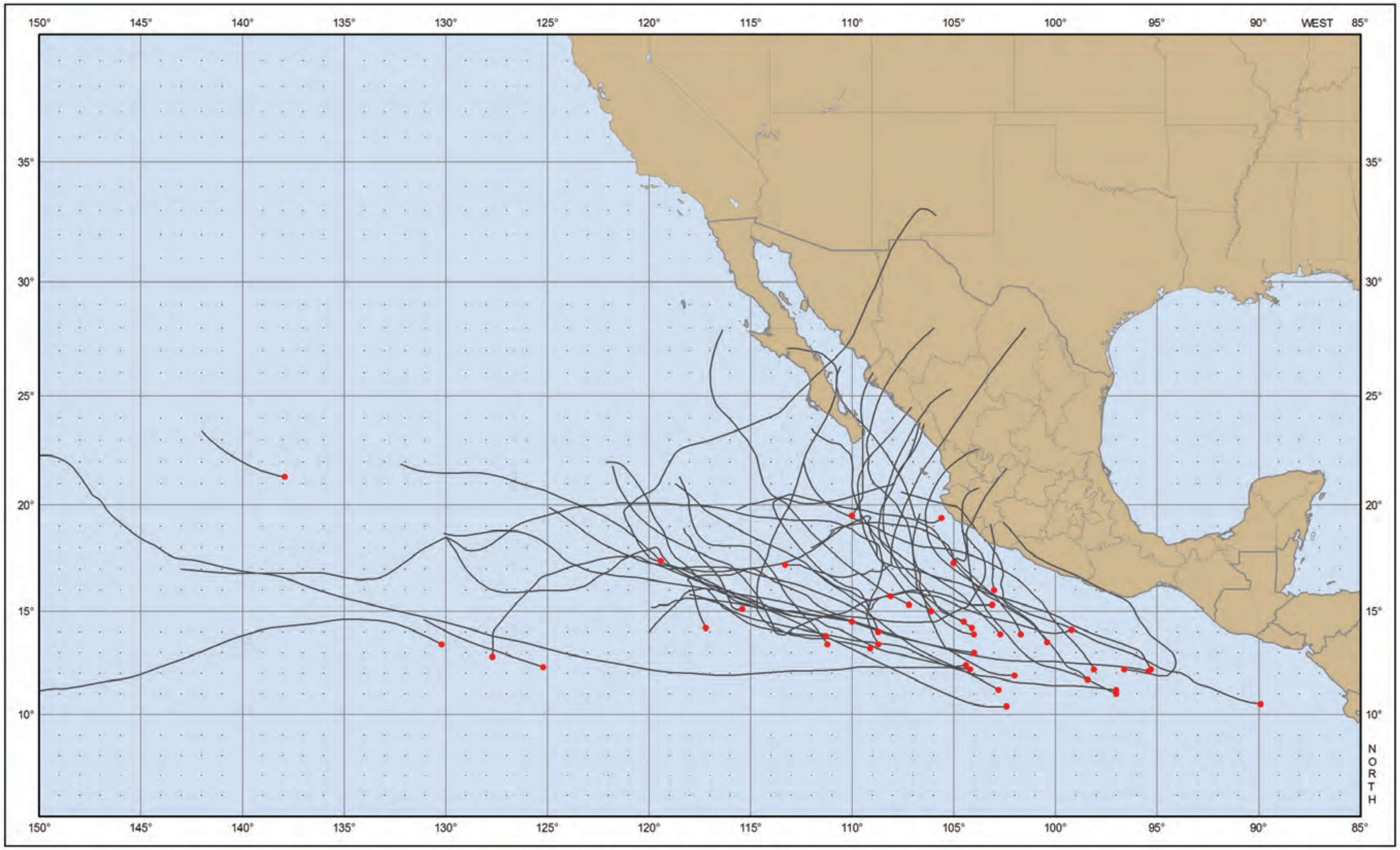

Tropical Cyclones Beginning September 1-10, 1949-2006, That Reached At Least Tropical Storm Status (57 Storms)



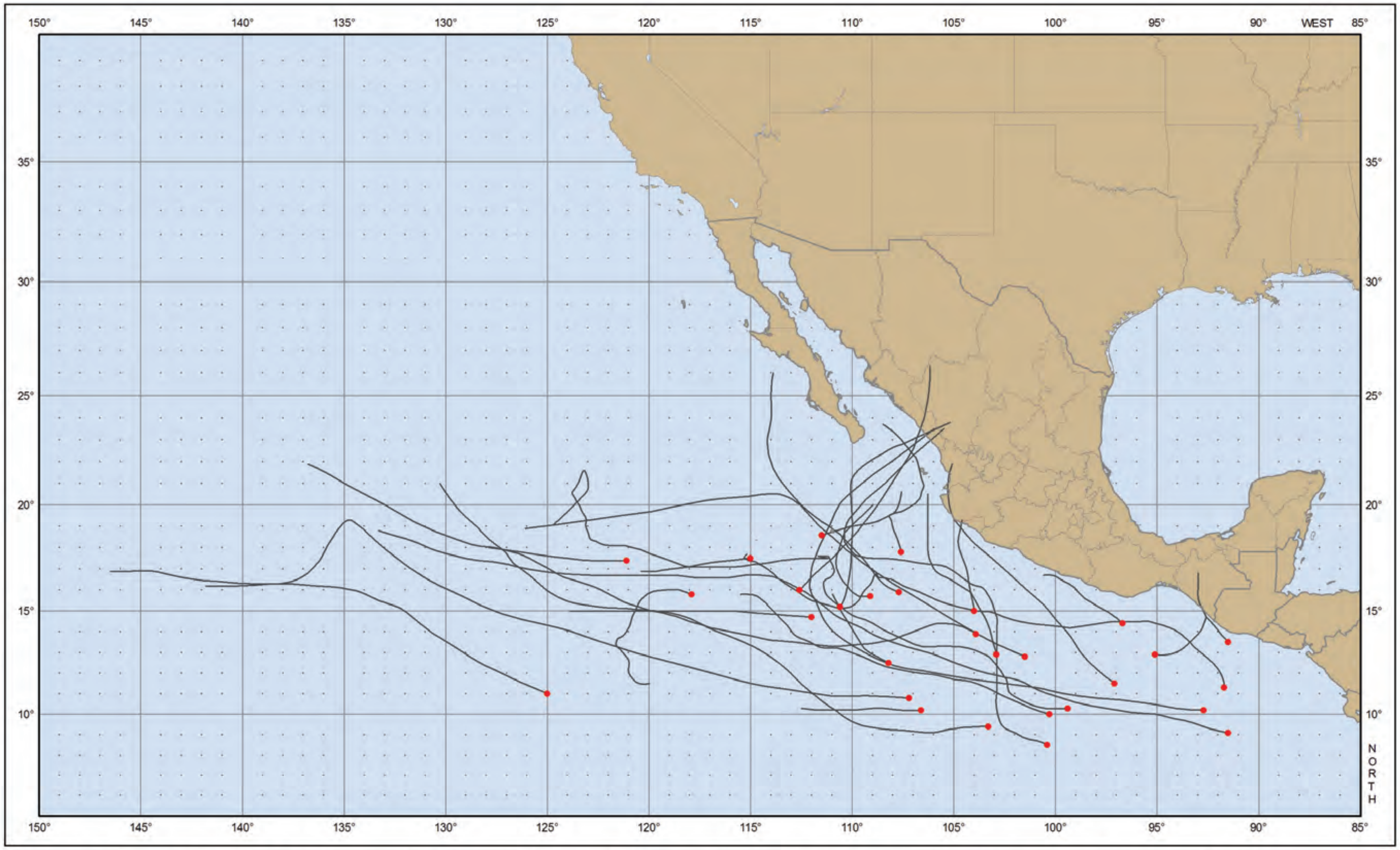

Tropical Cyclones Beginning September 11-20, 1949-2006, That Reached At Least Tropical Storm Status (62 Storms)



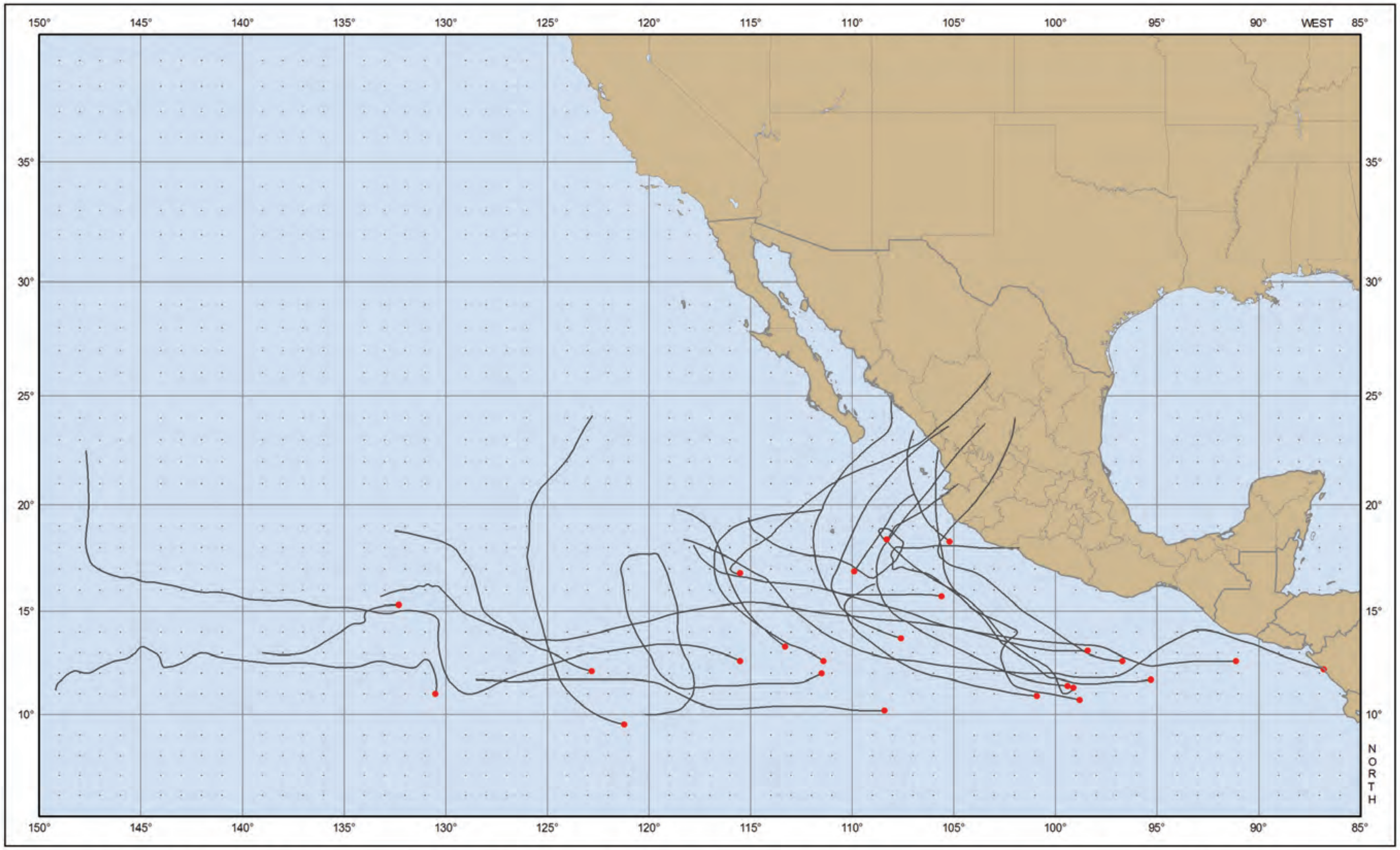

Tropical Cyclones Beginning September 21-30, 1949-2006, That Reached At Least Tropical Storm Status (53 Storms)



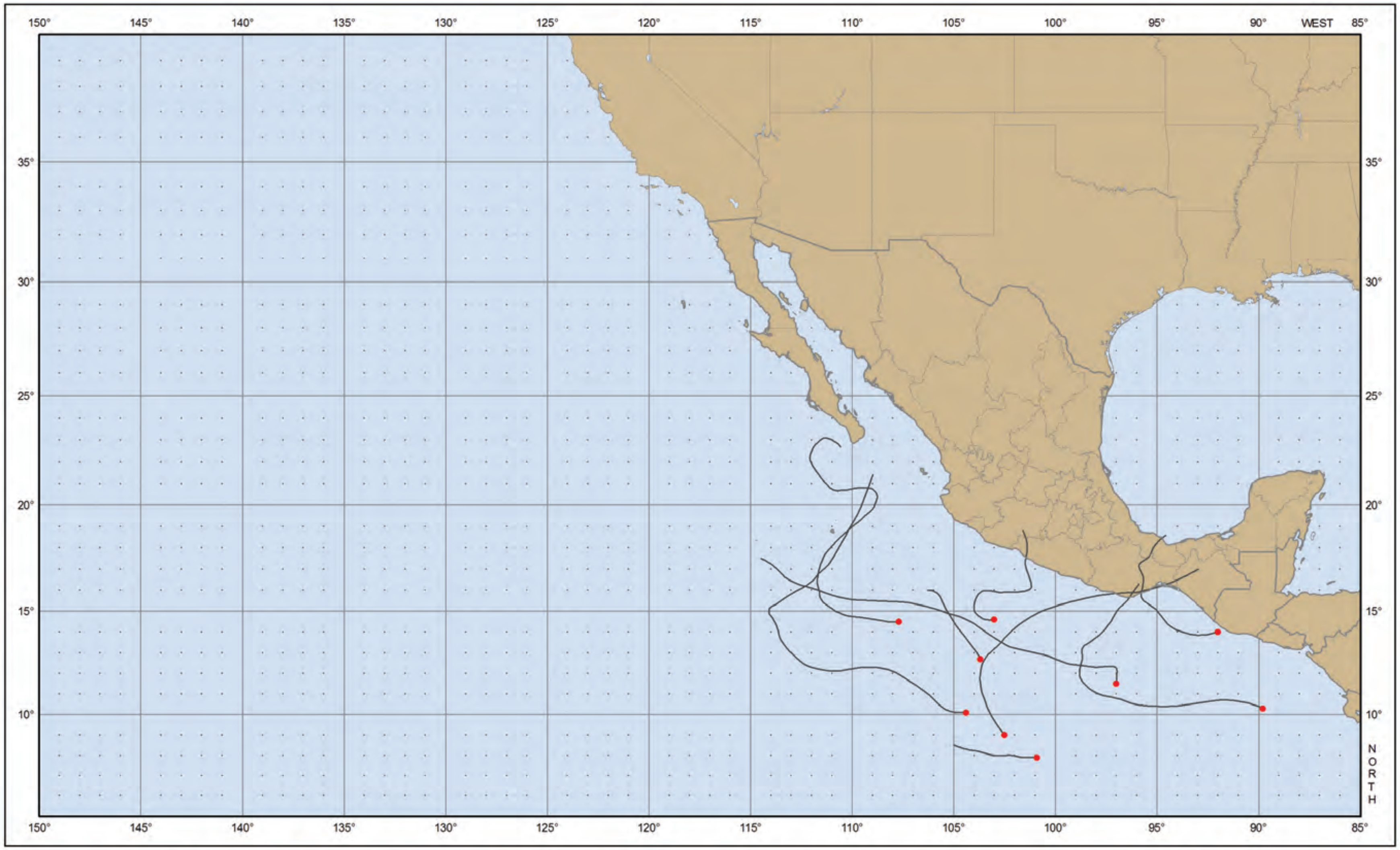

Tropical Cyclones Beginning October 1-10, 1949-2006, That Reached At Least Tropical Storm Status (43 Storms)



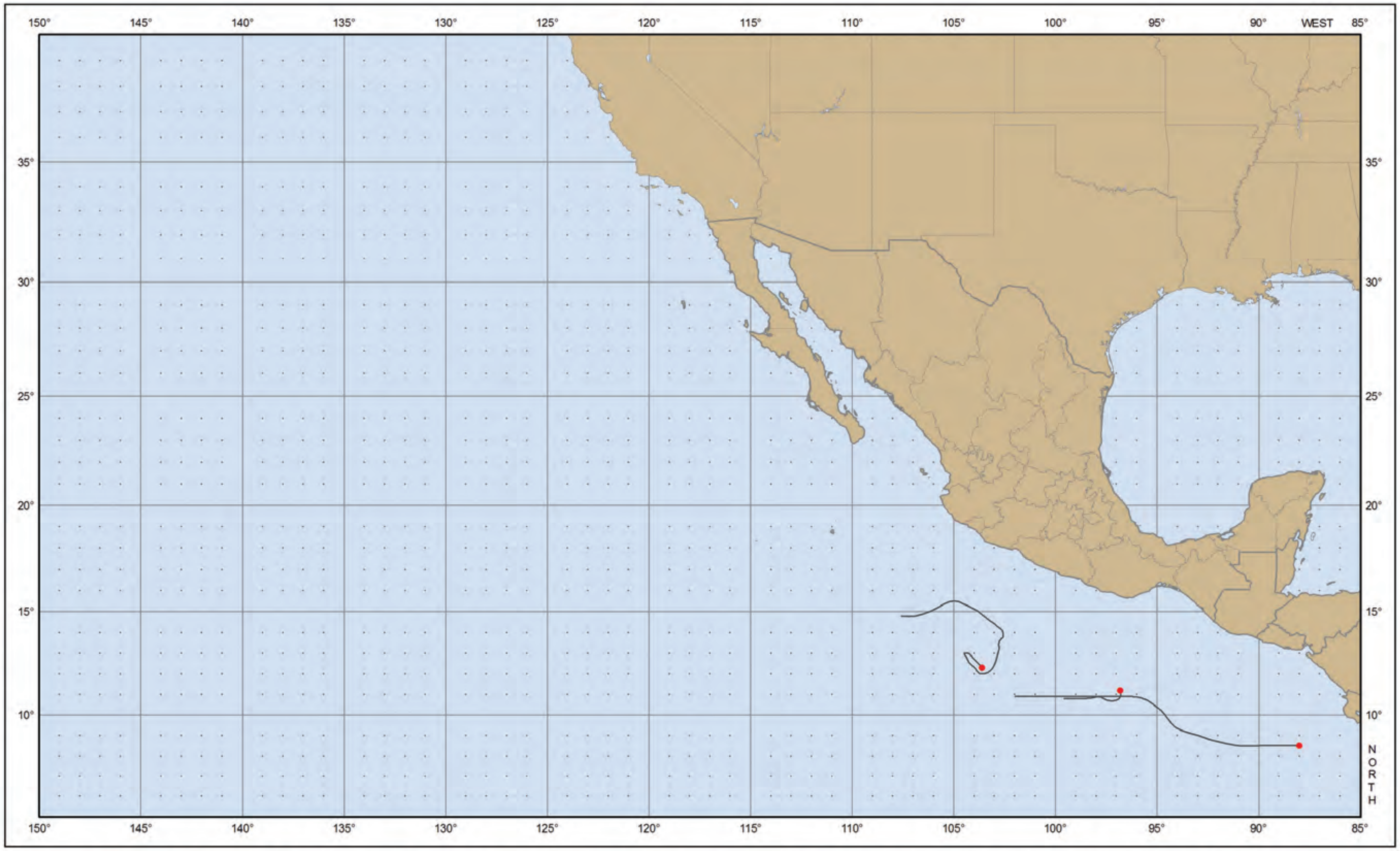

Tropical Cyclones Beginning October 11-20, 1949-2006, That Reached At Least Tropical Storm Status (29 Storms)



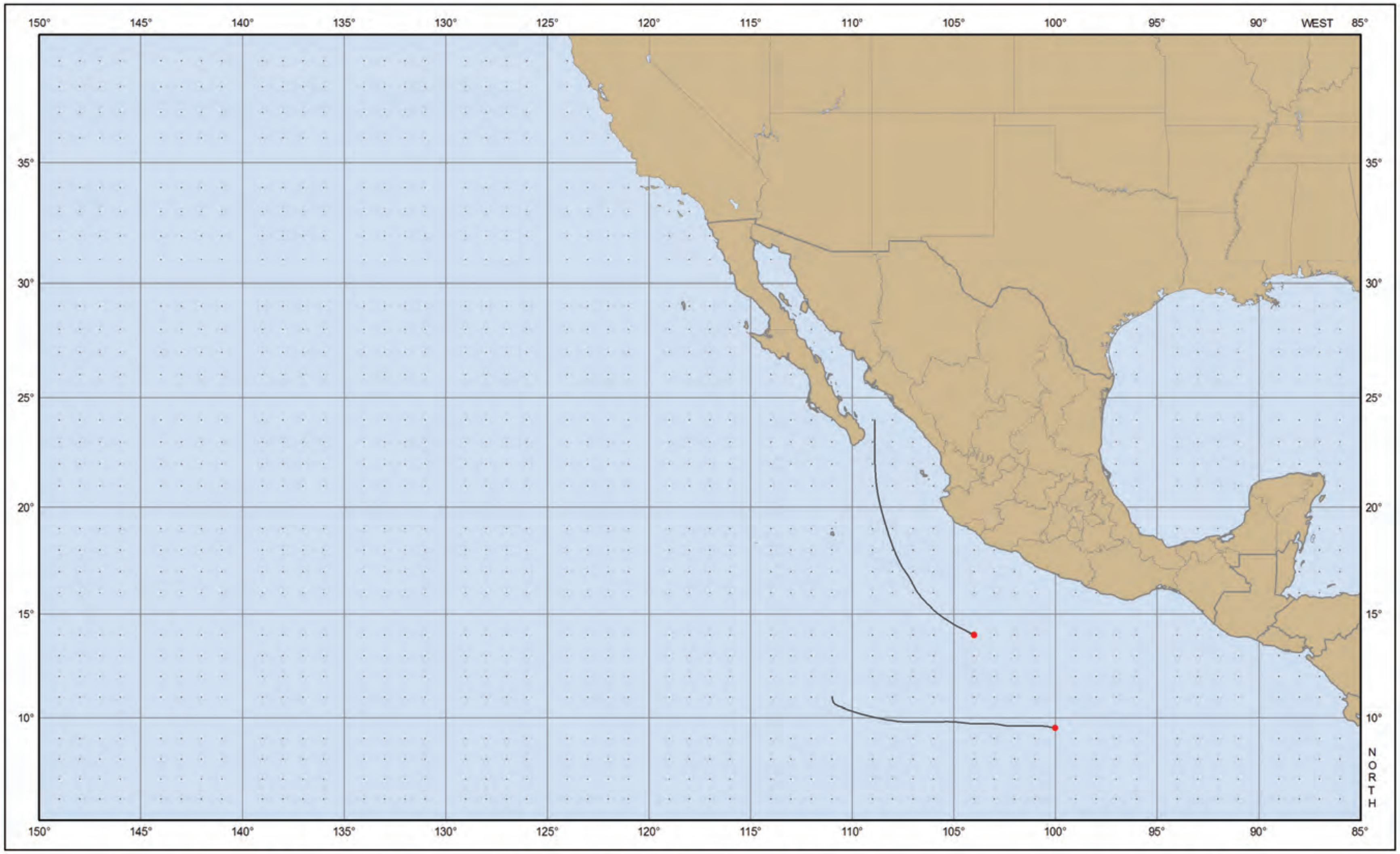

Tropical Cyclones Beginning October 21-31, 1949-2006, That Reached At Least Tropical Storm Status (24 Storms)



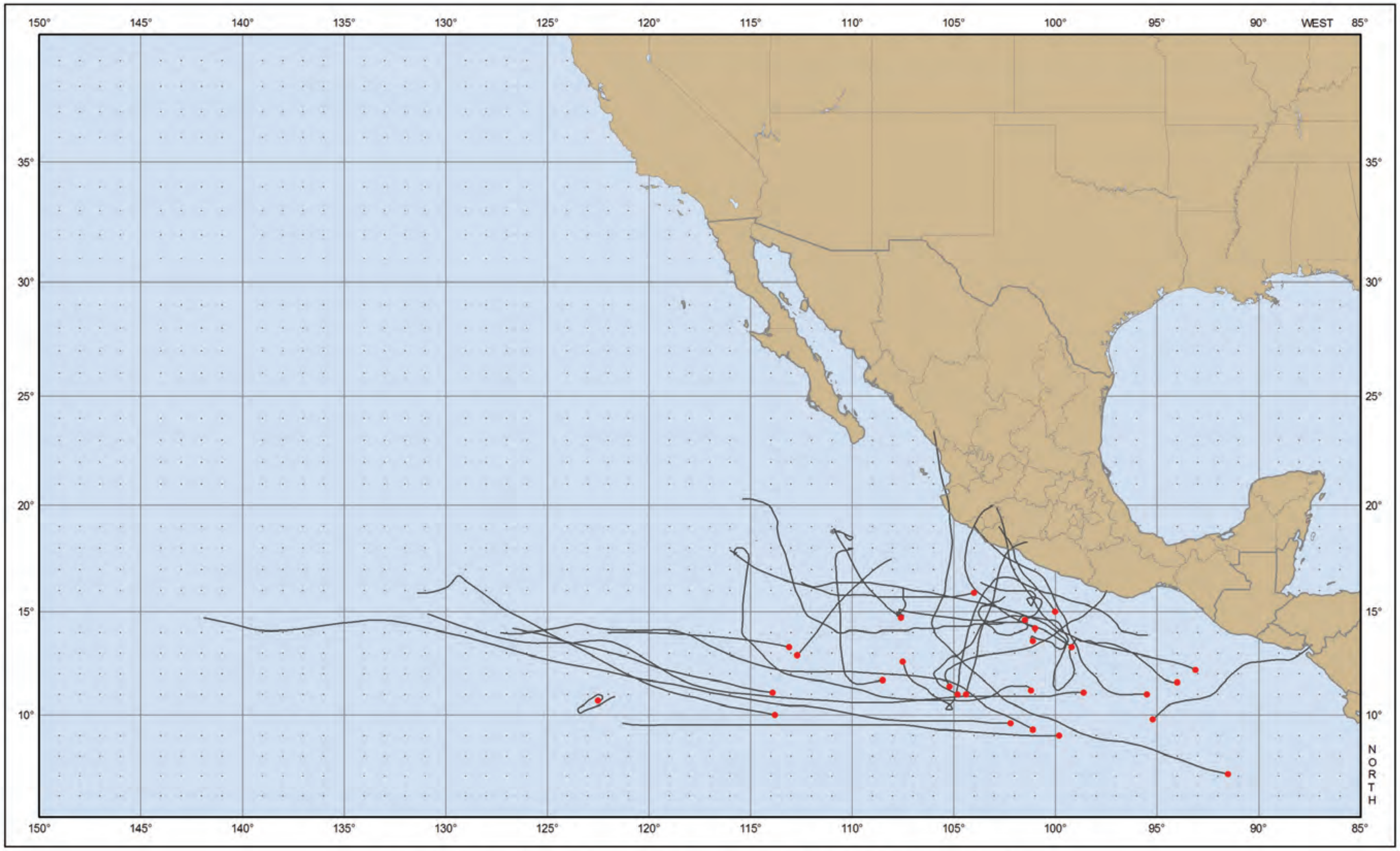

Tropical Cyclones Beginning November 1-10, 1949-2006, That Reached At Least Tropical Storm Status (9 Storms)



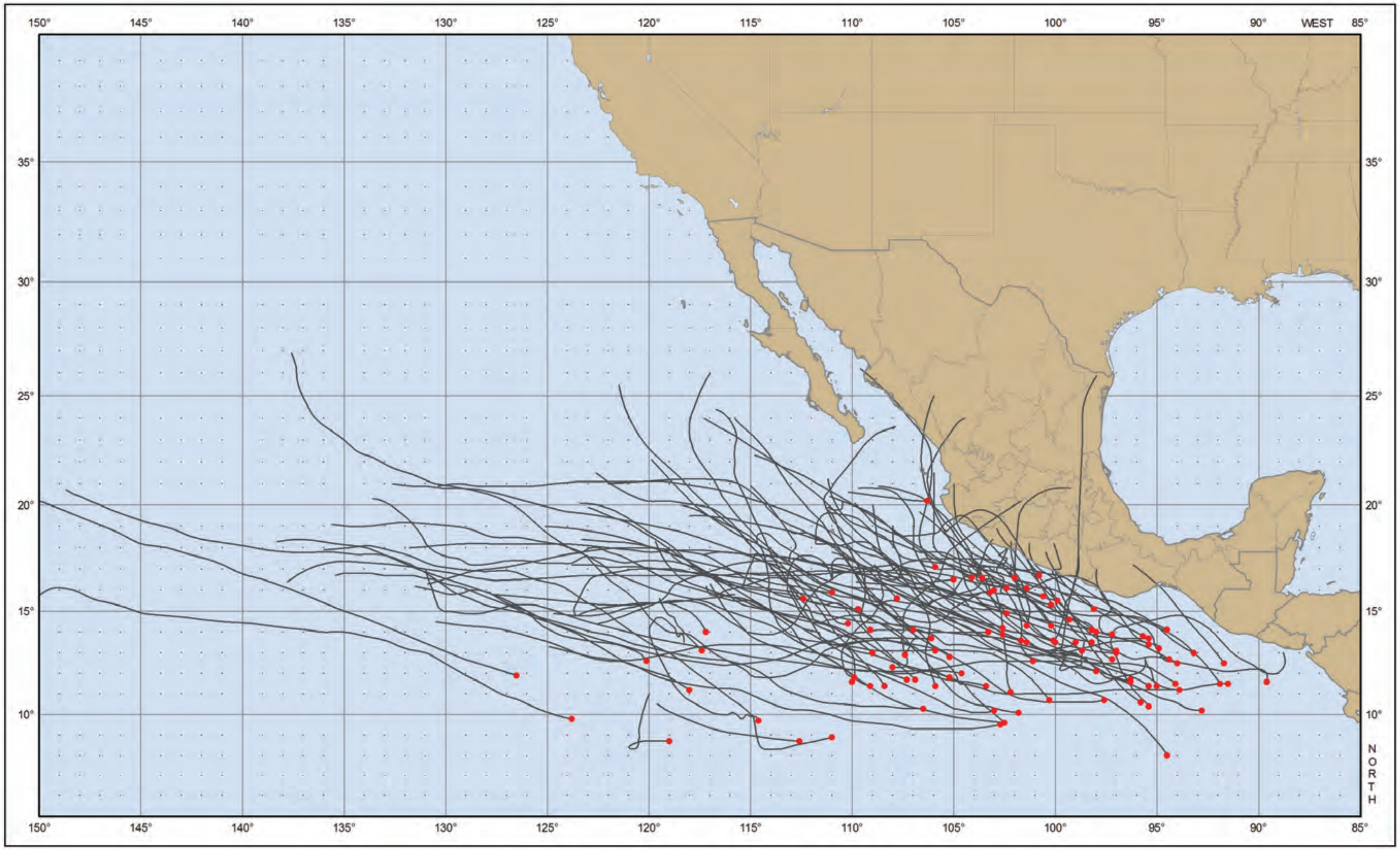

Tropical Cyclones Beginning November 11-20, 1949-2006, That Reached At Least Tropical Storm Status (3 Storms)



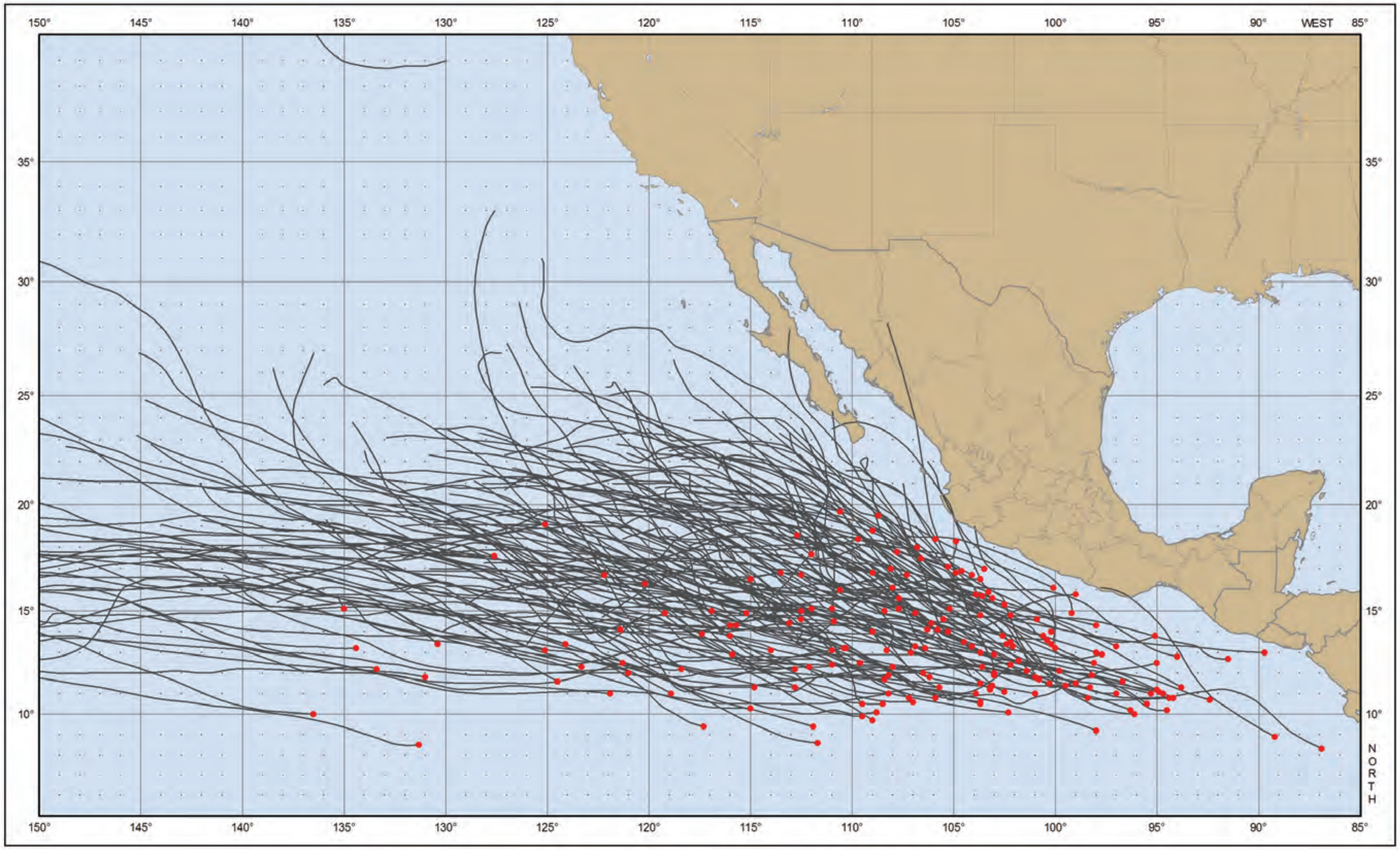

Tropical Cyclones Beginning November 21-30, 1949-2006, That Reached At Least Tropical Storm Status (2 Storms)



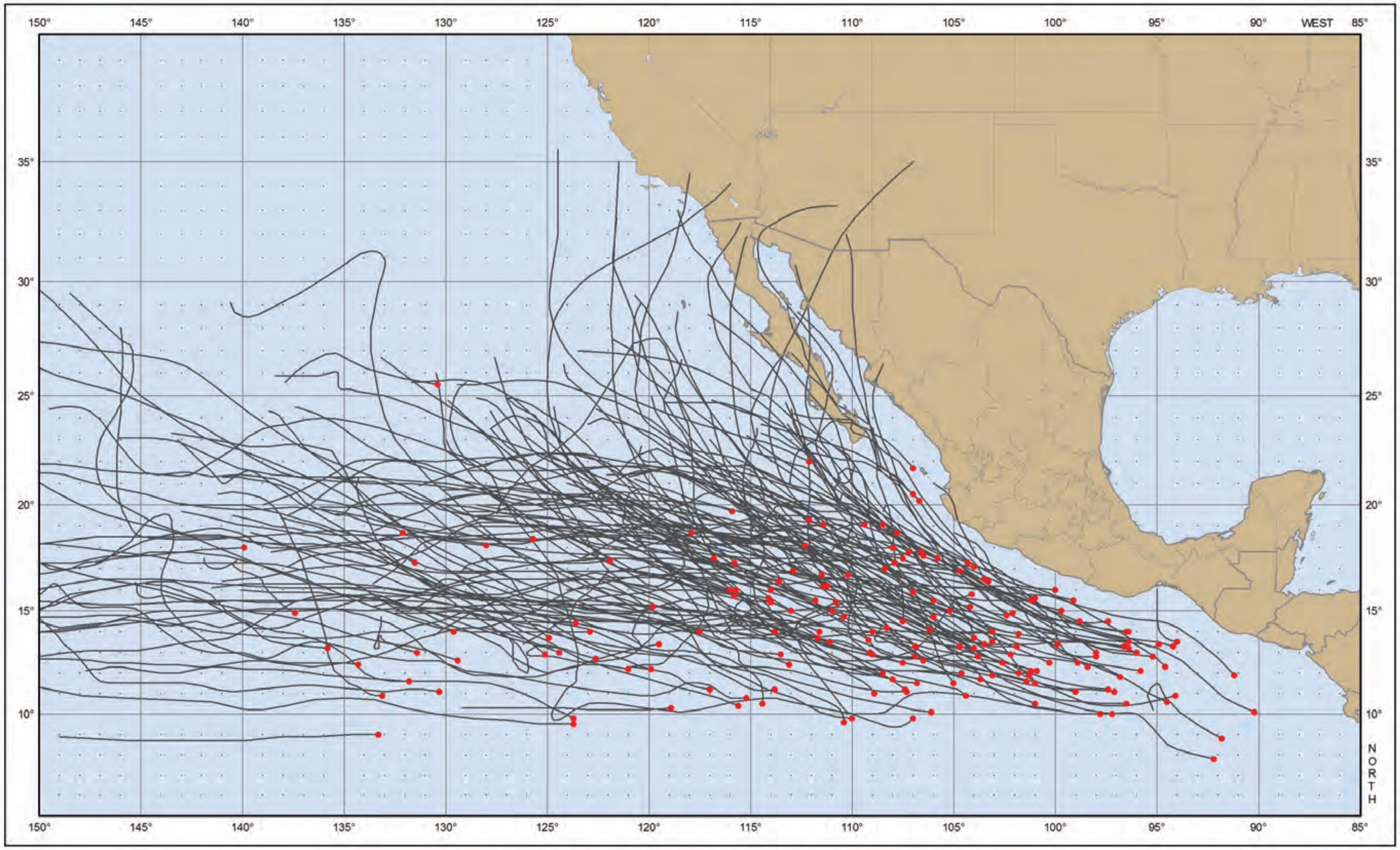

Tropical Cyclones Beginning in May, 1949-2006 (27 Storms)



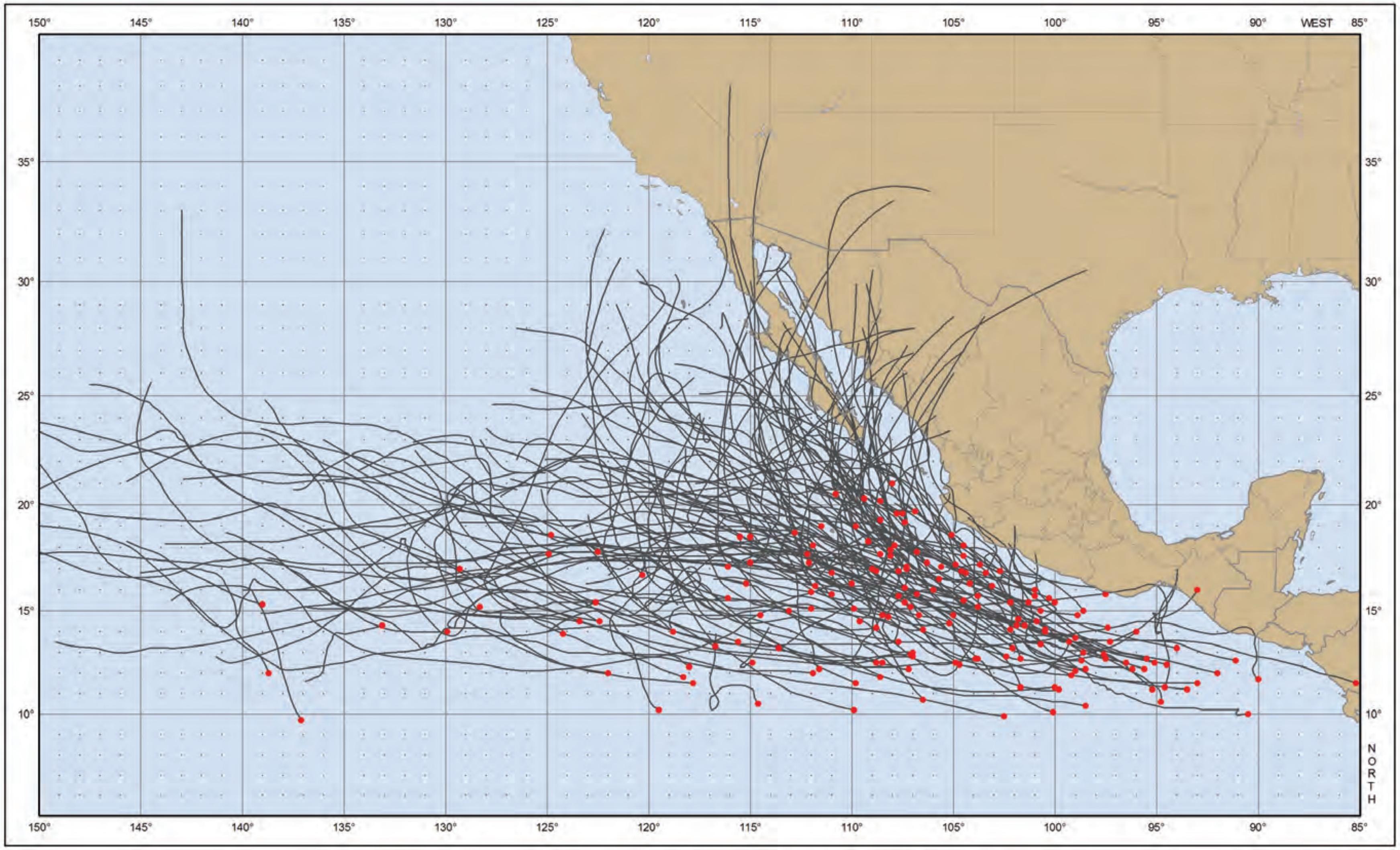

Tropical Cyclones Beginning in June, 1949-2006 (102 Storms)



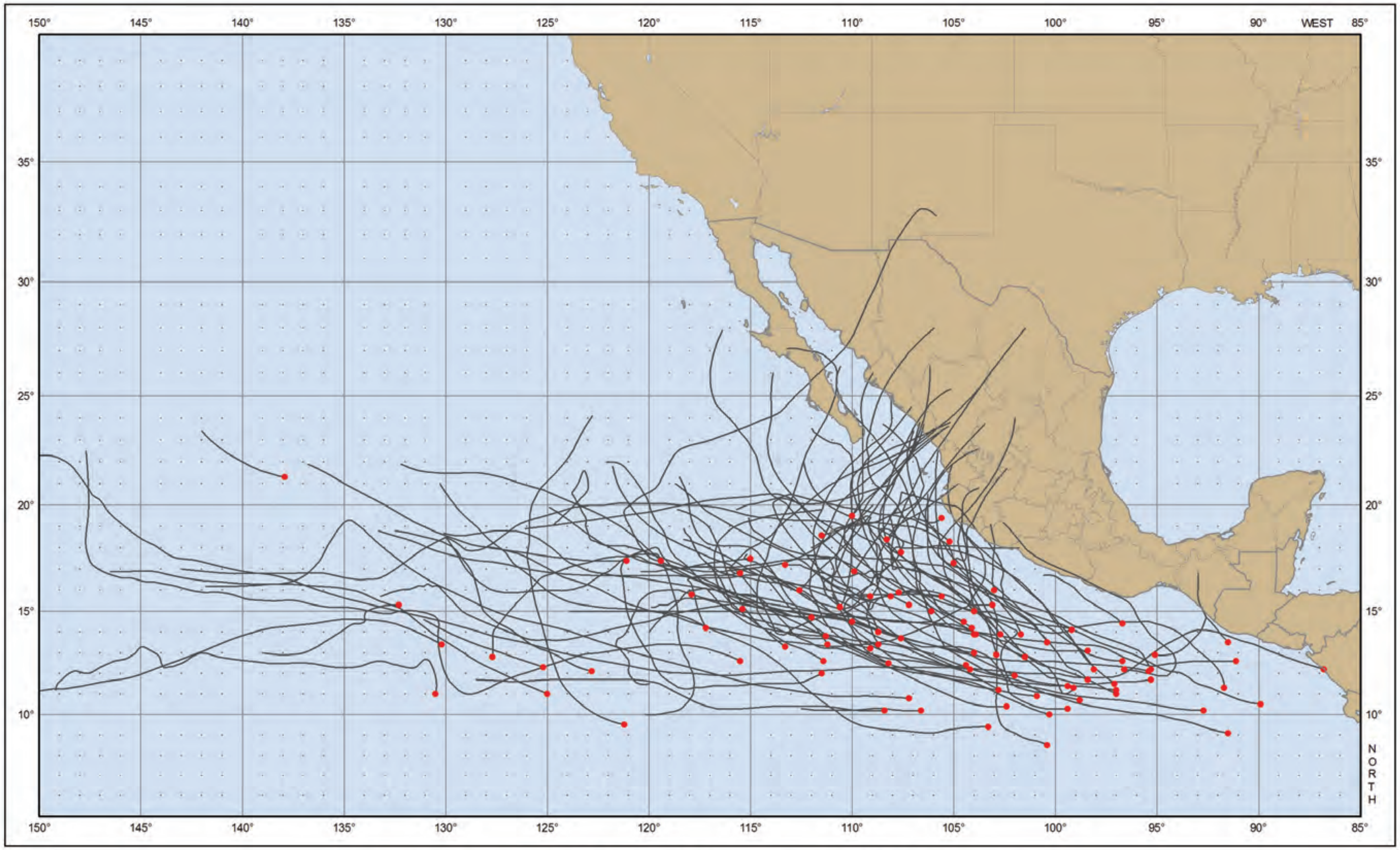

Tropical Cyclones Beginning in July, 1949-2006 (181 Storms)



Tropical Cyclones Beginning in August, 1949-2006 (177 Storms)




Tropical Cyclones Beginning in September, 1949-2006 (172 Storms)

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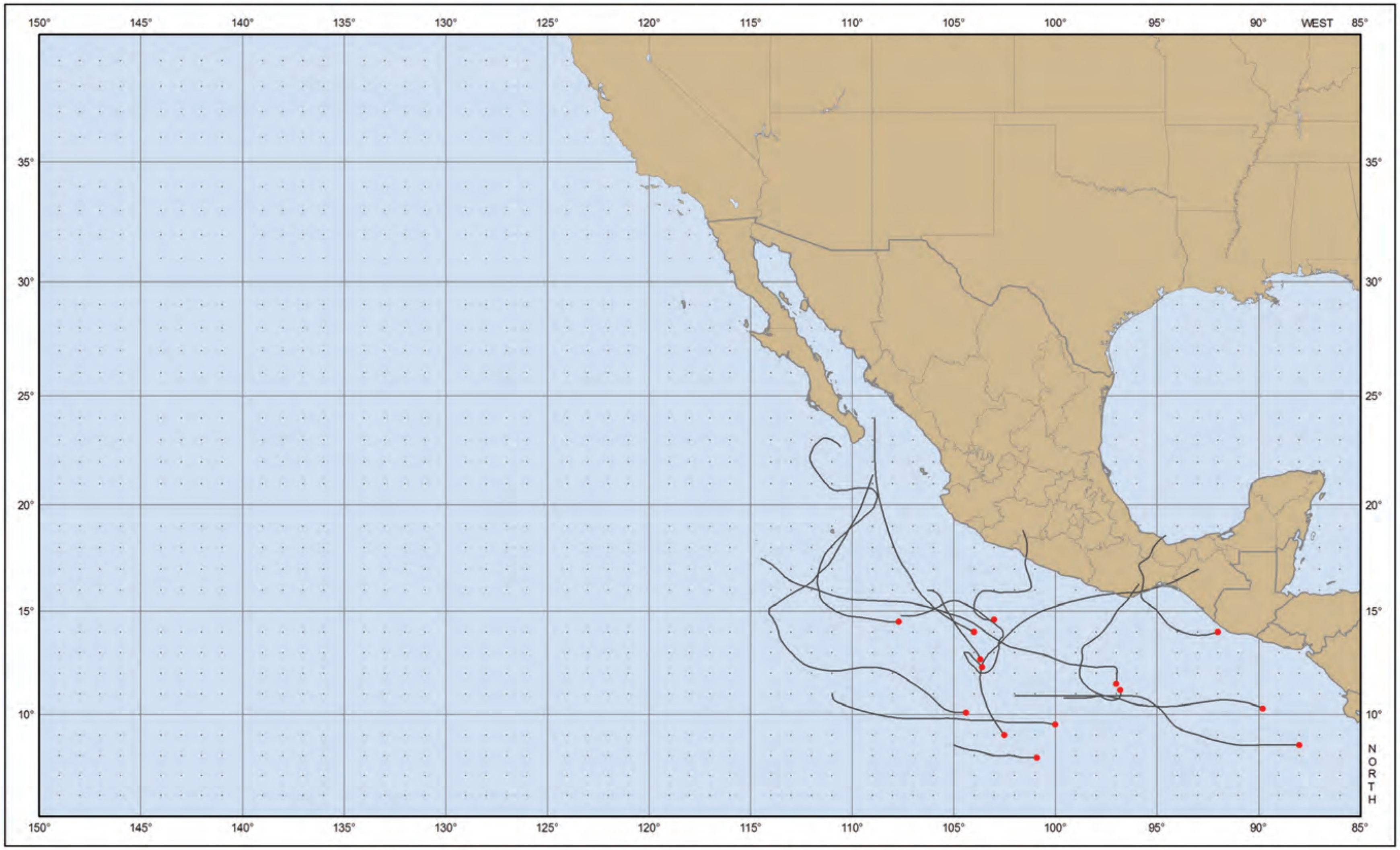


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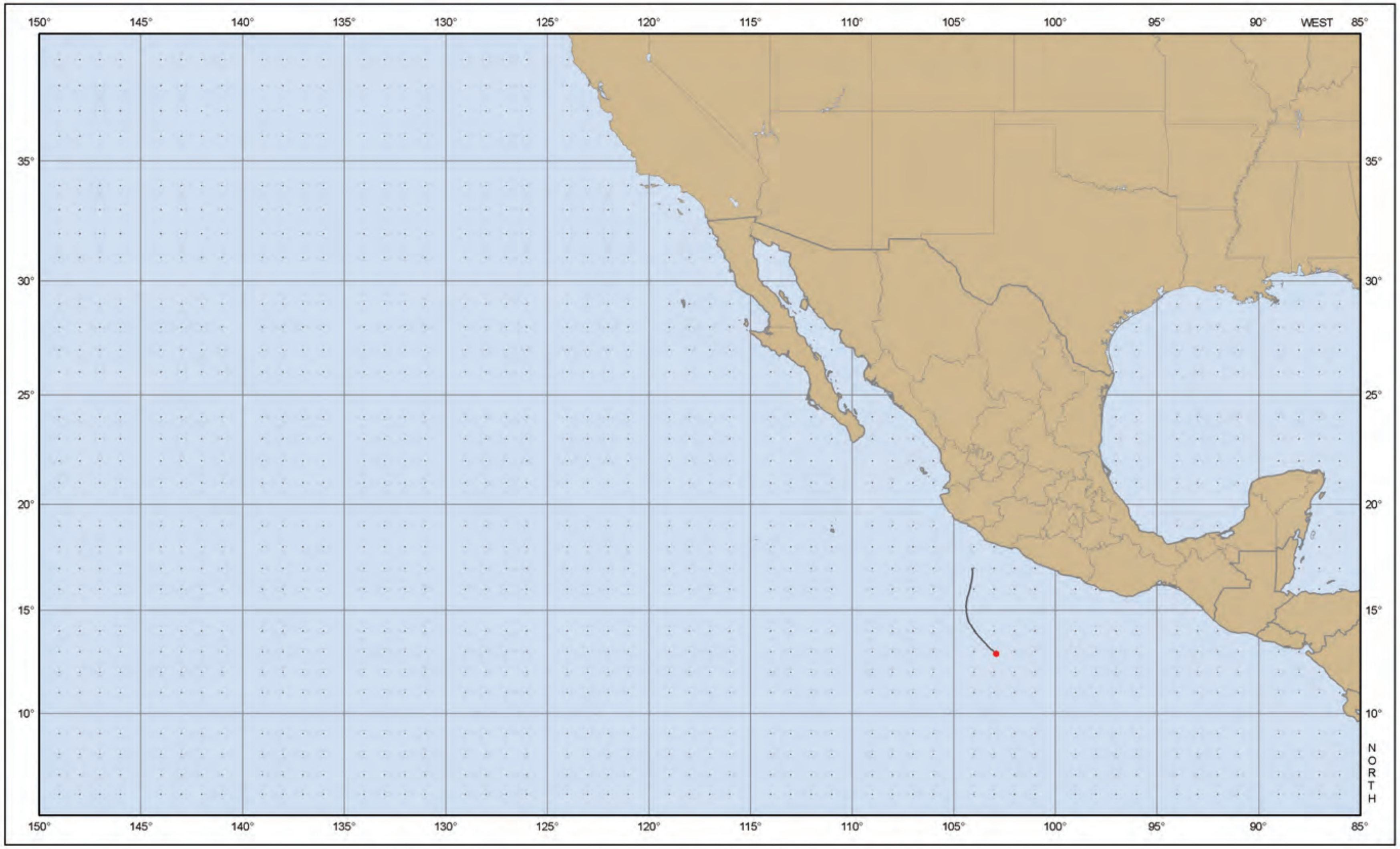

Tropical Cyclones Beginning in December, 1949-2006 (1 Storm)