



DAYLIGHT SAVING TIME

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Daylight Saving Time (DST) will begin at 2 a.m. local time, Sunday, March 13, 2015. Clocks and timepieces will be turned forward by one hour from 2 a.m. to 3 a.m. It is now nine years since the United States set the new North American standard for DST—to commence three weeks earlier, on the second Sunday of March, and to end a week later on the first Sunday of November.

This paper examines basic questions, history, and recent events related to both Standard Time and Daylight Saving Time. It is a condensed and updated version of an [earlier research paper](#) last revised in March 2013.

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INTRODUCTION

Daylight Saving Time (DST) will begin at 2 a.m. local time, Sunday, March 13, 2016. Clocks and timepieces will be turned forward by one hour from 2 a.m. to 3 a.m.

In 2007 the United States set the new North American standard for DST—to commence three weeks earlier, on the second Sunday of March, and to end one week later on the first Sunday of November as part of its energy saving *Energy Policy Act, 2005*. Provinces and territories that observe DST, like Ontario, saw the advantage of remaining synchronized with the US, and amended their time statutes accordingly.

This paper examines basic questions, history, and recent events related to both Standard Time and DST.

Recent News

A March 2015 CBC [article](#) about abolishing DST included a survey that was responded to by 16,750 people. Almost 60% voted to abolish DST, 28% voted to keep it all year round, and only 11.76% indicated things should be left as they are.

While most of the United States follows daylight saving time, the institution of DST continues to be an issue. For example on February 15, 2016 Missouri legislators [debated a motion](#) in a House Committee to make daylight saving time the standard because “the practice of gaining and losing hours due to time changes is not only unhealthy but bad for business.” [Oklahoma](#) and [South Dakota](#) are considering similar measures. DST bills have also been considered in a number of states in the past few years, including Mississippi, Florida, Oregon, Utah, Texas, and New Mexico, but none have passed.

Hawaii, American Samoa, Guam, Puerto Rico, the Virgin Islands and most of Arizona do not observe DST. Historically, local jurisdictions were allowed to decide when they would locally switch to DST, or not to observe DST at all. The *Uniform Time Act* of 1966 defined the rules for the dates of DST and all regions that practice DST use the same transition days. However, that same bill allows states to legislatively decide whether to practice it or not. Also, the date rules sometimes change, most recently in 1986 and 2007, extending the length of DST. The Department of Transportation oversees and regulates DST.¹

¹ National Institute of Standards and Technology, [Local Time: Frequently Asked Questions](#), December 4, 2015, accessed February 23, 2016.

WHAT IS DAYLIGHT SAVING TIME?

Daylight Saving Time, the practice of advancing the clock one hour (usually for a period of approximately six months, also known as “summer time” in some countries), is a derivation of Standard Time. Since 2007 DST in Canada and the United States has begun at 2 a.m. local time on the second Sunday of March and ended at 2 a.m. on the first Sunday of November. DST seeks to shift the hours of human activity to make better use of the daylight.² It provides a longer period of daylight to enjoy outdoor activities during summer evenings. The decline in the use of artificial light and appliances conserves fuel and energy, thereby generating financial savings. Studies done by the US Department of Transportation in the 1970s indicated that the country’s electrical usage declined by about 1% each day with DST.³

WHAT IS STANDARD TIME?

Sir Sandford Fleming, a Canadian railroad planner, engineer and citizen of Peterborough, Ontario is widely credited with inventing the worldwide system of standard time zones.

Before the establishment of standard time, local time (also known as solar time) was determined by the position of the sun at midday, and varied from one community to another. Prior to 1883, there were 100 or more local time zones in the United States based on solar time.⁴ Before the adoption of standard time, 12 noon in Kingston was twelve minutes later than 12 noon in Montreal and thirteen minutes before 12 noon in Toronto. With the introduction of railways, local time became highly inconvenient and inefficient. Travellers sometimes carried a number of watches, or one with six different faces, each labelled with the name of a different city. Train schedules based on local times created nightmares for railway stationmasters and chaos for a transcontinental railway.⁵

The solution was to adopt a system by which the clocks would read consistently in one large region. Railways began using Greenwich Mean Time (GMT) as the Standard Time for England, Scotland, and Wales in the 1840s, although it would not become the legal standard until 1880.

On November 18, 1883 North American railways adopted a system of one-hour time zones proposed by William F. Allen, secretary of the General Time Convention. Fleming, acting as chair of the standing committee on time for the American Society of Civil Engineers, was a key player in the process of encouraging the US Congress to call the 1884 International Prime Meridian Conference.⁶

² David S. Prerau, *Seize the Daylight: The Curious and Contentious Story of Daylight Saving Time* (New York: Thunder’s Mouth Press, 2005), p. xv.

³ California Energy Commission, Bob Aldrich, [Saving Time, Saving Energy: Daylight Saving Time, Its History and Why We Use It](#) (2005), accessed on March 7, 2011.

⁴ US House of Representatives, “Energy Conservation Potential of Extended and Double Daylight Saving Time,” n.p.

⁵ The CRB Foundation Heritage Project, “Sanford Fleming makes trains run on time.” accessed on October 4, 1999 (link no longer active).

⁶ *Dictionary of Canadian Biography Online*, “Fleming, Sir Sandford.”

Time Zones of Canada

There are six time zones in Canada, identified by their hours from the Greenwich meridian:

Newfoundland Standard Time (NST): 3½ hrs

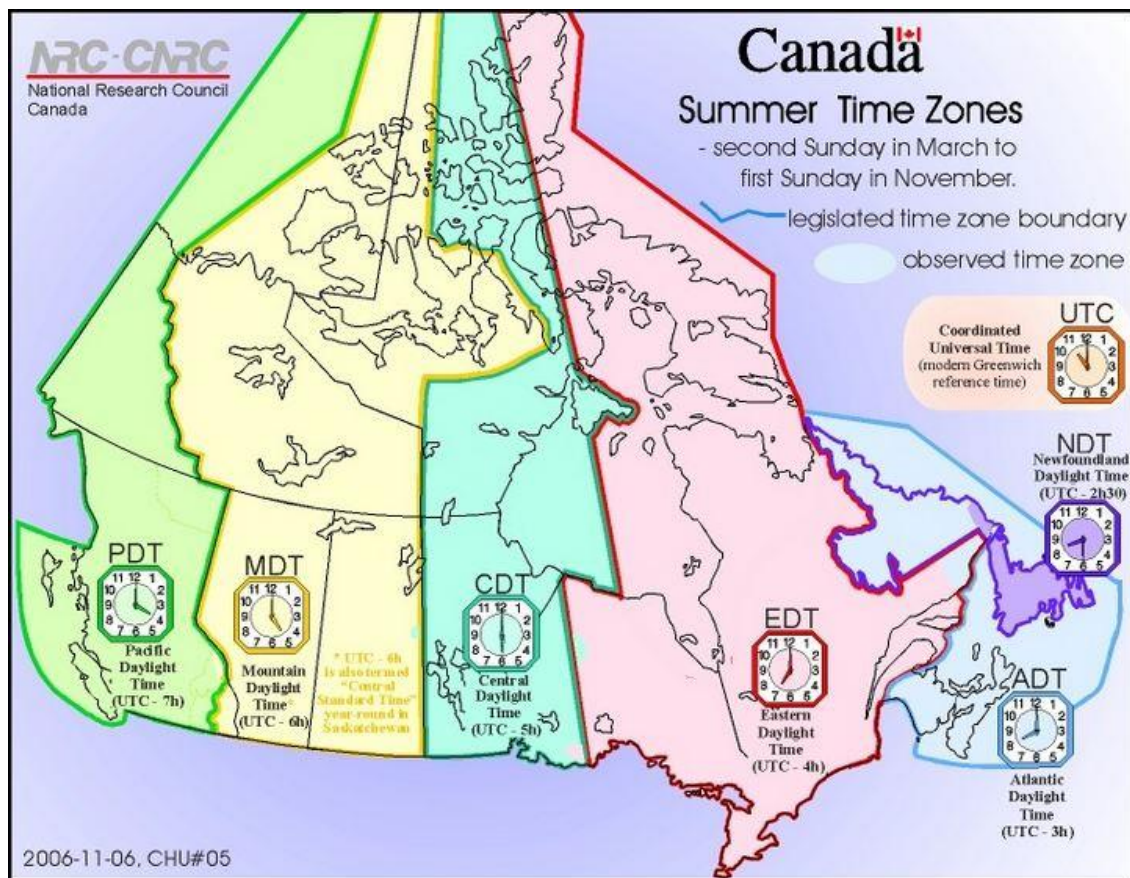
Atlantic Standard Time (AST): 4 hrs

Eastern Standard Time (EST): 5 hrs

Central Standard Time (CST): 6 hrs

Mountain Standard Time (MST): 7 hrs

Pacific Standard Time (PST): 8 hrs



Map reproduced with the kind permission of the Institute for National Measurement Standards, National Research Council of Canada.

BRIEF HISTORY OF DAYLIGHT SAVING TIME

Germany, the first country to adopt DST, did so in 1916. During World War I, clocks in several other countries, including Australia, Great Britain, Holland, Denmark and the United States, were advanced one hour as an energy conservation measure. In the United States, this proved so unpopular that it was repealed after the war.

During World War II the US Congress reinstated DST from February 2, 1942 until September 30, 1945. England used “double summer time,” advancing the clocks two

hours from Standard Time in the summer and one hour in the winter. In Canada, federal legislation established DST during a limited portion of the Second World War.

In Europe DST is commonly referred to as Summer Time and it typically begins on the last Sunday in March. The practise varies in other countries. Many countries, particularly in Asia, do not utilize DST, and those that do begin it on various days in March and early April.

REGULATION OF DST IN CANADA

While the federal government regulated DST as national policy during World War II, and municipal governments had jurisdiction thereafter, provincial and territorial governments now regulate DST through various statutes.

Ontario

Within Canada, all 10 provinces and three territories regulate time through legislation or regulation. As early as 1895 Ontario enacted a brief time statute known as *An Act respecting the Legal Meaning of Expressions relative to Time*. The first section stated that expressions of time in the Province would refer to Standard Time, and provided for two time zones. The parts of the province to the east and west of 87° W longitude (present day Terrace Bay) would be deemed to be five and six hours (respectively) behind Greenwich Time. The 1895 boundary between the Eastern and Central Time Zones fell about 225 km. east of today's boundary of 90° W longitude near Shebandowan, a small hamlet west of Thunder Bay.

No reference to "Daylight Saving Time" was made in any Ontario time statute until the passage in 1986 of a Private Member's Bill by Ross McClellan, such that DST would start on the first Sunday in April and end the last Sunday of October. This provided for nearly seven months of DST in Ontario, an adjustment consistent with action taken by the US Congress earlier that year.⁷

Saskatchewan

Saskatchewan, which remains on Central Standard Time (CST) year round, is the only province that does not observe DST. The question of DST in Saskatchewan has been overshadowed by the more pressing question of whether to accept Mountain Standard Time (MST) or CST as the uniform time in the province.

There are some in the province who argue that, in a sense, Saskatchewan is already observing DST. This is because Saskatchewan observes CST as its official time instead of MST (which is the "true" time associated with the 105° W meridian which runs through the middle of the province). Thus, Saskatchewan observes time that is one hour ahead of the official Greenwich Time for that part of the hemisphere.

⁷ Ministry of Municipal Affairs, *News Release* (March 10, 1987).

JUSTIFICATION FOR DST

The general justification for DST is that increasing the amount of daylight available adds convenience to evening schedules and reduces power usage demands. In 2000 the experience of brownouts and rolling blackouts in the United States prompted legislators from California and several Western states to consider year-round DST or even Double Daylight Saving Time as a means of reducing power consumption.⁸ As an energy conservation measure, the US *Energy Policy Act* declared that, commencing in 2007, DST would start three weeks earlier in the spring and end one week later in the fall. The Act also required the US Department of Energy to evaluate the effect of Extended DST (EDST) upon energy consumption and to report to Congress.⁹ In October 2008 analysts submitted their report to Congress indicating that the total electricity savings of EDST were 1.3 trillion watt-hours or 0.5% per EDST day, or 0.03% of electricity consumption over the year. Total 2007 electricity consumption in the United States was 3,900 trillion watt-hours.¹⁰ Some studies dispute the anticipated energy savings associated with DST.¹¹ A study by the California Energy Commission concluded that EDST in 2007 had a neutral effect on energy use in the state.¹²

Ontario's Response to the US *Energy Policy Act of 2005*

The Ministry of the Attorney General (AG) administers Ontario's *Time Act*.¹³ In 2005, Attorney General Michael Bryant asked his Parliamentary Assistant (PA), David Zimmer to investigate the impact that the extension of DST could have on the different sectors in Ontario. Mr. Zimmer led an inter-Ministry committee over a period of three months with the goal of preparing a report with recommendations for Cabinet. The PA also created a website and held consultations with different levels of government on the question of harmonizing with the United States on DST. According to the Attorney General:

Representatives from finance and capital markets, trade, manufacturing and industry unanimously urged us to harmonize daylight saving with the US. In fact, they told us that any misalignment could have a real and negative impact, namely: trade disruption as well as cost coordination, delivery system supply chain and border pressures.¹⁴

⁸ US House of Representatives, Committee on Science, Subcommittee on Energy, Hearing Charter for Hearing on "Energy Conservation Potential of Extended and Double Daylight Saving Time," (May 24, 2001).

⁹ The *Energy Policy Act* (2005), Section 110.

¹⁰ US Department of Energy, Energy Efficiency and Renewable Energy, [Impact of Extended Daylight Saving time on National Energy Consumption: Report to Congress](#) (Energy Policy Act of 2005, Section 110) October 2008, p. I, accessed on March 7, 2011.

¹¹ An examination of electricity usage and billing in Indiana since the state adopted DST in 2006 found that the time change led to a 1% overall *rise* in residential electricity use. This cost the state an extra \$9 million, according to the researchers. Charles Q. Choi, "Spring Forward or Not?" *Scientific American*, March 2009, p. 18.

¹² Ibid.

¹³ See the [Time Act](#), accessed March 8, 2011.

¹⁴ Legislative Assembly, *Hansard*, 2nd Sess., 38th Parl. ([October 20, 2005](#)), accessed on March 8, 2011.

On October 20 the Attorney General announced that Ontario would synchronize its DST schedule with the United States. PA Zimmer told the *National Post* that “a good, solid 75% [of Ontarians consulted] were in favour of extending DST.”¹⁵ Ontario Regulation 111/06 under the *Time Act*¹⁶ established DST conventions as they currently exist in Ontario. In 2010 the regulation was revoked and the *Time Act* was amended to set the start and finish dates for DST.

Ontario’s Time Zone Anomalies

The Northwestern Ontario communities of Atikokan, Pickle Lake, and Mishkeegogamang (formerly New Osnaburgh) are located west of the 90th meridian and therefore fall within the Central Time Zone. Like Saskatchewan, they do not observe DST and have no plans to change the status quo. As a further anomaly, Pickle Lake, which is situated quite near to the 90th meridian, has chosen to observe Eastern Time as local time, even though it is physically located within the Central Time Zone. There are a number of these time zone anomalies located throughout Canada.

OPPOSITION TO OBSERVING DST YEAR-ROUND

While some have advocated for year-round DST, critics of this suggestion have presented reasons for avoiding it during the late sunrise months of November through February. At the end of a two-year trial in the United States in 1974-75, data compiled showed a statistically significant increase in fatal traffic accidents between 5:30 and 9:30 a.m. during the late sunrise months of January and February 1974, compared with 1973. While the increase in accidents could not be definitively attributed to the time change, neither could DST be ruled out as a factor in these accidents.¹⁷ The morning darkness was and remains a concern for parents whose children wait for school buses or walk to school in the morning during November through February. Daylight Saving Time is most acceptable to the public when sunrises are not too late and sunsets are not too early.¹⁸ Some experts believe that the best period for DST in terms of light symmetry, is the six-month period starting on the first Sunday in April and ending on the last Sunday in September.¹⁹

GENERAL OPPOSITION TO DAYLIGHT SAVING TIME

Some people resent the twice a year inconvenience of resetting their clocks and the time on their various appliances.²⁰ Others dislike adjusting their sleeping patterns and some with sleep problems find the change disruptive and disorienting. They complain that adjusting to DST or back to Standard Time is “like getting jet lag without even leaving home.”²¹

¹⁵ Lee Greenberg, “Ontario to extend daylight savings,” *National Post*, (October 21, 2005), p. A4.

¹⁶ See [O. Reg. 111/06](#), accessed March 8, 2011.

¹⁷ Ian R. Barkky and Elizabeth Harrison, “Standard and Daylight-saving Time,” *Scientific American* (May 1979), p. 50.

¹⁸ Barkky and Harrison, “Standard and Daylight-saving Time,” p. 50.

¹⁹ *Ibid.*, p. 53.

²⁰ Sheila Danzig, [End Daylight Saving time](#), 1997, accessed on May 13, 2003.

²¹ Wood, “Changing clocks a sore subject.”

Stanley Coren, who authored the book *Sleep Thieves*, published data claiming that the spring shift to DST increases driver fatigue resulting in an increase in automobile collisions.²² Other experts dispute these claims.²³ However, a Hamilton sleep disorder specialist has observed that the loss of as little as one hour of sleep (as happens during the shift to DST) can have a significant impact on individuals already suffering from sleep deprivation.²⁴ A Swedish study noted that since 1987, the number of heart attacks rises about 5% during the first week of DST due to disruption of sleep patterns and biological rhythms.²⁵

Researchers at Stanford and Johns Hopkins universities reported in the journal *Sleep Medicine* that there may be a link between the spring change to DST and an increase in fatal auto accidents on the Monday following the spring change to DST. Reviewing records on fatalities kept by the US National Highway Transportation Safety Administration from 1974 to 1995, the data showed that an average of 78.2 fatalities had occurred during the weeks prior to the shift while an average of 83.5 fatalities occurred immediately following.²⁶ Several economists from British Columbia have even suggested that disrupted sleep routines lead to unusual declines on the stock market on the Monday following the start/end of DST.²⁷

²² Stanley Coren, [Sleep Deficit, Fatal Accidents and the Spring Shift to Daylight Savings Time](#) (1998) Presented at INABIS '98, 5th Internet World Congress at McMaster University, Canada, December 7-16, 1998, accessed on May 13, 2003.

²³ Nicolas van Rijn, "Accident unrelated to time change: study – Statistics show losing sleep has little or no effect," *Toronto Star*, October 17, 1998, p. A4.

²⁴ Suzanne Morrison, "All work and no sleep plays havoc with lives; Studies say lack of sleep causes premature aging, weakens immune system and leads to accidents," *The Hamilton Spectator*, March 31, 2001, p. A1.

²⁵ Charles Choi, "Spring Forward or Not? *Scientific American*, March 2009, p.18.

²⁶ Ibid.

²⁷ Derek DeCloet, "Thank God it's Monday: Don't Call your Broker Yet (Stock Market Decline Follows Switch to Daylight Savings Time)," *Canadian Business*, April 3, 2000, pp. 19-20.